Final Environmental Impact Statement for Eagle Take Permits for the Chokecherry and Sierra Madre Phase I Wind Energy Project

Volume 2 — Attachment A, Part 1

U.S. Fish and Wildlife Service
Mountain-Prairie Region

November 2016

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Attachment A

Eagle Take Permit Applications and Eagle Conservation Plan

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Power Company
of Wyoming LLC
555 Seventeenth Street
Suite 2400
Denver, CO 80202
Tel 303.298.1000
Fax 303.299.1356

VIA U.S. Postal Service Certified Mail

June 12, 2015

Migratory Bird Permit Office
P.O. Box 25486 DFC(60130)
Denver, CO 80225-0486

Clint Riley, Assistant Regional Director, Migratory Birds and State Programs
Mountain-Prairie Region
U.S. Fish and Wildlife Service
134 Union Blvd.
Lakewood, CO 80228

Tyler Abbott, Deputy Field Supervisor
Ecological Services Wyoming Field Office
U.S. Fish and Wildlife Service
5353 Yellowstone Road, Suite 308A
Cheyenne, WY 82009

Re: Application for Eagle Take – Associated with but not the purpose of an activity, Chokecherry and Sierra Madre Wind Energy Project, Phase I Construction Disturbance Take

Dear Messrs. Riley and Abbott:

Reflecting more than five years of collaboration and cooperation with the U.S. Fish and Wildlife Service (USFWS), Power Company of Wyoming LLC (PCW) is pleased to submit the enclosed June 2015 Phase I Eagle Conservation Plan (Phase I ECP) for Phase I of the Chokecherry and Sierra Madre Wind Energy Project (Phase I), along with its formal application for a standard eagle take permit addressing potential disturbance take that may occur during construction of Phase I. A check for the required $500 application fee is also enclosed. The Phase I ECP refines and replaces both the project-wide Eagle Conservation Plan that PCW submitted to the USFWS on August 14, 2011, and the draft Phase I ECP chapters that PCW subsequently provided in support of USFWS's work to prepare an Environmental Impact Statement, a process that began on December 4, 2013, with publication of the Notice of Intent.

The Phase I ECP supports PCW's request for a Bald and Golden Eagle Protection Act standard eagle permit covering disturbance take during construction of Phase I, which consists of 500 wind turbines and associated infrastructure including the Road Rock Quarry, West Sinclair Rail Facility and Phase I Haul Road and Facilities. Disturbance take during Phase I construction may result from quarry operations, construction and operation of the water extraction facility on the North Platte River, or other construction operations that generate traffic and/or noise.

The Phase I ECP outlines the comprehensive scientific data that was gathered and used to inform PCW's project design, and how this work, coupled with the extensive conservation and mitigation measures, assures that construction of Phase I is consistent with the USFWS's goal of maintaining stable or increasing breeding populations of eagles. PCW's Phase I ECP is built on a foundation of over seven years of rigorous study and analysis specific to the CCSM Project, including Phase I. Thousands of hours of surveys were completed consistent with the USFWS's recommendations and protocols to ensure a science-based, site-specific approach to the Phase I design. Further, the application of numerous avoidance and minimization measures, conservation measures, and best management practices ensure that construction of Phase I meets the legal criteria for issuance of a standard eagle take permit, i.e., whether the applicant has proposed avoidance and minimization measures to reduce the take to the maximum degree practicable.

We appreciate the time and effort that U.S. Fish and Wildlife Service officials devoted to providing recommendations to PCW. PCW looks forward to continuing this cooperation as we work toward responsibly developing Phase I to ensure that clean, renewable energy supplies are available to power our nation while also conserving the wildlife we all value.

Sincerely,

Garry L. Miller
Vice President, Land and Environmental Affairs

Encl. as referenced

Department of the Interior
U.S. Fish and Wildlife Service

OMB Control No. 1018 - 0022
Expires 5/31/2017

Federal Fish and Wildlife Permit Application Form

Click here for addresses.

Return to: U.S. Fish and Wildlife Service (USFWS)

Migratory Bird Permit Office
P.O. Box 25486 DFC(60130)
Denver, CO 80225-0486

Type of Activity: **Eagle Take – Associated With But Not the Purpose of an Activity**

☑ **New Application**
☐ **Requesting Renewal or Amendment of Permit #** ________________

Complete Sections A or B, and C, D, and E of this application. U.S. address may be required in Section C, see instructions for details.
See attached instruction pages for information on how to make your application complete and help avoid unnecessary delays.

A. Complete if applying as an individual			
1.a. Last name	1.b. First name	1.c. Middle name or initial	1.d. Suffix
2. Date of birth (mm/dd/yyyy)	3. Social Security No.	4. Occupation	5. Affiliation/ Doing business as (see instructions)
6.a. Telephone number	6.b. Alternate telephone number	6.c. Fax number	6.d. E-mail address

B. Complete if applying on behalf of a business, corporation, public agency, Tribe, or institution			
1.a. Name of business, agency, tribe, or institution: Power Company of Wyoming LLC	1.b. Doing business as (dba): N/A		
2. Tax identification no.: 26-1443919	3. Description of business, agency, or institution: Wind Energy Company		
4.a. Principal officer Last name: Miller	4.b. Principal officer First name: Garry	4.c. Principal officer Middle name/ initial: L.	4.d. Suffix
5. Principal officer title: Vice President, Land and Environmental Affairs	6. Primary contact name: Garry L. Miller		
7.a. Business telephone number: 303-299-1546	7.b. Alternate telephone number	7.c. Business fax number: 303-299-1356	7.d. Business e-mail address: garry.miller@tac-denver.com

C. All applicants complete address information				
1.a. Physical address (Street address; Apartment #, Suite #, or Room #; no P.O. Boxes): 555 Seventeenth Street, Suite 2400				
1.b. City: Denver	1.c. State: CO	1.d. Zip code/Postal code: 80202	1.e. County/Province: Denver	1.f. Country: USA
2.a. Mailing Address (include if different than physical address; include name of contact person if applicable): Same				
2.b. City	2.c. State	2.d. Zip code/Postal code:	2.e. County/Province	2.f. Country

D. All applicants MUST complete

1. Attach check or money order payable to the U.S. FISH AND WILDLIFE SERVICE **in the amount of (see attached fee schedule)** nonrefundable processing fee. Federal, Tribal, State, and local government agencies, and those acting on behalf of such agencies, are exempt from the processing fee – ***attach documentation of fee exempt status as outlined in instructions.*** (50 CFR 13.11(d))
2. Do you currently have or have you ever had any Federal Fish and Wildlife permits?
Yes ☐ If yes, list the number of the most current permit you have held or that you are applying to renew/re-issue: ________________ No ☑
3. Certification: I hereby certify that I have read and am familiar with the regulations contained in ***Title 50, Part 13 of the Code of Federal Regulations*** and the other ***applicable parts in subchapter B of Chapter I of Title 50***, and I certify that the information submitted in this application for a permit is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to the criminal penalties of 18 U.S.C. 1001.

[signature] 06/12/2015

Signature (**in blue ink**) of applicant/person responsible for permit (No photocopied or stamped signatures) Date of signature (mm/dd/yyyy)

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SECTION E. EAGLE TAKE – ASSOCIATED WITH BUT NOT THE PURPOSE OF AN ACTIVITY (EAGLE NON-PURPOSEFUL TAKE)

(Bald and Golden Eagle Protection Act, 50 CFR 22.26)

Note: ***A Federal eagle non-purposeful take permit authorizes the disturbance or other take of eagles where the take results from but is not the purpose of an otherwise lawful activity. Permits are available to individuals, agencies, businesses, and other organizations. This permit does not authorize possession of any eagle, eagle parts, or eagle nests. Please read "What You Should Know About a Federal Permit for Non-Purposeful Eagle Take" and the pertinent regulations at 50 CFR 22.26 before you sign and submit your application.***

Please provide the information requested below on a separate sheet of paper. You should be as thorough and specific as possible in your responses. Incomplete applications will be returned, delayed or abandoned. Processing time depends on the complexity of the request and completeness of the application.

Although you may submit supplemental documents that contain the required information, you must respond to each application requirement below specifically in a single attachment that includes all and only the information required by the application. Enumerate each response in accordance with the question numbers below. Please do not send pages that are over 8.5" x 11" or DVDs.

1. The name and contact information for any U.S. Fish and Wildlife Service employee(s) who has provided technical assistance or worked with you on this project.
2. The species and number of eagles that are likely to be taken and the likely form of that take (e.g., disturbance, other take).
3. The dates the activity will start and is projected to end. If the project has begun, describe the stage of progress.
4. A detailed description of the activity that will likely cause the disturbance or other take of eagles.
5. An explanation of why the take of eagles is necessary, including what interests will be protected by the project or activity.
6. Maps, digital photographs, county/city information, and latitude/longitude geographic coordinates of the proposed activity.
7. Maps, digital photographs, county/city information, and latitude/longitude geographic coordinates of eagle-use areas in the vicinity of the activity, including nest site(s), roost areas, foraging areas, and known migration paths. Provide the specific distance and locations of nests and other eagle-use areas from the project footprint.
8. If the projected take of eagles is in the form of disturbance, answer the following two questions:
   a. Will the activity be visible to eagles in the eagle-use areas, or are there visual buffers such as screening vegetation or topography that blocks the view?
   b. What is the extent of existing activities in the vicinity that are similar in nature, size, and use to your activity, and if so, what is the distance between those activities and the important eagle use areas
9. A detailed description of all avoidance and minimization measures that you have incorporated into your planning for the activity that you will implement to reduce the likelihood of take of eagles.
10. You must retain records relating to the activities conducted under your permit for at least 5 years from the date of expiration of the permit. Please provide the address where these records will be kept.
11. Any permit issued as a result of this application is not valid unless you also have any required State or Tribal permits associated with the activity. Have you obtained all required State or Tribal permits or approvals to conduct this activity? Indicate "Yes," Have applied," or None Required." If "Yes," attach a copy of the approval(s). If "Have applied," submit a copy when issued.
12. If you have received technical assistance for your project from your State wildlife agency, please provide the name and contact information for the individual(s).
13. **Disqualification factor**. A conviction, or entry of a plea of guilty or nolo contendere, for a felony violation of the Lacey Act, the Migratory Bird Treaty Act, or the Bald and Golden Eagle Protection Act disqualifies any such person from receiving or exercising the privileges of a permit, unless such disqualification has been expressly waived by the Service Director in response to a written petition. (50 CFR 13.21(c)) Have you or any of the owners of the business, if applying as a business, been convicted, or entered a plea of guilty or nolo contendere, forfeited collateral, or are currently under charges for any violations of the laws mentioned above? Indicate "Yes" or "No." If you answered "Yes" provide: a) the individual's name, b) date of charge, c) charge(s), d) location of incident, e) court, and f) action taken for each violation.

Fee Schedule for Eagle Take – Associated with but not the purpose of an Activity

Type of Permit	Permit Application Fee	Administration Fee[1]	Amendment Fee
Eagle Take—Associated With But Not the Purpose of an Activity	$500		$150
Eagle Take—Associated With But Not the Purpose of an Activity—Programmatic, low-risk projects, 5- to 30-year tenure[1]	$8,000	$500	$1,000
Eagle Take—Associated With But Not the Purpose of an Activity—Programmatic, up to 5-year tenure	$36,000	$2,600	$1,000
Eagle Take—Associated With But Not the Purpose of an Activity—Programmatic, over 5-year to 10-year tenure	$36,000	$5,200[2]	$1,000
Eagle Take—Associated With But Not the Purpose of an Activity—Programmatic, over 10-year to 15-year tenure	$36,000	$7,800[2]	$1,000
Eagle Take—Associated With But Not the Purpose of an Activity—Programmatic, over 15-year to 20-year tenure	$36,000	$10,400[2]	$1,000
Eagle Take—Associated With But Not the Purpose of an Activity—Programmatic, over 20-year to 25-year tenure	$36,000	$13,000[2]	$1,000
Eagle Take—Associated With But Not the Purpose of an Activity—Programmatic, over 25-year to 30-year tenure	$36,000	$15,600[2]	$1,000
Eagle Take—Associated With But Not the Purpose of an Activity—Transfer of a programmatic permit	$1,000		

[1] "Low-risk" means a project or activity is unlikely to take an eagle over a 30-year period and the applicant for a permit for the project or activity has provided the Service with sufficient data obtained through Service-approved models and/or predictive tools to verify that the take is likely to be less than 0.03 eagles per year.
[2] $2,600 assessed upon approval of permit, and for each 5-year review.

PERMIT APPLICATION FORM INSTRUCTIONS

The following instructions pertain to an application for a U.S. Fish and Wildlife Service or CITES permit. The General Permit Procedures in 50 CFR 13 address the permitting process. For simplicity, all licenses, permits, registrations, and certificates are referred to as a permit.

GENERAL INSTRUCTIONS:

- Complete all blocks/lines/questions in Sections A or B, and C, D, and E.
- **An incomplete application may cause delays in processing or may be returned to the applicant. Be sure you are filling in the appropriate application form for the proposed activity.**
- Print clearly or type in the information. Illegible applications may cause delays.
- Sign the application in blue ink. Faxes or copies of the original signature will not be accepted.
- Mail the original application to the address at the top of page one of the application or if applicable on the attached address list.
- **Keep a copy of your completed application.**
- **Please plan ahead. Allow at least 60 days for your application to be processed. Some applications may take longer than 90 days to process. (50 CFR 13.11)**
- Applications are processed in the order they are received.
- Additional forms and instructions are available from http://permits.fws.gov/.

COMPLETE EITHER SECTION A OR SECTION B:

Section A. **Complete if applying as an individual:**

- Enter the complete name of the responsible individual who will be the permittee if a permit is issued. Enter personal information that identifies the applicant. ***Fax and e-mail are not required if not available.***
- If you are applying on behalf of a client, the personal information must pertain to the client, and a document evidencing power of attorney must be included with the application.
- **Affiliation/ Doing business as (dba)**: business, agency, organizational, or institutional affiliation *directly* related to the activity requested in the application (e.g., a taxidermist is an individual whose business can *directly* relate to the requested activity). The Division of Management Authority (DMA) will **not** accept *doing business as* affiliations for individuals.

Section B. **Complete if applying as a business, corporation, public agency, Tribe, or institution:**

- Enter the complete name of the business, agency, Tribe, or institution that will be the permittee if a permit is issued. Give a brief description of the type of business the applicant is engaged in. Provide contact phone number(s) of the business.
- **Principal Officer** is the person in charge of the listed business, corporation, public agency, Tribe, or institution. The principal officer is the person responsible for the application and any permitted activities. Often the principal officer is a Director or President. **Primary Contact** is the person at the business, corporation, public agency, Tribe, or institution who will be available to answer questions about the application or permitted activities. Often this is the preparer of the application.

ALL APPLICANTS COMPLETE SECTION C:

- For all applications submitted to the Division of Management Authority (DMA) a physical U.S. address is **required**. Province and Country blocks are provided for those USFWS programs which use foreign addresses and are not required by DMA.
- **Mailing address** is address where communications from USFWS should be mailed if different than applicant's physical address.

ALL APPLICANTS COMPLETE SECTION D:

Section D.1 **Application processing fee:**

- An application processing fee is required at the time of application; unless exempted under 50 CFR13.11(d)(3). The application processing fee is assessed to partially cover the cost of processing a request. **The fee does not guarantee the issuance of a permit. Fees will not be refunded for applications that are approved, abandoned, or denied**. We may return fees for withdrawn applications prior to any significant processing occurring.
- **Documentation of fee exempt status is not required for Federal, Tribal, State, or local government agencies; but must be supplied by those applicants acting on behalf of such agencies**. Those applicants acting on behalf of such agencies must submit a letter on agency letterhead and signed by the head of the unit of government for which the applicant is acting on behalf, confirming that the applicant will be carrying out the permitted activity for the agency.

Section D.2 **Federal Fish and Wildlife permits:**

- List the number(s) of your most current FWS or CITES permit or the number of the most recent permit if none are currently valid. If applying for re-issuance of a CITES permit, the original permit must be returned with this application.

Section D.3 **CERTIFICATION:**

- **The individual identified in Section A, the principal officer named in Section B, or person with a valid power of attorney (documentation must be included in the application) must sign and date the application in blue ink.** This signature binds the applicant to the statement of certification. This means that you certify that you have read and understand the regulations that apply to the permit. You also certify that everything included in the application is true to the best of your knowledge. Be sure to read the statement and re-read the application and your answers before signing.

ALL APPLICANTS COMPLETE SECTION E.

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APPLICATION FOR A FEDERAL FISH AND WILDLIFE PERMIT
Paperwork Reduction Act, Privacy Act, and Freedom of Information Act – Notices

In accordance with the Paperwork Reduction Act of 1995 (44 U.S.C. 3501, *et seq.*) and the Privacy Act of 1974 (5 U.S.C. 552a), please be advised:

1. The gathering of information on fish and wildlife is authorized by:
   (Authorizing statutes can be found at: http://www.gpoaccess.gov/cfr/index.html and http://www.fws.gov/permits/ltr/ltr.html.)

   a. Bald and Golden Eagle Protection Act (16 U.S.C. 668), 50 CFR 22;
   b. Endangered Species Act of 1973 (16 U.S.C. 1531-1544), 50CFR 17;
   c. Migratory Bird Treaty Act (16 U.S.C. 703-712), 50 CFR 21;
   d. Marine Mammal Protection Act of 1972 (16 U.S.C. 1361, *et. seq.*), 50 CFR 18;
   e. Wild Bird Conservation Act (16 U.S.C. 4901-4916), 50 CFR 15;
   f. Lacey Act: Injurious Wildlife (18 U.S.C. 42), 50 CFR 16;
   g. Convention on International Trade in Endangered Species of Wild Fauna and Flora (TIAS 8249), http://www.cites.org/ , 50 CFR 23;
   h. General Provisions, 50 CFR 10;
   i. General Permit Procedures, 50 CFR 13; and
   j. Wildlife Provisions (Import/export/transport), 50 CFR 14.

2. Information requested in this form is purely voluntary. However, submission of requested information is required in order to process applications for permits authorized under the above laws. Failure to provide all requested information may be sufficient cause for the U.S. Fish and Wildlife Service to deny the request. We may not conduct or sponsor and you are not required to respond to a collection of information unless it displays a currently valid OMB control number.

3. Certain applications for permits authorized under the Endangered Species Act of 1973 (16 U.S.C. 1539) and the Marine Mammal Protection Act of 1972 (16 U.S.C. 1374) will be published in the **Federal Register** as required by the two laws.

4. Disclosures outside the Department of the Interior may be made without the consent of an individual under the routine uses listed below, if the disclosure is compatible with the purposes for which the record was collected. (Ref. 68 FR 52611, September 4, 2003)

   a. Routine disclosure to subject matter experts, and Federal, Tribal, State, local, and foreign agencies, for the purpose of obtaining advice relevant to making a decision on an application for a permit or when necessary to accomplish an FWS function related to this system of records.
   b. Routine disclosure to the public as a result of publishing **Federal Register** notices announcing the receipt of permit applications for public comment or notice of the decision on a permit application.
   c. Routine disclosure to Federal, Tribal, State, local, or foreign wildlife and plant agencies for the exchange of information on permits granted or denied to assure compliance with all applicable permitting requirements.
   d. Routine disclosure to Captive-bred Wildlife registrants under the Endangered Species Act for the exchange of authorized species, and to share information on the captive breeding of these species.
   e. Routine disclosure to Federal, Tribal, State, and local authorities who need to know who is permitted to receive and rehabilitate sick, orphaned, and injured birds under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act; federally permitted rehabilitators; individuals seeking a permitted rehabilitator with whom to place a bird in need of care; and licensed veterinarians who receive, treat, or diagnose sick, orphaned, and injured birds.
   f. Routine disclosure to the Department of Justice, or a court, adjudicative, or other administrative body or to a party in litigation before a court or adjudicative or administrative body, under certain circumstances.
   g. Routine disclosure to the appropriate Federal, Tribal, State, local, or foreign governmental agency responsible for investigating, prosecuting, enforcing, or implementing statutes, rules, or licenses, when we become aware of a violation or potential violation of such statutes, rules, or licenses, or when we need to monitor activities associated with a permit or regulated use.
   h. Routine disclosure to a congressional office in response to an inquiry to the office by the individual to whom the record pertains.
   i. Routine disclosure to the Government Accountability Office or Congress when the information is required for the evaluation of the permit programs.
   j. Routine disclosure to provide addresses obtained from the Internal Revenue Service to debt collection agencies for purposes of locating a debtor to collect or compromise a Federal claim against the debtor or to consumer reporting agencies to prepare a commercial credit report for use by the FWS.

5. For individuals, personal information such as home address and telephone number, financial data, and personal identifiers (social security number, birth date, etc.) will be removed prior to any release of the application.

6. The public reporting burden on the applicant for information collection varies depending on the activity for which a permit is requested. The relevant burden for an Eagle Non-Purposeful Take (standard) permit application is 16 hours, and 6 hours for a standard amendment. For an Eagle Non-Purposeful Take (programmatic) permit application, the relevant burden is 452 hours and70 hours for an amendment. This burden estimate includes time for reviewing instructions, gathering and maintaining data and completing and reviewing the form. You may direct comments regarding the burden estimate or any other aspect of the form to the Service Information Clearance Officer, U.S. Fish and Wildlife Service, Mail Stop 222, Arlington Square, U.S. Department of the Interior, 1849 C Street, NW, Washington D.C. 20240.

Freedom of Information Act – Notice

For organizations, businesses, or individuals operating as a business (i.e., permittees not covered by the Privacy Act), we request that you identify any information that should be considered privileged and confidential business information to allow the Service to meet its responsibilities under FOIA. Confidential business information must be clearly marked "Business Confidential" at the top of the letter or page and each succeeding page and must be accompanied by a non-confidential summary of the confidential information. The non-confidential summary and remaining documents may be made available to the public under FOIA [43 CFR 2.26 – 2.33].

U.S. Fish & Wildlife Service

Migratory Bird Regional Permit Offices

FWS REGION	AREA OF RESPONSIBILITY	MAILING ADDRESS	CONTACT INFORMATION
Region 1	**Hawaii, Idaho, Oregon, Washington**	911 N.E. 11th Avenue Portland, OR 97232-4181	Tel. (503) 872-2715 Fax (503) 231-2019 Email *permitsR1MB@fws.gov*
Region 2	**Arizona, New Mexico, Oklahoma, Texas**	P.O. Box 709 Albuquerque, NM 87103	Tel. (505) 248-7882 Fax (505) 248-7885 Email *permitsR2MB@fws.gov*
Region 3	**Iowa, Illinois, Indiana, Minnesota, Missouri, Michigan, Ohio, Wisconsin**	5600 American Blvd. West Suite 990 Bloomington, MN 55437-1458 (Effective 5/31/2011)	Tel. (612) 713-5436 Fax (612) 713-5393 Email *permitsR3MB@fws.gov*
Region 4	**Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virgin Islands, Puerto Rico**	P.O. Box 49208 Atlanta, GA 30359	Tel. (404) 679-7070 Fax (404) 679-4180 Email *permitsR4MB@fws.gov*
Region 5	**Connecticut, District of Columbia, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Virginia, Vermont, West Virginia**	P.O. Box 779 Hadley, MA 01035-0779	Tel. (413) 253-8643 Fax (413) 253-8424 Email *permitsR5MB@fws.gov*
Region 6	**Colorado, Kansas, Montana, North Dakota, Nebraska, South Dakota, Utah, Wyoming**	P.O. Box 25486 DFC(60154) Denver, CO 80225-0486	Tel. (303) 236-8171 Fax (303) 236-8017 Email *permitsR6MB@fws.gov*
Region 7	**Alaska**	1011 E. Tudor Road (MS-201) Anchorage, AK 99503	Tel. (907) 786-3693 Fax (907) 786-3641 Email *permitsR7MB@fws.gov*
Region 8	**California, Nevada**	2800 Cottage Way Room W-2606 Sacramento, CA 95825	Tel. (916) 978-6183 Fax (916) 414-6486 Email*permitsR8MB@fws.gov*

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SECTION E. EAGLE TAKE – ASSOCIATED WITH BUT NOT THE PURPOSE OF AN ACTIVITY (EAGLE NON-PURPOSEFUL TAKE)
(Bald and Golden Eagle Protection Act, 50 CFR 22.26)

Question 1.	The name and contact information for any U.S. Fish and Wildlife Service employee(s) who has provided technical assistance or worked with you on this project.
Answer 1.	Clint Riley, Casey Stemler, Kevin Kritz, Kelly Hogan, Region 6, Denver, Colorado Tyler Abbott, Nathan Darnall, Wyoming Ecological Services Field Office, Cheyenne, Wyoming Emily Bjerre, Division of Migratory Bird Management, Patuxent Wildlife Research Center, Laurel, Maryland Brian Millsap, Division of Migratory Bird Management, Albuquerque, New Mexico
Question 2.	The species and number of eagles that are likely to be taken and the likely form of that take (e.g., disturbance, other take).
Answer 2.	This application by Power Company of Wyoming LLC (PCW) is for disturbance take that may occur during construction of Phase I of the Chokecherry and Sierra Madre Wind Energy Project (CCSM Project). Disturbance take may occur for bald or golden eagles, the number of which has not been determined. *See Section 7.1.1 of the Chokecherry and Sierra Madre Wind Energy Project Phase I Eagle Conservation Plan (ECP).* PCW has filed a separate application for a programmatic Eagle Take Permit (ETP) for take that may occur during operations of Phase I of the CCSM Project.
Question 3.	The dates the activity will start and is projected to end. If the project has begun, describe the stage of progress.
Answer 3.	Phase I construction is expected to begin in 2016 and be complete by 2020 at which time commercial operations will commence. *See Section 3.1.4 and Table 3.2 of the ECP.*
Question 4.	A detailed description of the activity that will likely cause the disturbance or other take of eagles.
Answer 4.	Phase I of the CCSM Project consists of 500 wind turbines located in the western portions of two Wind Development Areas (WDAs) referred to as “Chokecherry” and “Sierra Madre” and associated infrastructure including the Road Rock Quarry, West Sinclair Rail Facility and Phase I Haul Road and Facilities. Disturbance take during construction may result from quarry operations, construction and operation of a water extraction facility on the North Platte River, and other construction operations creating traffic and noise. *See Chapters 3 and 7 of the ECP for a further description of the activity that may cause disturbance or other take of eagles.*
Question 5.	An explanation of why the take of eagles is necessary, including what interests will be protected by the project or activity.

Answer 5.	The Eagle Act authorizes the Secretary to permit take of eagles “necessary for the protection of …other interests in any particular locality.” This statutory language accommodates a broad spectrum of public and private interests (such as utility infrastructure development and maintenance, road construction, operation of airports, commercial or residential construction, resource recovery, recreational use, etc.) that might “take” eagles as defined under the Eagle Act. PCW’s objectives for the CCSM Project are to help satisfy the projected future market for power from renewable energy sources by extracting the maximum potential wind energy from the site and developing a 3,000 MW wind farm consisting of up to 1,000 wind turbines. PCW has determined that developing the CCSM Project in two phases will achieve its purpose and need for the CCSM Project. Generally, PCW’s objectives for Phase I of the CCSM Project are to permit and build an economically viable project and to extract the maximum potential wind energy from the site by developing the first phase of the CCSM Project. Phase I of the CCSM Project consists of 500 wind turbines with an installed capacity of 1,500 megawatts, which is enough energy to power almost 400,000 households, resulting in a reduction in carbon dioxide (CO_2) emissions of 3.5 to 5.5 million tons per year. PCW is applying for a permit for take of bald and golden eagles that is associated with, but not the purpose of, construction of Phase I of the CCSM Project. Issuance of an ETP will protect the interests of PCW during construction of Phase I. As documented in the Phase I ECP, PCW has identified potential risks to bald and golden eagles and reduced those risks through implementation of conservation measures, experimental Advanced Conservation Practices (ACPs), and avoidance and minimization measures to reduce the take to the maximum degree practicable.
Question 6.	Maps, digital photographs, county/city information, and latitude/longitude geographic coordinates of the proposed activity.
Answer 6.	The proposed activity is located in unincorporated Carbon County, Wyoming (no city location). The following coordinates define a central location for Phase I. Latitude (decimal) 41.683056 N; Longitude -107.2 W Latitude (degrees, minutes, seconds) 41 41’ 0” N; Longitude – 107 12’ 0” W A map showing an overview of the CCSM Project is attached as Exhibit 1. A map showing the Phase I layout is attached as Exhibit 2.
Question 7.	Maps, digital photographs, county/city information, and latitude/longitude geographic coordinates of eagle-use areas in the vicinity of the activity, including nest site(s), roost areas, foraging areas, and known migration paths. Provide the specific distance and locations of nests and other eagle-use areas from the project footprint.
Answer 7.	The Phase I development area is over 74,000 acres. Locations of nests and other eagle use areas in relation to the project footprint are described in the ECP. To assess the potential risk to eagles, PCW conducted numerous surveys beginning in 2008. See Table 5.1 of the ECP. These surveys include: 1. Eagle use surveys designed to characterize eagle use and identify important eagle

	use areas including those related to nesting activity, migration, foraging, and roosting; 2. Eagle nest surveys designed to characterize the local area nesting population; and 3. Prey base surveys to identify significant prey resources and potential foraging areas. In addition, PCW conducted migratory bird surveys and breeding bird surveys, and deployed an avian radar system to further characterize how avian species use the Phase I project site. The results of the extensive site-specific surveys conducted by PCW, along with maps and locational information, are presented in Chapter 5 of the ECP.
Question 8.	If the projected take of eagles is in the form of disturbance, answer the following two questions: a. Will the activity be visible to eagles in the eagle-use areas, or are there visual buffers such as screening vegetation or topography that blocks the view? b. What is the extent of existing activities in the vicinity that are similar in nature, size, and use to your activity, and if so, what is the distance between those activities and the important eagle use areas?
Answer 8.	a. Some activities will be visually screened to eagles in the eagle use areas; however, visual buffers, such as vegetation and topography, within the Phase I project site are limited. *See Section 7.2 of the ECP.* b. There are other existing wind farms in Carbon County, the closest of which (Seven Mile Hill) is located approximately 44 miles from Phase I. The distance between those existing facilities and Phase I important eagle use areas varies.
Question 9.	A detailed description of all avoidance and minimization measures that you have incorporated into your planning for the activity that you will implement to reduce the likelihood of take of eagles.
Answer 9.	PCW has worked cooperatively with USFWS to avoid and minimize impacts to eagles from Phase I. See Appendix H of the ECP. PCW used the best available scientific data, including the extensive data collected for Phase I using protocols approved by the USFWS, to develop the specific avoidance and minimizations measures that were incorporated into the Phase I wind turbine layout. Chapter 6 of the ECP outlines the avoidance and minimization measures that PCW implemented during siting of Phase I consistent with the USFWS Region 6 Guidance, including the following: 1. Considering alternative sites for reducing eagle/raptor/migratory bird risk in the Phase I siting and design process. 2. Removing and/or relocating wind turbines or potential wind turbine sites from the Phase I design using site-specific eagle and avian use data. 3. Modifying, removing, and/or relocating other infrastructure from the Phase I design using site-specific eagle and avian use data. 4. Adjusting the Phase I design using site-specific eagle and avian use data. 5. Incorporating the USFWS Region 6 Recommendations for Avoidance and Minimization of Impacts to Golden Eagles at Wind Energy Facilities as well as complying with project-specific recommendations made by USFWS.

	Additional best management practices and conservation measures are described in Chapter 8 of the ECP. The Phase I wind turbine layout - when combined with the best management practices, conservation measures, experimental ACPs and monitoring and adaptive management described in the Phase I ECP - avoids and minimizes impacts to bald and golden eagles to reduce the take to the maximum degree practicable.
Question 10.	You must retain records relating to the activities conducted under your permit for at least 5 years from the date of expiration of the permit. Please provide the address where these records will be kept.
Answer 10.	Power Company of Wyoming LLC, 555 Seventeenth Street, Suite 2400, Denver, CO 80202
Question 11.	Any permit issued as a result of this application is not valid unless you also have any required State or Tribal permits associated with the activity. Have you obtained all required State or Tribal permits or approvals to conduct this activity? Indicate "Yes," Have applied," or None Required." If "Yes," attach a copy of the approval(s). If "Have applied," submit a copy when issued.
Answer 11.	Pursuant to Wyo. Stat. Ann. §35-12-101 et seq., PCW is required to have a permit from the Wyoming Industrial Siting Council (ISC) to construct and operate the CCSM Project. On May 12, 2014, PCW filed its application with the Department of Environmental Quality, Industrial Siting Division for the required permit. On July 18, 2014, the Division determined that PCW's application was complete pursuant to Wyo. Stat. Ann. § 35-12-109. The ISC held a two-day administrative hearing beginning on August 5, 2014, in Saratoga, Wyoming. At the end of the hearing, the ISC deliberated in public and unanimously voted to grant PCW a permit for the CCSM Project. The ISC issued the permit on September 12, 2014, and it requires PCW to comply with all applicable federal permits. *See Section 1.2.3 of the ECP*. A copy of the ISC's approval is attached as Exhibit 3. No Tribal permits are required.
Question 12.	If you have received technical assistance for your project from your State wildlife agency, please provide the name and contact information for the individual(s).
Answer 12.	Scott Gamo Staff Terrestrial Biologist Habitat Protection Program Wyoming Game and Fish 5400 Bishop Blvd Cheyenne, WY 82006 307-777-4509

Question 13.	**Disqualification factor.** A conviction, or entry of a plea of guilty or nolo contendere, for a felony violation of the Lacey Act, the Migratory Bird Treaty Act, or the Bald and Golden Eagle Protection Act disqualifies any such person from receiving or exercising the privileges of a permit, unless such disqualification has been expressly waived by the Service Director in response to a written petition. (50 CFR 13.21(c)) Have you or any of the owner of the business, if applying as a business, been convicted, or entered a plea of guilty or nolo contendere, forfeited collateral, or are currently under charges for any violations of the laws mentioned above? Indicate "Yes" or "No." If you answered "Yes" provide: a) the individual's name, b) date of charge, c) charge(s), d) location of incident, e) court, f) action take for each violation.
Answer 13.	No.

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EXHIBIT 1

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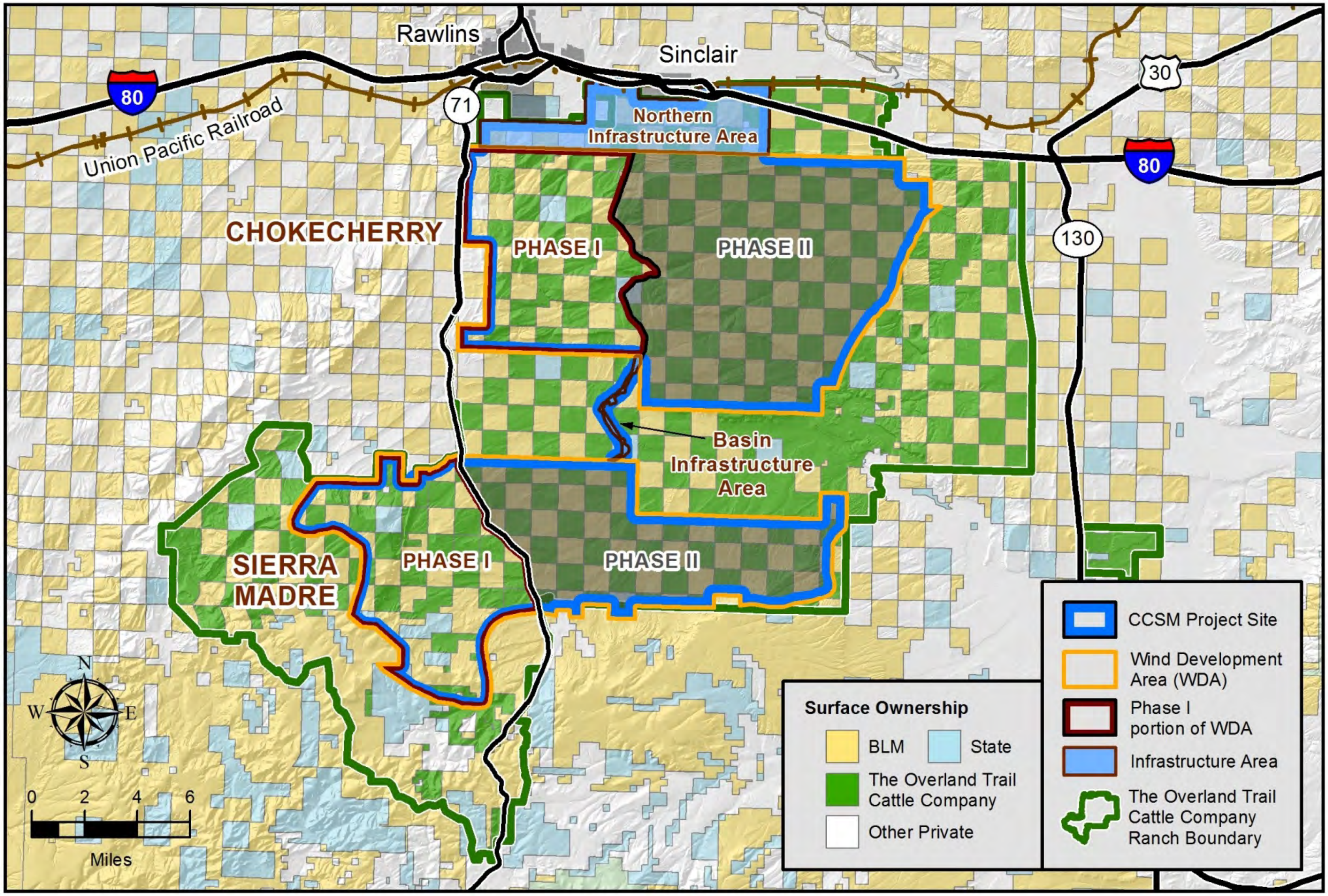

CCSM Project Overview

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EXHIBIT 2

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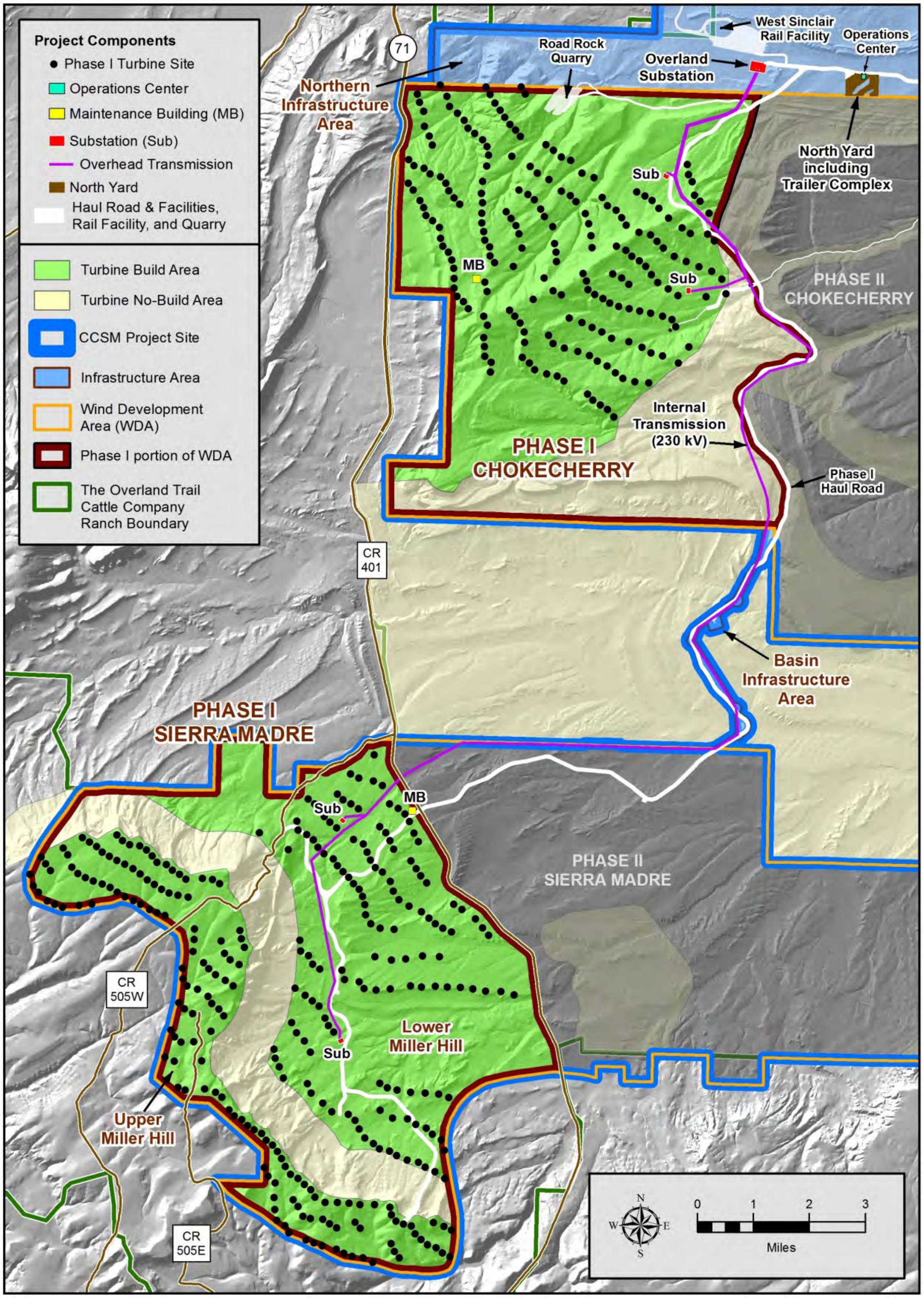

Phase I Layout

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EXHIBIT 3

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BEFORE THE WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY
INDUSTRIAL SITING DIVISION

STATE OF WYOMING

IN THE MATTER OF THE INDUSTRIAL	)	OAH DOCKET NO. 14-097-020
SITING PERMIT APPLICATION OF	)	DOCKET NO. DEQ/ISC 12-07
POWER COMPANY OF WYOMING, LLC	)	

FINDINGS OF FACT, CONCLUSIONS OF LAW, AND ORDER GRANTING PERMIT APPLICATION WITH CONDITIONS, AND ALLOCATING IMPACT ASSISTANCE FUNDS

THIS MATTER came before the Industrial Siting Council (Council) on August 5 – 6, 2014, for a contested case evidentiary hearing on whether the Council should issue a permit for the construction and operation of the Chokecherry and Sierra Madre Wind Energy Project. Council members present for the proceedings included Chairman Shawn Warner, Sandy Shuptrine, Gregg Bierei, James Miller, Richard O'Gara, Peter Brandjord, and John Corra. Karl D. Anderson, Senior Assistant Attorney General, was also present on the Council's behalf. Deborah A. Baumer from the Office of Administrative Hearings served as the Hearing Examiner in the proceedings.

The Applicant, Power Company of Wyoming, LLC (PCW), appeared by and through counsel, Paul J. Hickey, O'Kelley H. Pearson and Roxane J. Perruso. The Industrial Siting Division (Division) appeared by and through counsel, Assistant Attorney General Andrew J. Kuhlmann. Fifteen entities filed notices to become parties and fourteen of those entities participated in the evidentiary hearing, including the Carbon County Commissioners, represented by Chairman Leo J. Chapman; Albany County

Commissioners, represented by Commissioner Tim Chestnut; Sweetwater County Commissioners, represented by Marc Dedenbach; the Voices of the Valley, represented by Vice President Joseph Elder; Saratoga-Encampment-Rawlins Conservation District, represented by Leanne Correll; City of Rawlins, represented by City Attorney Amy L. Bach; the City of Laramie, represented by Assistant City Manager David Derragon; the Town of Saratoga, represented by Mayor John Zeiger; the Town of Encampment, represented by Mayor Greg Salisbury; the Town of Riverside, represented by Mayor Ronald L. Bedwell; the Town of Elk Mountain, represented by Linda Crane; the Town of Hanna, represented by Council member Linda Wagner; the Town of Sinclair, represented by Major Michelle Serres; and the Wyoming Building and Construction Trades Council, represented by Scott Norris. The Town of Medicine Bow timely filed notice to become a party but failed to appear at the hearing. PCW's Exhibits 1 through 16, the Division's Exhibits 1 through 3, and the Carbon County Board of County Commissioners' Exhibit 1 were admitted for purposes of the contested care hearing. The Council received one limited appearance statement in this case prior to the close of the evidentiary hearing. The Council has considered the evidence and arguments of the Applicant and the parties and makes the following findings:

I. JURISDICTION

Wyoming Statutes Annotated § 35-12-106(a) (LexisNexis 2013) provides that "[n]o person shall commence to construct a facility, as defined in this chapter, in this state without first obtaining a permit for that facility from the council."

"Industrial facility" or "facility" means any industrial facility with an estimated construction cost of at least one hundred ninety-three million eight hundred thousand dollars ($193,800,000.00) and any commercial facility generating electricity from wind and associated collector systems that consists of 30 or more wind turbines. *See* Wyo. Stat. Ann. § 35-12-102(a)(vii) (LexisNexis 2013).

Wyoming Statutes Annotated § 35-12-110(d) (LexisNexis 2013) provides that "[o]n receipt of an application, the director shall conduct a review of the application to determine if it contains all the information required by W.S. 35-12-109 and the rules and regulations."

Wyoming Statutes Annotated § 35-12-110(f) (LexisNexis 2013) provides that not more than ninety (90) days after receipt of an application for a permit, the director shall:

> (i) Schedule and conduct a public hearing, provided that no hearing shall be held until the state engineer has submitted a preliminary and final opinion as to the quantity of water available for the proposed facility pursuant to W.S. 35-12-108;
>
> (ii) Notify the applicant and local governments of the hearing . . . ;
>
> (iii) Cause notice of the hearing to be published in one (1) or more newspapers of general circulation within the area to be primarily affected by the proposed facility; and
>
> (iv) Hold the hearing at a community as close as practicable to the proposed facility. The provisions of W.S. 35-12-111, 35-12-112 and 35-12-114 apply to the hearing.

The contested case procedures of the Wyoming Administrative Procedure Act apply to the hearing. Wyo. Stat. Ann. § 35-12-112 (LexisNexis 2013).

Wyoming Statutes Annotated § 35-12-113(a) (LexisNexis 2013) provides that "[w]ithin forty-five (45) days from the date of completion of the hearing the council shall make complete findings, issue an opinion and render a decision upon the record, either granting or denying the application as filed, or granting it upon terms, conditions or modifications of the construction, operation or maintenance of the facility as the council deems appropriate."

On May 12, 2014, PCW submitted an application to the Division for an Industrial Siting permit to allow construction and operation of the Chokecherry and Sierra Madre Wind Energy Project (the CCSM Project) to be located in Carbon County, Wyoming, on portions of the private land mostly owned and operated by Overland Trail Cattle Ranch and federal land managed by the Bureau of Land Management (BLM). At a previously held jurisdictional meeting on April 25, 2012, PCW showed cost estimates for the total construction were in excess of the $193.8 million statutory jurisdictional limit of the Council. The proposed CCSM Project also will consist of more than 30 electricity generating wind turbines. Therefore, this Council has jurisdiction to hear and decide this matter.

II. STATEMENT OF THE CASE

PCW proposes to construct and operate the CCSM Project which consists of 1,000 wind turbines capable of generating up to 3,000 megawatts (MW) of wind energy. PCW seeks a permit from the Council to construct, operate, maintain, and decommission the CCSM Project.

On May 12, 2014, PCW filed its Application for an Industrial Siting permit pursuant to Wyoming Statutes Annotated § 35-12-109 (LexisNexis 2013) to construct the CCSM Project.

As originally submitted, the Division's staff found that the Application was lacking certain information and notified PCW of the deficiencies. Upon submittal of the additional information, the Division's staff determined that PCW's Application was complete and in full compliance with Wyoming law and was ready for the Council's determination as to whether a permit should be issued. PCW requested that the Council approve the Application as submitted, with the additional conditions proposed by the Division, and also requested four variances from Council rules governing decommissioning, reclamation, and financial assurance prior to construction. Fourteen of fifteen parties appeared at the evidentiary hearing and all were in favor of issuing the permit.

III. ISSUES AND CONTENTIONS

The sole issue in this case is whether PCW has proven, by a preponderance of the evidence, that the Application regarding the CCSM Project meets the requirements of the Wyoming Industrial Development Information and Siting Act, Wyo. Stat. Ann. §§ 35-12-101 through −119 (LexisNexis 2013), and the Industrial Development Information and Siting Rules and Regulations, ch. 1, § 8 (2014) (Division's Rules) governing the proposed CCSM Project. If the Council decides to issue the Industrial Siting permit, it must also decide what, if any, conditions to place on the permit, as well as whether to grant three requested variances from the Division's Rules governing decommissioning and reclamation, and one variance regarding financial assurances.

PCW asserted its Application (in conjunction with the supplemental exhibits) was complete and in compliance with all applicable laws, would not pose a threat of serious injury to the environment, and would not substantially impair the health, safety, or welfare of the inhabitants in the affected area. PCW agreed with the conditions proposed by the Division to be placed upon the CCSM Project. PCW requested three variances from the Division's Rules with regard to the removal of turbine foundations, cabling, and vegetative reclamation, in favor of the Bureau of Reclamation's (BLM) standards. PCW also requested a variance with regard to financial assurance prior to construction of the project in favor of a graduated bonding regime.

The Carbon County Commissioners, Albany County Commissioners, Sweetwater County Commissioners, Cities of Rawlins and Laramie, and the Towns of Saratoga, Encampment, Riverside, Elk Mountain, Hanna, Sinclair, and Medicine Bow, as well as the Voices of the Valley and the Wyoming Building and Construction Trades Council were all in support of the CCSM Project.

The Saratoga-Encampment-Rawlins Conservation District was generally in support of the CCSM Project but was opposed to the request for three variances regarding decommissioning and reclamation.

IV. FINDINGS OF FACT

A. Procedural Background

1. PCW is a limited liability company organized in Delaware and authorized to do business in Wyoming. The company is, indirectly, wholly-owned by The Anschutz Corporation. PCW proposes to construct and operate the CCSM Project located in Carbon County, Wyoming, on checkerboard portions of the private land mostly owned and operated by Overland Trail Cattle Ranch and federal land managed by the BLM. The CCSM Project consists of 1,000 wind turbines capable of generating up to 3,000 MW of wind energy, along with all associated facilities necessary to generate and deliver electricity to the desert Southwest through the transmission grid. *PCW Exs. 1, 2.*

2. This case dates back to a jurisdictional meeting held with the Division on April 25, 2012, in which PCW established that cost estimates for the CCSM Project exceeded the statutory dollar threshold of $193,800,000.00 and consisted of at least 30 wind turbines in all phases of construction. On September 7, 2012, the ISD issued its Notice of Jurisdiction, advising PCW that the project was subject to the jurisdiction of the Wyoming Industrial Development Information and Siting Act, Wyo. Stat. Ann. §§ 35-12-101 through –119, and that a permit was required to construct and operate the CCSM Project. *Division's Ex. 1, p. 4.*

3. On October 2, 2012, the Carbon County Board of County Commissioners, after opportunity for public hearing, voted unanimously to approve PCW's application for a Conditional Use Permit with regard to the CCSM Project. *CCC's Ex. 1.*

4. A pre-application filing meeting was held on October 25, 2012. PCW initially intended to file its Application in January 2013 but ultimately determined it would be more appropriate to file in 2014. Thereafter, on April 22, 2014, PCW met with the Division for its final pre-application filing meeting. PCW filed its Application, with Appendices A through V, with the Division on May 12, 2014. PCW initially filed Appendix G, containing documentation of financial capability, as confidential. On June 27, 2014, PCW resubmitted Appendix G as a public document. *PCW Exs. 1, 2.*

5. All of the materials constituting the filing of the Application were received by the Division on May 12, 2014. The Application consisted of 75 hard copies of the Application document, *Wyoming Industrial Development Information and Siting Act Section 109 Permit Application;* 45 electronic copies of that document and all appendices; the payment of the application fee in the amount of $70,076.00, as required by Wyoming Statutes Annotated § 35-12-109(b); a certification by Roxane J. Perruso, Vice-President and Secretary of PCW, attesting to the truthfulness and accuracy of the Application; and a transmittal letter by Joseph H. Tippetts, Associate General Counsel. *PCW's Ex. 2, §§ 15-1, p. 482.*

6. The Division staff checked the contents of the Application against the applicable statutes and Division Rules and determined that additional information was necessary. On June 11, 2014, the Division sent PCW a Notice of Deficiency requesting information regarding ten separate, enumerated items. On July 10, 2014, PCW provided a response to the Division's Notice of Deficiency, which the Division's staff and PCW incorporated into the Application. On July 18, 2014, PCW was notified by the Division

that the Application was complete. The Division also recommended 19 permit conditions should the Council grant the permit. *Division's Ex. 1, §§ E; H.*

7. Upon review of the Application, the Administrator of the Division determined the study area for potential impacts of the CCSM Project included Carbon County, Sweetwater County, Albany County, and Natrona County. The Administrator determined the areas primarily affected were the facility site, the municipalities of Rawlins, Baggs, Dixon, Elk Mountain, Encampment, Hanna, Medicine Bow, Riverside, Saratoga, Sinclair, Laramie, Rock River, and Wamsutter, and the inclusive areas of Carbon, Albany, and Sweetwater Counties. Examination copies of the Application were then filed on May 13, 2014, with the Carbon, Albany, and Sweetwater County Clerks. *Division's Ex. 1, p. 5.*

8. Also on May 13, 2014, the Division's staff distributed copies of the Application to the various state agencies, local governments, and school districts within the area primarily affected pursuant to Wyo. Stat. Ann. § 35-12-110(b) (LexisNexis 2013) in order to obtain information and recommendations relative to the impact of the proposed CCSM Project as it applied to each agency's area of expertise. Sixteen of the eighteen state agencies provided timely responses. Only the State Engineer's Office initially recommended denial of the Application until PCW estimated water usage by the entire workforce inclusive of the workers located off-site. In a letter dated July 9, 2014, PCW provided the estimated water usage. The State Engineer's Office responded to the Division on July 14, 2014, that PCW's response satisfied the concerns raised and

recommended that the application process proceed. *Division's Ex. 1, pp. 5 – 6; Division's Ex. 2, p. 9.*

9. Pursuant to Wyo. Stat. Ann. § 35-12-110, the Division's staff placed two separate legal advertisements in five newspapers, publishing the location and description of the CCSM Project, the locations where the Application was available for review, and notice of the Council's hearing on the Application. *Division's Ex. 1, p. 7.*

10. Prior to submitting its Application, PCW notified and described the CCSM Project to local governments in the study area and held open houses for the public to gain information regarding the CCSM Project and to provide comments. A list of all meetings and details of the public and government involvement is found in Section 4 and Appendix K of the Application, titled Public Outreach and Involvement. In summary, PCW conducted 49 public meetings and presentations between 2008 and 2013 regarding the proposed project; 12 of those meetings took place in 2013. *PCW's Ex. 2, Application, § 4, Public Outreach and Involvement; App. K; Division's Ex. 1, p. 4.*

B. Project Specific Documentary Evidence

11. The CCSM Project is a single project to be constructed in two phases. PCW plans to construct Phase I, consisting of approximately 500 wind energy turbines and an associated railway distribution facility, access road, and rock quarry, from approximately the fourth quarter of 2014 to 2018. Phase II will consist of 500 wind energy turbines and their associated access roads constructed from approximately 2018 to August 2021. Construction is anticipated to peak at 945 workers during the third quarter of 2017. PCW estimates that the long-term operations workforce will consist of 114 workers, including

supervisors, operators, maintenance staff, electricians, and environmental monitors. *PCW's Ex. 2, § 7.*

12. PCW plans to construct a rail distribution facility and a road network that are internal to the CCSM Project. To reduce the effects on local roadways that transporting equipment, components, and materials necessary to build the CCSM Project might have, PCW will bring as many of those items as practical to the CCSM Project by rail. Since the existing nearby rail facilities cannot support the load requirements of the CCSM Project, PCW plans to build the West Sinclair Rail Facility adjacent to the Union Pacific main line located along the northern boundary of the CCSM Project site. The West Sinclair Rail Facility will transport construction materials, wind turbine components, and other equipment to the CCSM Project site. The primary delivery staging area will be located adjacent to the rail facility. Any materials and equipment for the CCSM Project that arrive outside the rail facility are expected to use I-80 and Exit 221 (East Sinclair) to reach the CCSM Project's northern entrance. The main thoroughfare between the CCSM Project facilities and entrances is the haul road. An internal road network will be established to interconnect the CCSM Project facilities, including wind turbines, operations and maintenance buildings, substations, and access points. *PCW's Ex. 2, Application at pp. 6-8 – 6-12.*

13. PCW plans to construct a rock quarry to provide a portion of the aggregate materials for the construction of the CCSM Project. The rock quarry will be developed on private land at the location of a previous rock quarry. The quarry is internal to the CCSM

Project, so there will be no impact on local roads from quarry operations. *PCW's Ex. 2, Application at p. 6-9.*

14. The water supply needed for dust suppression, road compaction, concrete production, and domestic and sanitary uses was estimated at approximately 635 acre-feet of water over the eight-year construction period. Estimates of long-term water demand for the CCSM Project are for less than 50 acre-feet of water per year during operations and maintenance and less than 100 acre-feet per year during the three-year decommissioning period. Because the CCSM Project proposes to use less than 800 acre-feet of water of the state annually, PCW was not required to submit a water yield or water supply analysis to the State Engineer in accordance with Wyo. Stat. Ann. § 35-12-108 (LexisNexis 2013). *PCW's Ex. 2, Application at pp. 12-14 – 12-28.*

15. PCW developed a Workforce Housing Plan as depicted in Section 11 of its Application. PCW anticipated a split of the workforce requiring a variety of housing options including hotel/motel rooms, RV sites, rental units, and a construction camp housing 250 employees. PCW also provided confirmations and commitments from hotels in the area primarily affected to accommodate the workforce. *PCW's Ex. 2, Application at § 11; App. Q; PCW's Ex. 16.*

C. <u>Financial Assurance</u>

16. PCW originally filed Appendix G, containing documentation of financial capability, as confidential. On June 27, 2014, PCW resubmitted Appendix G as a public document. PCW submitted the following information to establish financial capability to construct, operate, maintain, decommission, and reclaim the CCSM Project:

(1) A commitment letter from PCW's parent company, The Anschutz Corporation, which describes the corporation's reputation for success as a large project developer, commitment to the CCSM Project, its financial capabilities and the resources the corporation has already expended on behalf of the CCSM Project.

(2) The affidavit of Wayne Barnes, Vice-President and Chief Financial Officer of Anschutz Company, which wholly owns The Anschutz Corporation. Mr. Barnes attests to the fact that the Anschutz Company and The Anschutz Corporation are highly-experienced project development companies with substantial resources and relationships and a strong track record with large development projects.

(3) A letter from KPMG LLP, the independent financial auditors of the Anschutz Company, which provided that, according to the consolidated financial statements of the Anschutz Company as of December 31, 2013, the stockholders' equity was in excess of $1.5 billion.

(4) A letter from an investment bank sharing its view that the necessary capital (both debt and equity) can be raised to successfully finance the CCSM Project.

(5) Letters from Travelers Casualty and Surety Company of America and Zurich North America Insurance Company regarding providing surety bonding for the decommissioning and reclamation of the CCSM Project. Those letters attested to the Anschutz Company's ability to provide adequate surety bonds for the estimated costs of decommissioning and reclamation.

PCW's Ex. 2, Application, App. G.

D. <u>PCW's Request for Variances</u>

17. The CCSM Project is located primarily within an ownership region known as the "checkerboard," in which land ownership alternates between private land (mostly owned by the Overland Trail Cattle Ranch) and federal land managed by BLM. The BLM has jurisdiction over the federal lands within the CCSM Project and will require

PCW to provide satisfactory financial assurance for PCW's decommissioning and reclamation obligations before authorizing PCW to conduct material surface disturbance activities on those federal lands. Likewise, the Council has jurisdiction over PCW's decommissioning and reclamation obligations on the private land, as well as financial assurance requirements. *PCW's Ex. 2, Application at p. 8-1.*

18. As a result of BLM and Council overlapping jurisdictions, PCW has requested four variances with regard to decommissioning, reclamation, and financial assurance. *PCW's Ex. 2, Application, pp. 8-2 – 8-9.*

19. With respect to decommissioning, PCW requested variances from certain prescriptive decommissioning requirements listed in the Division's Rules, Chapter 1, Section 9(a)(i) to make state and federal standards for decommissioning consistent with a BLM requirement removing wind turbine foundations to a depth of 42 inches and allowing underground cable to remain undisturbed. *Id. at pp. 8-2 – 8-3.*

20. With respect to reclamation, PCW requested a variance from Council standards in favor of BLM reclamation standards. The Council requires that all surface disturbances be regraded and revegetated with a uniform perennial vegetative cover with a density of 90 percent native or adaptive background vegetative cover. BLM requires reclamation of 80 percent of predisturbance ground cover and 90 percent dominant species. *Id. at pp. 8-4 – 8-5.*

21. Finally, PCW must provide a site reclamation and decommissioning plan and associated financial assurances to ensure proper decommissioning and reclamation of the CCSM Project. As set forth more fully in Section 8.4.4 of the Application, PCW

requested a variance from the Division's Rules, Chapter 1, Section 9(d)(i), which requires that all financial assurances be in place prior to the commencement of construction, in favor of the graduated bonding regime proposed by PCW in Section 8 of the Application. Accordingly, PCW requested that the Council approve a variance that will allow PCW to provide a series of surety bonds that are commensurate with and correspond to each individual BLM right-of-way grant. The variance to allow graduated bonding would insure that adequate financial resources are in place prior to construction but will not require PCW to post bonds potentially years ahead of initiation of surface disturbance activities undertaken pursuant to a particular right-of-way grant. *Id. at pp. 8-6 – 8-9.*

E. Impact Assistance Funds

22. The PCW and the Division developed a forecast of impact assistance payments by quarter that will be distributed throughout the construction period because of the sales and use tax contribution to the state from the CCSM Project. The forecasted average quarterly impact assistance payment is $1.67 million. The forecasted yearly impact assistance payment is $6.05 million. The Division recommended the distribution of the funds, as was agreed to between the counties and their affected municipalities, at 94 percent to Carbon County, 3 percent to Albany County, and 3 percent to Sweetwater County. *PCW's Ex. 2, Application, Table 10-34 at p. 10-67; Division's Ex. 1, p. 15; Attach. 9.*

F. Hearing Testimonial Evidence

i. Applicant's Witnesses

(a) Bill Miller

23. Bill Miller (Miller) is the Senior Vice-President of Energy and Land Resources for the Anschutz Corporation, and the President and CEO of PCW and the Overland Trail Cattle Company. Miller has been employed with the corporation for 34 years. The Anschutz Company is a highly diversified enterprise that has operations across a huge array of industries including oil and gas exploration and production; pipeline development and operations; ranching and farming operations; rural energy and electrical transmission; lodging, recreation, and entertainment businesses; and the newspaper business. The CCSM Project is the first renewable energy project in Anschutz's portfolio. [Transcript of Proceedings (hereinafter Tr.) at pp. 16 – 18; 38]

24. Miller confirmed that PCW has a great deal of experience in developing, constructing, financing, and operating large infrastructure, oil and gas, and ranching projects around the world. Examples include the Pacific Pipeline Group, Staples Center in downtown Los Angeles, the LA Live Entertainment District, Anschutz Exploration Corporation, arenas in England and Germany, and several large ranching and other agricultural assets in Wyoming. [Tr. at pp. 17 – 22]

25. According to Miller, PCW began developing the CCSM Project in 2006. The CCSM Project will consist of 1,000 turbines and will be capable of generating up to 3,000 MW of electricity. The project is sited mostly within the Overland Trail Cattle Ranch. The Ranch is comprised of a combination of private, federal and state lands. The

project will involve establishing an on-site quarry for construction materials for the roads and turbine locations, a rail distribution facility, a haul road, electrical collector lines, substations, and a maintenance and operation facility within the project. [Tr. at pp. 23 – 26]

26. The initial markets for the CCSM Project will be the desert Southwest, which will include the states of California, Nevada, and Arizona. This is due to the population and commercial load growth of that area, and a recognized increase in the percentage of renewable energy due to federal and state policies dealing with emissions and greenhouse gases. The project is dependent upon the development, construction, and completion of the Transwest Express transmission lines which will run from Rawlins to an area south of Las Vegas, Nevada. [Tr. at pp. 26 – 27; 43]

27. To date, PCW has expended in excess of $45 million in the permitting and development process for the CCSM Project. The estimated cost for the wind project to be operating and commissioned is $5 billion. The revenues the project will generate for the local governments, Carbon County, and State of Wyoming are estimated at $800 million from property taxes, sales and use tax, and the wind generation tax. [Tr. at pp. 28 – 29]

(b) Wayne Barnes

28. Wayne Barnes (Barnes) is the Vice-President of Finance and Chief Financial Officer for both Anschutz Company and The Anschutz Corporation. Barnes explained that the Anschutz Company is the parent of The Anschutz Corporation. Wyoming Renewable Resources and the Overland Trail Cattle Company are owned by

the Anschutz Company. Wyoming Renewable Resources owns Power Company of Wyoming. [Tr. at pp. 46 – 47]

29. Barnes testified in conjunction with PCW's Exhibit 4 consisting of documents supporting PCW's financial capability and assurances. Based upon considerations that include discussions with Morgan Stanley, who is acting as financial advisor for the Anschutz Company, Anschutz has concluded that an appropriate capital structure for the CCSM Project would be to fund it with 35 percent equity (approximately $1.68 billion) and 65 percent debt (approximately $3.11 billion). As evidence of its financial strength, the Anschutz Company obtained a letter dated April 7, 2014 from KPMG, Anschutz's independent auditor, stating that Anschutz's stockholder equity as of December 31, 2013 (the date of the most recent KPMG annual audit) was in excess of $1.5 billion. *PCW's Ex. 4;* [Tr. at pp. 48 – 51]

30. Barnes confirmed that decommissioning and reclamation of the project is estimated at a range from $265 million to $345 million. Barnes confirmed that Travelers Insurance Company and Zurich Surety each provided letters of commitment to issue surety bonds in an amount up to $500 million. [Tr. at pp. 52 – 54]

31. Finally, Barnes testified that based upon his financial knowledge and experience, PCW had the financial capability to construct, maintain, operate, decommission, and reclaim the CCSM Project. [Tr. p. 54]

(c) Ryan Jacobson

32. Ryan Jacobson (Jacobson) is a professional engineer licensed in the states of Wyoming, Colorado, and North Dakota and is the Director of Engineering and

Construction for PCW. Jacobson testified that PCW has been monitoring the wind data on 34 separate sites in the project area since 2007. The data confirmed that the project site is very conducive to high power production that matches well with the electrical demand of the West. The wind class is between Class 5, which is considered excellent, and Class 7, which is the top end of the curve. The project capacity factor is at 40 to 45 percent, which is extraordinary considering the size of the project. [Tr. pp. 56 – 62]

33. Jacobson explained that the rotor portion of the turbine will be up to 120 meters, which is just under 400 feet in diameter. The top of the turbine tower will be 100 meters, which is about 328 feet. About one-third of the turbines will have flashing red lights on the top of the cell. The turbines are connected together via a buried cable, and once a series of turbines connect together on that cable and generate enough electricity, the cable fills and goes back to the nearby substation. As the power is collected at the substation, it will travel by an overhead transmission line to an interconnected substation on the north end of the project where it connects to the grid. [Tr. pp. 66 – 67]

34. Jacobson confirmed that PCW intends to bring many of the components of the construction materials to the site by rail, avoiding heavy reliance on I-80 and other local highways, thereby reducing overall traffic impacts. Additionally, an on-site quarry will be used to construct a road network for the project. The north entrance to the project will be I-80 at Exit 221. Additionally, sections of County Roads 441 and 505 will be utilized and are covered through a road use agreement with Carbon County Road and Bridge Department entered into in June 2014. [Tr. pp. 68 – 71; 99]

35. In response to comments expressed by the Wyoming State Geological Survey regarding landslides, expansive soils, and seismic characteristics, Jacobson clarified that PCW's geotechnical engineers agreed that establishing a turbine setback of 500 feet from steep terrain was appropriate. *PCW's Ex. 9;* [Tr. pp. 75 – 77]

36. With respect to monthly workforce during construction of the project, Jacobson testified the project had an overall average of 282 workers. Phase I peaks at 945 workers of which 776 would be nonlocal. In 2017, the workforce was estimated to peak at 925 workers, of which 761 would be nonlocal. Once the project is completed, 114 full-time technicians, operators, and office staff will be employed year-round. [Tr. pp. 79 – 81]

37. PCW puts a high priority on safety by utilizing a health and safety plan, including an emergency response plan in coordination with the project and local emergency services. PCW also has a fire prevention and suppression plan. [Tr. pp. 81 – 82]

38. Jacobson testified that based upon his knowledge and experience, the project will not significantly impair the health, safety, or welfare of the workers or the public. Additionally, the project complied with applicable law and standards of good engineering practice.

39. With regard to the workforce housing plan, PCW balanced two priorities. The first was to promote economic development by utilizing temporary vendors in the communities. The second was to develop on-site accommodations so PCW would not overload the local accommodations. PCW anticipated that local workforce levels would

exceed the available local accommodations in nearby communities so decided to mobilize an on-site construction camp for 250 workers, as well as 100 RV sites. At the end of construction, PCW will demobilize the construction camp and reclaim both the camp site and the RV sites. [Tr. pp. 83 – 88]

40. According to Jacobson, decommissioning of the project will occur in approximately 30 years and will take three years to complete, at a total cost of $265 million. PCW is requesting two variances of the Council's decommissioning requirements due to two different methods mandated by state and federal rules governing revegetation. The federal requirements for reclamation require that PCW remove the pedestal portion of the turbine 42 inches, while the state requires 48 inches of the foundation to be removed. PCW requested a variance to use the federal standard so that only one standard would apply to the entire project and would avoid unnecessary ground disturbance. The Department of Environmental Quality, Land Quality Division, had no objection to PCW using the federal standard. If the variance is granted, the cost saving to PCW would be approximately $50 million. *PCW's Ex. 6;* [Tr. pp. 88 – 92; 112]

41. The other decommissioning variance requested by PCW concerned buried electrical cables. Federal guidelines require the cables to remain in place and buried at 36 inches or deeper. The Division's Rules require removal of the cables. The variance is requested to leave the cables in place to avoid disturbing ground that would have been reclaimed for 30 years. Again, the Land Quality Division had no objection to the requested variance. If the variance is granted, the resulting cost savings to PCW would be $30 million. *PCW's Ex. 6; Division's Ex. 2, p. 6;* [Tr. pp. 92 – 93; 112]

42. For waste management, PCW plans to use the Sweetwater County and Rock Springs landfill. Additionally, noise levels were analyzed with regard to construction near residences. The nearest turbines are 4,000 feet away from any homes, two and one-half miles from Rawlins, three miles from Sinclair, and over nine miles from Saratoga. Therefore, no potential noise impact will occur with this project. [Tr. pp. 95; 100 – 101]

(d) Nathan Wojcik, PhD

43. Dr. Nathan Wojcik is an ecologist for SWCA, Inc, Environmental Consultants. Dr. Wojcik has a bachelor's of science degree in ecology, evolution and conservation biology, and a PhD in biochemistry. Dr. Wojcik has been working for PCW for five years, with a crew of field biologists conducting baseline surveys to support project planning, including vegetation and soil sampling, vegetation and habitat modeling, and wildlife surveys. Dr. Wojcik testified that he "literally walked nearly every inch of [the] project site, 200,000 acres, and also areas around the project site[.]" [Tr. pp. 123 – 125]

44. Dr. Wojcik addressed three areas – vegetation, soils, and reclamation. With regard to vegetation, Dr. Wojcik determined the project site was predominately sagebrush, and there were approximately 25 unique vegetative communities across the site. Dr. Wojcik and his crew conducted more than 1,500 transects to identify and count the composition, species, diversity, and other indexes of vegetation. [Tr. pp. 125 – 126]

45. Soils on the project were predominately loamy, which is a rich soil mixture that plants like. Dr. Wojcik and his crew dug holes into the ground and have completed

240 soil pits and 80 geotechnical borings across the project site. The data collected provides information to guide the reclamation process and wildlife management. Due to the involvement of federal land, and based upon his analysis of the data collected, Dr. Wojcik recommended utilizing the BLM reclamation standards to include: (1) to reclaim 80 percent of native vegetative ground cover; (2) species diversity has to represent the vegetation cover that was previously there; (3) no noxious weeds on federal lands; and (4) control and minimize erosion. [Tr. pp. 127 – 130]

46. Dr. Wojcik explained that the BLM and state share the same objectives for reclamation – to successfully reconstruct the landscape. However, the federal and state standards for reclamation differ in that the state requires 90 percent native or adaptive background cover, which means not all species have to be native, versus BLM's requirement of 80 percent native species only, thus keeping noxious weeds out. It is not practical to have two different standards on the checkerboard land. One standard also provides more consistent monitoring. PCW's plan applies a more stringent standard than the state requires. [Tr. pp. 133 – 135; 151 – 153]

47. With respect to PCW's request for a variance regarding removal of the turbine foundations, Dr. Wojcik testified that a ten-fold increase in disturbance of the area would occur if the variance is not granted. From a reclamation viewpoint, the BLM standard would reduce additional disturbance to areas that have already been reclaimed from the passage of time. The same holds true for leaving the underground cables in place so that no additional disturbance occurs on ground that has already been reclaimed from the passage of time. Based upon Dr. Wojcik's experience and education, PCW's

reclamation plan effectively prevents injury to the soil and vegetation and leads to successful reclamation. [Tr. pp. 135 – 139]

(e) Joseph Hammond

48. Joseph Hammond (Hammond) is a principal project manager in CH2M HILL's environmental group. Hammond prepared the socioeconomic analysis reflected in Section 10 of the Application. [Tr. pp. 157 – 158]

49. Hammond's group analyzed each of the resource areas affected, population, economic and physical conditions, housing, public education, public safety, healthcare, municipal services, and government and human services facilities. Potential social and economic impacts of the project were evaluated using common methods in the industry. [Tr. pp. 159 – 161]

50. Hammond confirmed the workforce employment numbers, occupations, and average wages as reflected in Section 10 of the Application, as well as the economic benefits of the project to the areas of influence. Those figures will not be repeated in this Order, but can be found in PCW's Exhibit 2, Section 10. Hammond also confirmed that the estimates for sales and use tax, property tax, and excise tax over the construction and operation of the project was $781 million. [Tr. pp. 163 – 172]

51. With regard to estimated impact assistance payments, Hammond testified that there would be peaks and valleys in those numbers because of the fluctuation of construction workforce. Hammond confirmed the figures in Section 10, Table 10-34 in the Application showing a range from $24,612 in the first three quarters to $3.2 million in

later quarters. The annual average of impact assistance is $6.05 million. [Tr. pp. 172 – 173]

52. Hammond discussed the housing plan in great detail and testified in accordance with the housing analysis reflected in Section 10 of the Application. Those figures will not be repeated in this Order. Hammond testified that Appendix Q in the Application contained an outdated version of housing availability data and was substituted with PCW's Exhibit 16 which contained figures from 2014. Hammond concluded that the overall analysis determined that adequate temporary accommodations exist in the area of influence to meet the needs of nonlocal workers during peak and nonpeak periods. [Tr. pp. 173 – 182]

53. Hammond's analysis also concluded that the project would have a negligible impact on the Carbon County school system and that two additional law enforcement officers in the Carbon County Sheriff's Office and two additional officers in the Rawlins Police Department would be needed during peak construction periods between 2017 and 2021. Hammond admitted there is currently a shortage of healthcare providers in the area of influence, but did not believe there would be an overall significant effect upon the system. Additionally, Hammond believed the impact to municipal services was negligible. [Tr. pp. 182 – 185]

54. Cumulative impacts were also analyzed by Hammond's team, and 41 projects in the area were evaluated. The analysis appears in Sections 9 and 10 of the Application. The primary cumulative impacts related to the availability of temporary housing. PCW developed a plan for minimizing those impacts by proposing to mobilize

an on-site construction camp for 250 workers, as well as an on-site RV camp for 100 workers. [Tr. pp. 187 – 193]

55. Finally, in Hammond's professional opinion, the Application complied with the requirements of the Council; the project did not pose a threat of serious injury to the economic condition of the present or expected inhabitants in the areas of influence; and the project would not substantially impair the health, safety, or welfare of the present or expected inhabitants in the areas of influence. [Tr. pp. 195 – 196]

(f) Garry Miller

56. Garry Miller (Miller) is the President of Land and Environmental Affairs for PCW. Miller testified to the land ownership and control regarding the project. According to Miller approximately 49 percent of the 170,000 acre project site is private ownership, a majority of which is owned by the Overland Trail Cattle Company. Approximately 4 percent of the project site is state-owned lands, and PCW has an agreement with the state to install 42 turbines on the state land. Finally, approximately 47 percent of the project site is on BLM land. An Environmental Impact Statement for the project reflected no conflicts with oil and gas development on federal land. [Tr. pp. 241 – 245]

57. The Carbon County Board of County Commissioners found that the project complies with all applicable zoning and county land use regulations and authorized a conditional use permit for the project. In July 2014, the Carbon County Commissioners voted unanimously to grant a request from PCW for a one-year extension on the requirement to begin construction. [Tr. pp. 248; 251]

58. In terms of long-term disturbance to the 320,000 acre ranch, the long-term disturbance is 1,545 acres, which is less than 1 percent. Ranching operations will be allowed to continue as they have in the past. Additionally, the project will have no affect on adjacent property landowners due to property line setbacks, and the road use agreement successfully mitigates the impacts of the project on the use of county roads. [Tr. pp. 249 – 252]

59. Miller confirmed that PCW did not object to the 19 conditions proposed by the Division to be placed on the permit, with a correction of a typographical error to Condition 15. [Tr. p. 252]

60. Miller testified regarding the conservation plan reflected in PCW's Exhibit 8. The conservation plan addresses wildlife, including sage grouse, mule deer, birds and bats, and aquatics. PCW has agreed to submit a report every year to a technical advisory committee (TAC) composed of PCW, Overland Trail Cattle Ranch, Wyoming Game and Fish, and other vital parties. The TAC will review that report, look at monitoring results, assess any trends, and make recommendations for modifications, improvements, or other necessary measures that may be advisable for wildlife protection. Miller detailed the research and monitoring conducted by PCW with regard to the various wildlife located on the project site. The Application at Appendix U contains a full summary of all the environmental commitments and requirements for the project. [Tr. pp. 257 – 265]

61. Based upon Miller's knowledge and experience, the project will not have a significant detriment on economics, recreation, cultural resources, and wildlife areas. [Tr. pp. 265 – 266]

62. Miller also addressed BLM's bonding requirements for federal land. BLM's requirements include posting a bond prior to construction of the project. Bonding would be synchronized with federal permit approval and would occur prior to the initiation of particular activities as the project progresses. The request for a variance with regard to bonding is to prevent double bonding for federal lands and overbonding for construction that has not started, while protecting the State's interests. Miller testified that the CCSM Project is unique in that it is the only wind project in Wyoming that involves the checkerboard and mix of federal and private lands. [Tr. pp. 339 – 343]

(g) Kelly Cummins

63. Kelly Cummins (Cummins) is a senior landman and environmental engineer. Cummins has a bachelor's degree in chemical engineering and is a licensed professional engineer in environmental engineering. Cummins is responsible for supporting the permit of the CCSM project. Cummins testified regarding several areas of the Application, including air quality, water resources, water quality, and scenic resources. [Tr. p. 275]

64. With regard to air quality, Cummins testified there were two primary sources of air pollution for the project – fugitive dust from ground disturbance, vehicles and equipment traveling on roadways, and tailpipe emissions from equipment and vehicles. Cummins testified that, as reflected in Appendix L of the Application, the project will not increase the concentrations of air pollutants over legal limits. Additionally, the BLM's air quality analysis concluded that neither the federal nor the

state ambient air quality standards would be exceeded. *PCW's Ex. 2, Application, App. L;* [Tr. pp. 275 – 276]

65. Cummins further testified that water usage for the project was estimated at 635 acre-feet over the eight-year construction period. The peak usage in any one year would be 110 acre-feet. The vast majority of water would be used for dust suppression, as well as road compaction and concrete production. PCW plans to minimize water usage by using magnesium chloride for dust suppression which would potentially decrease water usage by 30 percent. The water supply would come from a combination of water sources, including surface water, groundwater, as well as municipal supplies. The project's water usage is based upon the use of existing water rights and, therefore, should not impact the North Platte water, Colorado River basin, or other existing water usage. The State Engineer requested additional information regarding the water use of the workers staying in the local communities outside of the project site. PCW provided the State Engineer an estimate of that operation and the State Engineer provided a letter to the Division indicating they were satisfied with the response. [Tr. pp. 277 – 280]

66. Additionally, both PCW and the BLM evaluated potential impacts to the scenic resources. BLM concluded that the project was consistent with the visual resource management plans for the area. [Tr. pp. 281 – 282]

(h) Kara Choquette

67. Kara Choquette (Choquette) is the Director of Communications and Public Outreach for PCW. Choquette has been responsible for producing PCW brochures and handouts, managing PCW's website, attending public meetings, and serving as a

community's liaison for PCW. From 2008 through the end of 2013, Choquette participated in 49 public meetings throughout Wyoming, the majority of which were in Carbon County. Four additional meetings were held in 2014, all in an effort to have the public learn about the project. Some meetings were held in conjunction with BLM open houses. Appendix K in the Application provides a summary of the public meetings and open houses held in conjunction with the project. [Tr. pp. 285 – 290]

68. In addition to the public meetings and open houses, Choquette held events at the Carbon County Higher Education Center for three years at the Celebration of Wind event, participated in the Carbon County Industry Round Table held in Rawlins for four years, spoke at local school groups, hosted science students at the ranch, and spoke at the Rawlins Rotary Clubs and Lions Clubs over the years about the project. Additionally, PCW sponsored community events regarding the project. [Tr. pp. 291 – 292]

69. Finally, PCW has involved environmental groups in its development process, including Audubon Wyoming, Wyoming Outdoor Council, the Wyoming Wildlife Federation, the Nature Conservancy, the Sonoran Institute, Wilderness Society, Defenders of Wildlife, Sierra Club, Natural Resources Defense Council, and Western Resource Advocates. [Tr. pp. 292 – 293]

70. As a result of the extensive outreach efforts conducted by PCW, groups, vendors, and individuals were provided information on the project and how to obtain employment with PCW. Choquette also talked to hundreds of media over the years about covering the project and learning about the project. [Tr. pp. 294 – 297]

71. Due to Choquette's comprehensive outreach program, no environmental groups or other entities objected to the CCSM Project. [Tr. pp. 297 – 299]

ii. Division's Witnesses

(a) Kimber Wichmann

72. Kimber Wichmann (Wichmann) is the Principal Economist with the Department of Environmental Quality, Industrial Siting Division. Wichmann received and processed the Application and the Division's Exhibits 1 through 3 in this case. Wichmann confirmed that as part of the process, a jurisdictional meeting was held with the Applicant on April 25, 2012. A determination was made that the CCSM Project cost was in excess of the statutory threshold for obtaining an Industrial Siting permit, and that more than 30 wind turbines would be constructed. The Application for the Project was subsequently filed on May 12, 2014. [Tr. pp. 302 – 304]

73. According to Wichmann, after review of the Application, the Division issued a June 11, 2014, Notice of Deficiency to PCW identifying ten items requiring further information. The Division requested additional documentation as outlined on pages A-13 – A-14 of the Division's Exhibit 1. PCW's response to the request for additional information was provided as A-078 – A-104 in the Division's Exhibit 1, and as a result, the Application was thereafter deemed complete and contained the statutory requirements and criteria pursuant to Wyo. Stat. Ann. § 35-12-109. [Tr. pp. 307 – 309]

74. Wichmann further testified that all state agencies, with the exception of the University of Wyoming and the Department of Education, responded to a request for comments on the Application. All agencies' comments are reflected in the Division's

Exhibit 2. Several agencies requested additional information, which was provided by PCW. After receipt of additional information requested from PCW, no state agency recommended denial of the Application. [Tr. pp. 310 – 314]

75. Wichmann confirmed that PCW requested five variances which are located on page 8 of the Division's Exhibit 1. Those variances included a request to remove the federal lands from bonding; a request for graduated bonding; a request to use the BLM revegetative requirements during decommissioning and reclamation; a request to use BLM requirements for removing just the pedestal portion of the turbines rather than the state requirement to go to a depth of 48 inches; and a request to use BLM standards to leave cabling in the ground rather than the state requirement to remove cabling. [Tr. pp. 306 – 307]

76. Wichmann recommended permit conditions as set forth in the Division's Exhibit 3, as the Application was complete per the statutory requirements. The permit conditions set forth in paragraphs 1 through 14 are standard permit conditions for a wind project. Wichmann also recommended five additional permit conditions found in Conditions 15 through 19. Wichmann clarified that Condition 15 contained a typographical error, and the figure depicted in that condition should be corrected from $146,918,000 to $20,673,000. [Tr. pp. 303; 315 – 318]

77. Finally, Wichmann testified as to the distribution of impact assistance funds. The split recommended by the areas primarily affected was agreeable to the Division as is reflected in the Division's Exhibit 1, p. 15. [Tr. p. 314 – 315]

(b) Luke Esch

78. Luke Esch (Esch) is the Administrator of the Industrial Siting Division, and of the Solid and Hazardous Waste Division for the Environmental Quality Division. Esch provided an historical perspective to the CCSM Project. According to Esch, well before the April 2012 jurisdictional meeting, the Division and PCW representatives met on several occasions and discussed the variances regarding bonding and reclamation issues. Esch also had discussions with BLM in an effort to enter into a memorandum of understanding (MOU) regarding the differing state and federal bonding and reclamation standards. Ultimately, the parties were unable to enter into a MOU. [Tr. pp. 323 – 325]

79. Esch explained that the Division's Rules require bonding to be in place prior to the commencement of construction. The BLM also requires bonding, which would result in a dual bonding situation. The Division's Rules also provide for specific reclamation standards. The project is unique from past wind projects in that it lies on a checkerboard of BLM and privately owned land. The BLM reclamation standard requires cabling to remain buried. The Division's Rules requires cabling to be removed, making the reclamation a very difficult, if not impossible process. Additionally, the BLM standards for reclamation include removal of the turbine pedestal to 42 inches, while the state requires removal to 48 inches. Esch testified that the Division's Rules regarding removal of the turbine pedestals to a depth of 48 inches was based upon public comment and not based upon any scientific evidence. Regardless, the Division's Rules also allow the Council to provide a variance for the requirements regarding the bonding and reclamation standards. It remains a Council decision whether to grant PCW's requests for

variances based upon a site-specific inquiry and case-by-case analysis. [Tr. pp. 325 – 329; 334 – 335; 393]

iii. Parties' Witnesses

(a) Carbon County Commissioner's Witnesses

Leo Chapman

80. Leo Chapman (Chapman) is the Chairman of the Carbon County Commission. Chapman testified that the Carbon County Commissioners support the CCSM Project and the opportunity for the impact assistance funds resulting from the project. The funds will be necessary for increased emergency services and law enforcement, and will benefit the schools in the county. Chapman also expressed his appreciation in the avian and wildlife studies conducted by PCW. [Tr. pp. 350 – 352]

81. Chapman complimented PCW for its public outreach and confirmed that the Carbon County Commissioners extended a conditional use permit for beginning construction of the project. [Tr. p. 351]

John Espy

82. John Espy (Espy) is Vice-Chairman of the Carbon County Commission. Espy complimented PCW in putting together a comprehensive housing plan to take care of its workers. [Tr. p. 354]

(b) Voices of the Valley's Witness

Joseph Elder

83. Joseph Elder (Elder) is the Vice-President of the Voices of the Valley, a nonprofit organization in the upper North Platte Valley that tries to foster public

engagement and awareness of various projects that are developing in the area. [Tr. p. 355]

84. Elder expressed the group's initial concern over the possible housing shortage due to the influx of project workers, and the concern over impact on tourism and enough hotel/motel space during the construction months of the project. Elder believed that PCW met those concerns and requested the Council approve Condition #18 regarding the commitment of PCW to mobilize a construction camp and RV site at the facility. [Tr. pp. 355 – 356]

(c) Saratoga-Encampment-Rawlins Conservation District

Leanne Correll

85. Leanne Correll (Correll) was the Saratoga-Encampment-Rawlins Conservation District's representative. Correll explained that the Conservation District's mission statement is to develop and direct programs to promote long-term conservation and enhancement of the District's natural resources, while contributing to the economic stability of the District and its residents. Correll addressed the Conservation District's disapproval of the variances requested by PCW regarding decommissioning and reclamation and requested the Council deny those requested variances. [Tr. pp. 358 – 359]

86. Specifically, Correll testified that in order to revegetate the land, a combination of native and non-native species, as permitted by the Division's Rules, accomplished greater soil stabilization. According to Correll, the soils in the project area have a moderate to high erodibility. Correll testified that the BLM has had mixed success

in previous reclamation efforts and recommended that both native and non-native species be utilized to stabilize the soil during reclamation. Correll testified that there should be two different seed mixtures used for reclamation, one for the BLM portions of the checkerboard and one for the private lands on the checkerboard. [Tr. pp. 360 – 362; 369]

87. Correll also expressed concerns regarding watershed monitoring during the operations phase of the project, as she believed there would be continued impacts not recognized by PCW. According to Correll, the impacts to cattle and wildlife are unknown at this time for changes in the water usage from agricultural use to making concrete. [Tr. pp. 363 – 364]

88. A third concern expressed by Correll related to the possibility that bonding was not sufficient for reclamation in 30 years. Correll requested the Council reconsider the bonding every five years during the life of the project. [Tr. p. 365]

89. With regard to PCW's requested variance on the decommissioning of the foundations of the turbines, Correll testified there would be a significant detriment to the environment for the long-term reclamation success in 50 years if the variance was granted to allow BLM standards to govern. Correll stated there would be a decline in the sagebrush if the reclamation was to a depth of 42 inches versus 48 inches. [Tr. p. 366]

90. Correll concluded by asking the Council to deny the requested variances and hold PCW to the state standards for reclamation, rather than allowing the federal BLM standards to control. [Tr. pp. 365; 368 – 369]

(d) Town of Saratoga's Witness

John Zeiger

91. John Zeiger (Zeiger) is the Mayor of Saratoga. Mayor Zeiger expressed his support of the project on behalf of the Town of Saratoga. Mayor Zeiger testified that PCW addressed his concerns regarding the housing impact on hotels/motels and tourism by agreeing to a construction camp for its workers. [Tr. pp. 373 – 374]

(e) Town of Encampment's Witness

Greg Salisbury

92. Greg Salisbury (Salisbury) is the Mayor of the Town of Encampment. Mayor Salisbury testified in support of the project and stated that the Town of Encampment had expanded its infrastructure and was prepared for the growth in the valley as a result of the project. [Tr. p. 375]

(f) Town of Riverside's Witness

Ronald Bedwell

93. Ronald Bedwell (Bedwell) is the Mayor of the Town of Riverside. Mayor Bedwell expressed his support of the project on behalf of Riverside. [Tr. p. 376]

(g) Town of Sinclair's Witness

Michelle Serres

94. Michelle Serres (Serres) is the Mayor of the Town of Sinclair. Mayor Serres echoed her support of the project but expressed concerns regarding the housing in the area of influence. Mayor Serres' main concern was that the temporary workers at the Sinclair Refinery were not considered as part of the impact with housing in the area for

PCW workers. According to Mayor Serres, 500 to 2,500 temporary workers are occasionally brought in for certain projects and would create a very large housing crunch. Serres did not believe the housing study conducted by PCW was accurate due to this large fluctuation of workers. [Tr. pp. 377 – 379]

(h) Town of Hanna's Witness

Linda Wagner

95. Linda Wagner (Wagner) is a Hanna council member. Wagner testified that despite what she believed to be an inadequate housing study conducted by PCW, she was in favor of the project. Wagner testified that after voicing her concerns regarding the housing study, representatives from PCW came to Hanna and personally spoke to the Town Clerk and investigated housing opportunities in Hanna that were not identified in the housing study. Wagner commended PCW for its outreach and strongly urged the Council to approve the project with its requested variances. [Tr. pp. 379 – 380]

(i) Town of Elk Mountain's Witness

Linda Crane

96. Linda Crane (Crane) is the Treasurer for the Town of Elk Mountain. Crane echoed her support of the project and requested the permit be issued. [Tr. p. 383]

(j) City of Rawlins' Witness

Amy Bach

97. Amy Bach (Bach) is the Rawlins City Attorney. Bach testified that the City of Rawlins was generally in support of the project and was working cooperatively with PCW to address housing concerns which Bach characterized as a "crisis." [Tr. p. 384]

(k) City of Laramie's Witness

David Derragon

98. David Derragon (Derragon) is the Assistant City Manager for Laramie. Derragon expressed his support of the project and gratitude for the information supplied by PCW concerning the cumulative effects of impacts of multiple projects in the area. Derragon also expressed his appreciation for the information received from the Division staff throughout the permitting process. [Tr. p. 385]

(l) Wyoming Building and Construction Trades Council

Scott Norris

99. Scott Norris (Norris) testified on behalf of the Wyoming Building and Construction Trades Council (WBCTC). Norris testified that WBCTC believes the CCSM Project is important to the State of Wyoming in many different aspects, including adding value and a positive outcome for the power industry, and value to state and local economies. [Tr. p. 386]

(m) Albany County Board of County Commissioners' Witness

Tim Chestnut

100. Tim Chestnut (Chestnut) is an Albany County Commissioner. Chestnut expressed his appreciation of the impact assistance funds to Albany County as a result of the project and Albany County's full support of the project. [Tr. pp. 387 – 388]

(n) Sweetwater County Commissioner's Witness

Marc Dedenbach

101. Marc Dedenbach (Dedenbach) appeared on behalf of the Sweetwater County Commissioner's and stated that the Sweetwater County Commission had no objection to the project. Dedenbach expressed concern over the potential for workers to "pour-over" into the Wamsutter area and the effect it would have on housing and law enforcement. Dedenbach requested that if there is a disproportionate amount of burden, the impact assistance funds be re-negotiated between the parties. [Tr. p. 389]

102. All findings of fact set forth in the following Conclusions of Law section shall be considered a finding of fact and are fully incorporated into this paragraph.

V. CONCLUSIONS OF LAW

A. Principles of Law

103. PCW bears the burden of proof in the proceedings herein. "The general rule in administrative law is that, unless a statute otherwise assigns the burden of proof, the proponent of an order has the burden of proof." *JM v. Dep't of Family Servs.,* 922 P.2d 219, 221 (Wyo. 1996) (citation omitted); *Penny v. State, Wyo. Mental Health Professions Licensing Bd.*, 2005 WY 117, 120 P.3d 152 (Wyo. 2005).

104. Wyoming Statutes Annotated § 35-12-109(a)(i)-(xxi) (LexisNexis 2013) provides that an application for a permit shall be filed with the Division and contain the following information:

> (i) The name and address of the applicant, and, if the applicant is a partnership, association or corporation, the names and addresses of

the managers designated by the applicant responsible for permitting, construction or operation of the facility;

(ii) The applicant shall state that to its best knowledge and belief the application is complete when filed and includes all the information required by W.S. 35-12-109 and the rules and regulations, except for any requirements specifically waived by the council pursuant to W.S. 35-12-107;

(iii) A description of the nature and location of the facility;

(iv) Estimated time of commencement of construction and construction time;

(v) Estimated number and job classifications, by calendar quarter, of employees of the applicant, or contractor or subcontractor of the applicant, during the construction phase and during the operating life of the facility. Estimates shall include the number of employees who will be utilized but who do not currently reside within the area to be affected by the facility;

(vi) Future additions and modifications to the facility which the applicant may wish to be approved in the permit;

(vii) A statement of why the proposed location was selected;

(viii) A copy of any studies which may have been made of the environmental impact of the facility;

(ix) Inventory of estimated discharges including physical, chemical, biological and radiological characteristics;

(x) Inventory of estimated emissions and proposed methods of control;

(xi) Inventory of estimated solid wastes and proposed disposal program;

(xii) The procedures proposed to avoid constituting a public nuisance, endangering the public health and safety, human or animal life, property, wildlife or plant life, or recreational facilities which may be adversely affected by the estimated emissions or discharges;

(xiii) An evaluation of potential impacts together with any plans and proposals for alleviating social and economic impacts upon local governments or special districts and alleviating environmental impacts which may result from the proposed facility. The evaluations, plans and proposals shall cover the following:

(A) Scenic resources;

(B) Recreational resources;

(C) Archaeological and historical resources;

(D) Land use patterns;

(E) Economic base;

(F) Housing;

(G) Transportation;

(H) Sewer and water facilities;

(J) Solid waste facilities;

(K) Police and fire facilities;

(M) Educational facilities;

(N) Health and hospital facilities;

(O) Water supply;

(P) Other relevant areas;

(Q) Agriculture;

(R) Terrestrial and aquatic wildlife;

(S) Threatened, endangered and rare species and other species of concern identified in the state wildlife action plan as prepared by the Wyoming game and fish department.

(xiv) Estimated construction cost of the facility;

(xv) What other local, state or federal permits and approvals are required;

(xvi) Compatibility of the facility with state or local land use plans, if any;

(xvii) Any other information the applicant considers relevant or required by council rule or regulation;

(xviii) A description of the methods and strategies the applicant will use to maximize employment and utilization of the existing local or in-state contractors and labor force during the construction and operation of the facility;

(xix) Certification that the governing bodies of all local governments which will be primarily affected by the proposed facility were provided notification, a description of the proposed project and an opportunity to ask the applicant questions at least thirty (30) days prior to submission of the application;

(xx) For facilities permitted pursuant to W.S. 35-12-102(a)(vii)(E) or (F), a site reclamation and decommissioning plan, which shall be updated every five (5) years, and a description of a financial assurance plan which will assure that all facilities will be properly reclaimed and decommissioned. All such plans, unless otherwise exempt, shall demonstrate compliance with any rules or regulations adopted by the council pursuant to W.S. 35-12-105(d) and (e);

(xxi) Information demonstrating the applicant's financial capability to decommission and reclaim the facility.

105. Wyoming Statutes Annotated § 35-12-110(b)(i)-(xxiii) (LexisNexis 2013) requires that the division obtain information and recommendations from the following state agencies relative to the impact of the proposed facility as it applies to each agency's area of expertise:

(i) Wyoming department of transportation;

(ii) Public service commission;

. . . .

(iv) Game and fish department;

(v) Department of health;

(vi) Department of education;

(vii) Office of state engineer;

. . . .

(ix) Wyoming state geologist;

(x) Wyoming department of agriculture;

(xi) Department of environmental quality;

. . . .

(xiv) The University of Wyoming;

(xv) Department of revenue;

(xvi) The Wyoming business council;

(xvii) Department of workforce services;

(xviii) Office of state lands and investments;

(xix) Department of workforce services;

(xx) Department of state parks and cultural resources;

(xxi) Department of fire prevention and electrical safety;

(xxii) Department of family services;

(xxiii) Oil and gas conservation commission.

106. Wyoming Statutes Annotated § 35-12-110(c) (LexisNexis 2013) provides:

> The information required by subsection (b) of this section shall be provided by the agency from which it is requested not more than sixty (60) days from the date the request is made and shall include opinions as to the advisability of granting or denying the permit together with reasons therefor, and recommendations regarding appropriate conditions to include in a permit, but only as to the areas within the expertise of the agency. Each agency which has regulatory authority over the proposed facility shall provide to the council a statement defining the extent of that agency's jurisdiction to regulate impacts from the facility, including a statement of the agency's capability to address cumulative impacts of the facility in conjunction with other facilities. The statement of jurisdiction from each agency is binding on the council.

107. Wyoming Statutes Annotated § 35-12-110(d) (LexisNexis 2013) provides that:

> On receipt of an application, the director shall conduct a review of the application to determine if it contains all the information required by W.S. 35-12-109 and the rules and regulations. If the director determines that the application is incomplete, he shall within thirty (30) days of receipt of the application notify the applicant of the specific deficiencies in the application. The applicant shall provide the additional information necessary within thirty (30) days of a receipt of a request for additional information from the director.

108. Wyoming Statutes Annotated § 35-12-110(f)(i)-(iv) (LexisNexis 2013) provides that not more than ninety (90) days after receipt of an application for a permit, the director shall:

> (i) Schedule and conduct a public hearing, provided that no hearing shall be held until the state engineer has submitted a preliminary and final opinion as to the quantity of water available for the proposed facility pursuant to W.S. 35-12-108;
>
> (ii) Notify the applicant and local governments of the hearing . . .;

> (iii) Cause notice of the hearing to be published in one (1) or more newspapers of general circulation within the area to be primarily affected by the proposed facility; and
>
> (iv) Hold the hearing at a community as close as practicable to the proposed facility. The provisions of W.S. 35-12-111, 35-12-112 and 35-12-114 apply to the hearing.

109. Pursuant to Wyo. Stat. Ann. § 35-12-111(a)-(e) (LexisNexis 2013), the parties to a permit proceeding include:

> (i) The applicant;
>
> (ii) Each local government entitled to receive a copy of the application under W.S. 35-12-110(a)(i);
>
> (iii) Any person residing in a local government entitled to receive a copy of the application under W.S. 35-12-110(a)(i) including any person holding record title to lands directly affected by construction of the facility and any nonprofit organization with a Wyoming chapter, concerned in whole or in part to promote conservation or natural beauty, to protect the environment, personal health or other biological values, to preserve historical sites, to promote consumer interests, to represent commercial, agricultural and industrial groups, or to promote the orderly development of the areas in which the facility is to be located. In order to be a party the person or organization must file with the office a notice of intent to be a party not less than twenty (20) days before the date set for the hearing.
>
> (b) Any party identified in paragraph (a)(iii) of this section waives his right to be a party if he does not participate orally at the hearing. Any party identified in paragraph (a)(ii) of this section waives its right to be a party unless the local government files a notice of intent to be a party with the office not less than twenty (20) days before the date set for the hearing.
>
> (c) Any person may make a limited appearance in the proceeding by filing a statement in writing with the council prior to adjournment of the hearing. A statement filed by a person making a limited appearance shall become part of the record and shall be made

available to the public. No person making a limited appearance under this subsection is a party to the proceeding.

(d) No state agency other than the industrial siting division shall act as a party at the hearing. Members and employees of all other state agencies and departments may file written comments prior to adjournment of the hearing but may testify at the hearing only at the request of the council, the industrial siting division or any party.

(e) Any person described in W.S. 35-12-111(a)(ii) or (iii) who participated in the public hearing under W.S. 35-12-107 may obtain judicial review of a council decision waiving all or part of the application requirements of this chapter.

110. Pursuant to Wyo. Stat. Ann. § 35-12-113(a)-(f) (LexisNexis 2013), the council shall:

(a) Within forty-five (45) days from the date of completion of the hearing the council shall make complete findings, issue an opinion and render a decision upon the record, either granting or denying the application as filed, or granting it upon terms, conditions or modifications of the construction, operation or maintenance of the facility as the council deems appropriate. The council shall not consider the imposition of conditions which address impacts within the area of jurisdiction of any other regulatory agency in this state as described in the information provided in W.S. 35-12-110(b), unless the other regulatory agency requests that conditions be imposed. In considering the imposition of conditions requested by other agencies upon private lands, the council shall consider in the same manner and to the same extent any comments presented by an affected landowner. The council may consider direct or cumulative impacts not within the area of jurisdiction of another regulatory agency in this state. The council shall grant a permit either as proposed or as modified by the council if it finds and determines that:

(i) The proposed facility complies with all applicable law;

(ii) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition or inhabitants or expected inhabitants in the affected area;

(iii) The facility will not substantially impair the health, safety or welfare of the inhabitants; and

(iv) The applicant has financial resources to decommission and reclaim the facility. . . .

(b) No permit shall be granted if the application is incomplete.

(c) If the council determines that the location of all or part of the proposed facility should be modified, it may condition its permit upon that modification, provided that the local governments, and persons residing therein, affected by the modification, have been given reasonable notice of the modification.

(d) The council shall issue with its decision, an opinion stating in detail its reasons for the decision. If the council decides to grant a permit for the facility, it shall issue the permit embodying the terms and conditions in detail, including the time specified to commence construction, which time shall be determined by the council's decision as to the reasonable capability of the local government, most substantially affected by the proposed facility, to implement the necessary procedures to alleviate the impact. A copy of the decision shall be served upon each party.

(e) A permit may be issued conditioned upon the applicant furnishing a bond to the division in an amount determined by the director from which local governments may recover expenditures in preparation for impact to be caused by a facility if the permit holder does not complete the facility proposed. The permit holder is not liable under the bond if the holder is prevented from completing the facility proposed by circumstances beyond his control.

(f) Within ten (10) days from the date of the council's decision, a copy of the findings and the council's decision shall be served upon the applicant, parties to the hearing and local governments to be substantially affected by the proposed facility and filed with the county clerk of the county or counties to be primarily affected by the proposed facility. Notice of the decision shall be published in one (1) or more newspapers of general circulation within the area to be affected by the proposed facility.

111. The Industrial Development Information and Siting Rules and Regulations (2014), Chapter 1 provide, in part:

> Section 8. **Application Information to be Submitted.**
>
> In accordance with W.S. 35-12-109, the application shall contain the information required by the Act with respect to both the construction period and online life of the proposed industrial facility and the following information the Council determines necessary:
>
> (a) The application shall state the name, title, telephone number, mailing address, and physical address of the person to whom communication in regards to the application shall be made.
>
> (b) A description of the specific, geographic location of the proposed industrial facility. The description shall include the following:
>
> (i) Preliminary site plans at an appropriate scale indicating the anticipated location for all major structures, roads, parking areas, on-site temporary housing, staging areas, construction material sources, material storage piles and other dependent components; and
>
> (ii) The area of land required by the industrial facility and a land ownership map covering all the components of the proposed industrial facility.
>
> (c) A general description of the major components and dependent components of the proposed industrial [sic].
>
> (d) A description of the operating nature of the proposed industrial facility, the expected source and quantity of its raw materials, and energy requirements. The description shall include, but is not limited to, the following:
>
> (i) The proposed on-line life of the industrial facility and its projected operating capacity during its on-line life; and, for transmission lines exceeding one hundred fifteen thousand (115,000) volts included as part of the proposed industrial facility, a projection indicating when such lines will become insufficient to meet the future demand and at what time a

need will exist to construct additional transmission lines to meet such demands; and

(ii) Products needed by facility operations and their source.

(e) A statement that shall be a reasonable estimate of the calendar quarter in which construction of the industrial facility will commence, contingent upon the issuance of a permit by the Council.

(f) A statement that shall be a reasonable estimate of the maximum time period required for construction of the industrial facility and an estimate of when the physical components of the industrial facility will be ninety (90) percent complete, and the basis for that estimate.

(g) The applicant shall identify what it deems to be the area of site influence and recommends as the local governments primarily affected by the proposed industrial facility as defined in Sections 2(b), (c) and (d). The immediately adjoining area(s) and local governments shall also be identified with a statement of the reasons for their exclusion from the list of area(s) or local governments primarily affected by the proposed industrial facility.

(h) Using tables, provide a detailed tally of the estimated work force to construct and to operate the facility showing the following information:

(i) All workers providing direct labor and direct support; (safety, supervision, inspection) at the work site;

(ii) Information by calendar quarter and year from the commencement of construction through the first year of operation;

(iii) Identify and provide totals of those which are construction and those which are permanent;

(iv) Identify and provide quarterly totals of the number, job classification and recurrence; of those which are estimated to be in-migrating (from outside the study area at the time of hire for the facility) and of those pre-existing employees of the applicant engaged in construction;

(v) Provide estimates of wages; and

(vi) Provide estimates of paid benefits including per diem and paid fees.

(i) The social and economic conditions in the area of site influence. The social and economic conditions shall be inventoried and evaluated as they currently exist, projected as they would exist in the future without the proposed industrial facility and as they will exist with the facility. Prior to submitting its application, each applicant shall confer with the Administrator to define the needed projections, the projection period and issues for socioeconomic evaluation. The evaluation may include, but is not limited to:

(i) An analysis of whether or not the use of the land by the industrial facility is consistent with state, intrastate, regional, county and local land use plans, if any. The analysis shall include the area of land required and ultimate use of land by the industrial facility and reclamation plans for all lands affected by the industrial facility or its dependent components;

(ii) A study of the area economy including a description of methodology used. The study may include, but is not limited to, the following factors:

(A) Employment projections by major sector;

(B) Economic bases and economic trends of the local economy;

(C) Estimates of basic versus non-basic employment;

(D) Unemployment rates;

(iii) A study of the area population including a description of methodology used. The study may include, but is not limited to, an evaluation of demographic characteristics for the current population and projections of the area population without the proposed industrial facility;

(iv) An analysis of housing facilities by type, including a quantitative evaluation of the number of units in the area and a discussion of vacancy rates, costs, and rental rates of the units. The analysis should include geographic location, including a quantitative evaluation of the number of units in the area required by the construction and operation of the proposed industrial facility and a discussion of the effects of the proposed industrial facility on vacancy rates, costs, and rental rates of the units. Specific housing programs proposed by the applicant should be described in detail;

(v) An analysis of effects on transportation facilities containing discussion of roads (surface type), and railroads (if applicable);

(vi) Public facilities and services availability and needs, which may include, but are not limited to:

(A) Facilities required for the administrative functions of government;

(B) Sewer and water impacts shall describe the distribution and treatment facilities including the capability of these facilities to meet projected service levels required due to the proposed industrial facility. Use of facilities by the proposed industrial facility should be assessed separately from population related increases in service levels. If required pursuant to W.S. 35-12-108, the application shall contain the Water Supply and Water Yield Analysis and Final Opinion of the State Engineer;

(C) Solid waste collection and disposal services including the capability of these facilities to meet projected service levels required due to the proposed industrial facility. Use of facilities by the proposed industrial facility should be assessed separately from population related increases in service levels;

(D) Existing police and fire protection facilities including specific new demands or increases in service levels created by the proposed industrial facility;

(E) An analysis of health and hospital care facilities and services;

(F) Human service facilities, programs and personnel, including an analysis of the capacity to meet current demands and a description of problems, needs, and costs of increasing service levels;

(G) An analysis of community recreational facilities and programs and urban outdoor recreational opportunities;

(H) Educational facilities, including an analysis based upon enrollment per grade, physical facilities and their capacities and other relevant factors with an assessment of the effect that the new population will have on programs and facilities;

(I) Problems due to the transition from temporary, construction employees to operating workforces should be addressed. Changes in levels of services required as a result of the proposed industrial facility should specifically be addressed. Cumulative impacts of the proposed industrial facility and other developments in the area of site influence should be addressed separately. This assessment should examine increased demands associated with the construction and operational phases of the proposed industrial facility, as well as effects on the level of services as the construction or operational workforces decline;

(J) A copy of any studies that may have been made of the social or economic impact of the industrial facility.

(vii) A fiscal analysis over the projection period for all local governments and special districts identified by the applicant as primarily affected by the proposed industrial facility, including revenue structure, expenditure levels, mill levies, services provided through public financing, and the problems in providing public services. The analysis may include, but is not limited to:

(A) An estimate of the cost of the facility.

(B) An estimate of the cost of the facility construction subject to sales and use taxes.

(C) An estimate of sales and use taxes by year for each county if the facility is located in more than one county.

(D) Estimates of impact assistance payments which will result from the project.

(E) An estimate of the cost of components of the industrial facility which will be included in the assessed value of the industrial facility for purposes of ad valorem taxes for both the construction and operations periods. This estimate should include a breakdown by county if the components of the industrial facility will be located in more than one county.

(j) An evaluation of the environmental impacts as they would exist if the proposed industrial facility were built. Each evaluation should be followed by a brief explanation of each impact and the permit issued that regulates the impact. If the impact is not regulated by a state regulatory agency or federal land management agency, the application must include plans and proposals for alleviating adverse impacts. Cumulative impacts of the proposed industrial facility and other projects in the area of site influence should be addressed separately.

(k) The applicant shall describe the procedures proposed to avoid constituting a public nuisance, endangering the public health and safety, human or animal life, property, wildlife or plant life, or recreational facilities which may be adversely affected by the proposed facility, including:

(i) Impact controls and mitigating measures proposed by the applicant to alleviate adverse environmental, social and economic impacts associated with construction and operation of the proposed industrial facility;

> (ii) Monitoring programs to assess effects of the proposed industrial facility and the overall effectiveness of impact controls and mitigating actions.

112. Wyoming Statutes Annotated § 18-5-502 (LexisNexis 2013) provides further guidance in the regulation of wind energy projects including, in relevant part:

> (a) It is unlawful to locate, erect, construct, reconstruct or enlarge a wind energy facility without first obtaining a permit from the board of county commissioners in the county in which the facility is located.

113. With regard to variances, the Rules Indus. Dev. Info. & Siting, ch. 1 (2014) provides, in part:

> Section 9. **Additional Application Requirements for Wind Energy Facilities.**
>
> (a) Facility Decommissioning. The applicant shall provide a facility decommissioning plan.
>
> > (i) The facility decommissioning plan shall include provisions regarding the removal and proper disposal of all wind turbines, towers, substations, buildings, cabling, electronic components, foundations to a depth of forty-eight (48) inches, and any other associated or ancillary equipment or structures within the facility boundary above and below ground.
>
> . . . .
>
> (f) The Council may give a case-by-case variance to requirements of this Section after considering evidence by the Applicant or landowner.

114. In addition to the requirements of Wyo. Stat. Ann. § 35-12-109(a)(xx) (LexisNexis 2013) reflected in paragraph 104 of this Order, Rules Indus. Dev. Info. & Siting, ch. 1, § 9 (2014) also addresses financial assurances requiring, in part:

> (d) Financial Assurance: The applicant shall provide financial assurances for a wind energy facility, sufficient to assure complete decommissioning and site reclamation of the facility in accordance with the provisions of these rules[.]
>
> > (i) All financial assurances shall be in place prior to commencement of construction of any wind energy facility, and shall be adjusted up or down every five years from the date of permit issuance by the Council based on the results of paragraph (e) of this section.
>
> (e) Cost Estimation for Decommissioning and Site Reclamation of the facility:
>
> > . . . .
> >
> > (ii) Decommissioning and site reclamation estimates shall be submitted to the Division in the application and every five years after the date of permit issuance until the completion of final reclamation.

B. <u>Application of Principles of Law</u>

115. This Council has considered all the evidence, testimony, and arguments presented at the August 5 and 6, 2014 evidentiary hearing. Through the evidence and testimony, this Council finds that PCW has shown, by a preponderance of the evidence, that it filed a complete Application with the Division regarding the proposed CCSM Project, which included the requirements in Wyo. Stat. Ann. § 35-12-109(a) and Chapter 1, Section 8 of the Industrial Development Information and Siting Rules and Regulations, and that the proposed CCSM Project complies with all applicable law. The completeness of the Application is supported by the testimony of Jacobson, Garry Miller, Choquette, Wichmann, and Chairman Chapman of the Carbon County Board of County Commissioner's.

116. PCW has shown, through the exhibits and testimony of all its witnesses, the proposed CCSM Project will not pose a threat of serious injury to the environment nor to the social and economic conditions of inhabitants in the affected area, and that the project will not substantially impair the health, safety, and welfare of those inhabitants. The testimony of Jacobson, Hammond, and Garry Miller all indicated that to be the case.

117. PCW has also shown, by a preponderance of the evidence, that its request for variances with regard to bonding, decommissioning, and reclamation should be granted. PCW's evidence of the reasonableness of the variances was proven through the testimony of Jacobson and Dr. Wojcik, both of whom had the knowledge, education, and expertise in formulating an effective reclamation plan which prevents injury to the soil and vegetation, leading to successful reclamation. Those variances are incorporated into this Order through Conditions #15 through #19 as set forth below on pages 55 and 56 of this Order. This Council was not persuaded by the Saratoga-Encampment-Rawlins Conservation District's request to apply different standards on the checkerboard portions of the land within the CCSM Project area. Applying two different standards for decommissioning and reclamation will lead to additional, unnecessary disturbance of the lands and additional, unnecessary costs to the applicant.

118. With respect to the concerns expressed by the Saratoga-Encampment-Rawlins Conservation District that the reclamation bonding was potentially inadequate, this Council is satisfied that those concerns are sufficiently addressed in the statutes and rules governing financial assurance for decommissioning and site reclamation. Specifically, Wyo. Stat. Ann. § 35-12-109(a)(xx) (LexisNexis 2013) and the Rules Indus.

Dev. Info. & Siting, ch. 1, § 9 (d) and (e)(2014) require a review of PCW's financial assurance plan every five years to assure complete decommissioning and site reclamation of the facility.

119. The Division proposed 19 enumerated conditions should the permit be issued. PCW had no objections to the conditions, with a minor correction to a typographical error in Condition #15.

120. Finally, with regard to the allocation of the impact assistance funds, this Council finds the Division's recommendation to allocate 94 percent of the impact funds to Carbon County, 3 percent of the impact funds to Albany County, and 3 percent of the impact funds to Sweetwater County is reasonable. The parties agreed to the recommended allocation of funds.

VI. DECISION

Pursuant to the authority vested in the Industrial Siting Council by Wyo. Stat. Ann. § 35-12-113 (LexisNexis 2013), this Council hereby **GRANTS** the Industrial Siting Permit Application filed by Power Company of Wyoming to construct and operate the Chokecherry and Sierra Madre Wind Energy Project to be located at the Overland Trail Cattle Company Ranch in Carbon County, Wyoming.

The Council specifically finds, with the imposition of the following conditions, that:

(1) The proposed facility complies with all applicable law;

(2) The facility will not pose a threat of serious injury to the environment nor to the social or economic condition of inhabitants or expected inhabitants of the affected area;

(3) The facility will not substantially impair the health, safety, or welfare of the inhabitants;

(4) The Applicant has the financial resources to decommission and reclaim the facility;

(5) The variance requested by the Applicant to leave in place the underground cables buried to a depth of 36 inches is reasonable and granted;

(6) The variance requested by the Applicant to reclaim the turbine pads at the pedestal level is reasonable and granted;

(7) The variance requested by the Applicant to reclaim the vegetation at BLM standards is reasonable and granted; and

(8) The variance requested by the Applicant for graduated bonding for the project is reasonable and granted.

(9) Pursuant to its authority, this Council allocates the impact assistance funds as follows:

Carbon County, Wyoming: 94%
Albany County, Wyoming: 3%
Sweetwater County, Wyoming: 3%

(10) Finally, pursuant to its authority, this Council places the following terms and conditions on the facility, as modified, from the *Division's Ex. 3*:

STANDARD WIND PERMIT CONDITIONS

Condition #1. Power Company of Wyoming, LLC (Permittee) shall obtain and maintain all required State and local permits and approvals in accordance with W. S. 35-12-109(a)(xv), 35-12-113(a)(i), and 35-12-115 during the term of this permit.

Condition #2. Permittee shall commence to construct within three years following the date of the award of this permit.

Condition #3. Before engaging in any activity over which the Industrial Siting Council (ISC) has jurisdiction which could significantly affect the environment external to Permittee's permit area, or the social, or economic, or environmental conditions of the area of site influence and which was not evaluated in the permit process, the Permittee shall prepare and file an evaluation of such activity with the Industrial Siting Division (ISD). When in the opinion of the Director of the Department of Environmental Quality (Director), the evaluation indicates that such activity may result in significant adverse impacts that were not considered in the permit, the Permittee shall file a permit amendment in accordance with W. S. 35-12-106.

Condition #4. The Permittee shall develop a written compliance plan and program to ensure compliance with voluntary commitments of this Permit, testimony, agreements with local governments, and these permit conditions. A compliance coordinator shall be designated and identified to the ISD prior to the onset of construction. This individual shall present himself/herself and meet with the ISD staff before construction commences and review the permit requirements with the ISD staff. This coordinator shall assume the responsibility for assuring that contractors and subcontractors are aware of and enable the Permittee to meet all permit requirements.

Condition #5. The ISC may review any adverse social, economic, or environmental impacts either within or outside the area primarily affected that are attributed to the Permittee:

a. Which adversely affect the current level of facilities or services provided by the local community;

b. Which cannot be alleviated by financing through ordinary sources of revenue, given due consideration to bonding history and capacity of the jurisdiction involved;

c. Which were not evaluated or foreseen at the time the permit was granted and can be attributed in whole or in part to the permitted facility; and

d. Which are not or cannot be resolved by voluntary measures by industrial representatives in the community.

Then by order issued in accordance with the Wyoming Administrative Procedures Act, the ISC may require additional mitigation by the Permittee in cooperation with other basic industries (existing and future) provided that:

a. A local government has requested mitigation assistance; and

b. Such adverse impacts were determined to be a result of the activities of the Permittee.

Permittee shall be required to assist in mitigating any impacts that result from construction or operation of the Chokecherry and Sierra Madre Wind Energy Project (Facility), including those resulting from direct and indirect employment. For purposes of determining additional mitigation measures by the Permittee, consideration shall be given to previous mitigation efforts. However, in any event, Permittee shall not be required to provide mitigation in excess of the proportion that the Permittee's activities are contributing to the total impacts within the impacted area (as defined by W. S. 35-12-102).

Condition #6. The Permittee shall give written notice to the ISD when construction commences.

Condition #7. The Permittee shall give written notice to the ISD when the physical components of the Facility are 90 percent complete.

Condition #8. As a means of adhering to W. S. 35-12-109(a)(xviii) to provide preference for local and resident hiring, the Permittee, contractors and subcontractors shall follow these hiring guidelines:

a. Procedures to foster local hiring shall be incorporated into the compliance plan.

b. Job postings shall be filed with the local Workforce Center.

Condition #9. The Permittee shall submit an annual report to ISC for the years or portion of a year that includes construction and again for the first year of operation of the facility for each phase. The annual report shall include:

a. Efforts to assure compliance with voluntary commitments, mitigation agreements with local governments, and conditions contained in this permit;

b. The extent to which construction has been completed in accordance with the approved schedule;

c. Any revised time schedules or time tables for construction, operations, and reclamation, and a brief summary of the construction, reclamation, and other activities that will occur in the next one-year period; and

d. Demonstration of compliance with permit conditions.

Condition #10. In order that the ISD may monitor Permittee's performance, the Permittee shall institute the following monitoring program that shall be recorded on a monthly basis and reported to the ISD on a quarterly basis through the construction period of each phase. Monthly data will be in a form prescribed by ISD and shall include:

a. The average and peak number of employees for the Permittee, contractors and subcontractors.

b. Employee city and state of residency at the time of hire and the employee city and state while employed and type of residence while employed.

c. The number of new students enrolled by grade level and school district who are related to Permittee employees, identified as either local (no change of residence) and in-migrants.

d. Wyoming resident versus non-resident workforce.

e. An updated construction schedule in the form of Figure 7-1 and Figure 7-2 as shown on pages 7-2 and 7-3 of the *Section 109 Power Company of Wyoming, LLC, Chokecherry and Sierra Madre Wind Energy Project application* (Application).

Condition #11. The Permittee shall notify the ISD in advance of proposed changes to the scope, purpose, size or schedule of the Facility. The Director may authorize such changes if he or she finds that:

a. The change should not result in any significant adverse environmental, social, and economic impacts in the area of site influence; and

b. No party nor Council Member has requested that the matter be heard before the Council in accordance with the permit procedures of W. S. 35-12-106(c) and (d).

The Director will provide public notice of the proposed change and his intent to approve the request.

Condition #12. The Permittee shall notify the ISD in advance and provide updates to the On-Site Construction Workforce Schedule, Table 7-3 and Figure 7-4 on pages 7-7 and 7-8 of the Application, and all other pages of the Application where changes are expected to occur if:

a. Actual on-site workforce during construction is expected to exceed the peak number estimated in the Application by more than fifteen percent (15%);

b. The Permittee wishes to make changes to the lodging plan as described in the Application.

The Director may authorize such changes or refer the matter to the Siting Council.

Condition #13. As may be subsequently required by the Director, the Permittee shall pay a fee based on the estimated costs to prepare, schedule, and conduct a special hearing or meeting of the Council to remedy any action or inaction by the Permittee. Unused fees shall be refunded to the Permittee.

Condition #14. When the Project is nearing completion, Permittee shall place notice to that effect in the newspapers in the general area of the Facility.

ADDITIONAL PERMIT CONDITIONS

Condition #15. The Permittee shall provide bonding on the permit for only the non-federal lands in the amount of $146,918,000 for decommissioning and reclamation which is a waiver to W.S. 35-12-109(a)(xx) and Rules of the Council. The Permittee shall provide the surety bond in steps outlined below:

a) Step 1: Before the start of any construction, Permittee shall provide a surety bond or similar security acceptable to the Administrator for $20,673,000 payable to the Department of Environmental Quality.

b) Step 2: At least 30 days prior to construction on SPOD 4, Phase I Wind Turbine Development, the Permittee shall provide:

   i. the Division a copy of the ROW grant as described in Section 5.2.2 of the Application for SPOD 4,

   ii. and an additional surety for $65,352,000 payable to the Department of Environmental Quality so that the total surety prior to construction on SPOD 4 would be $86,025,000.

c) Step 3: At least 30 days prior to construction on SPOD 5, Phase II Wind Turbine Development, the Permittee shall provide:

   i. the Division a copy of the ROW grant as described in Section 5.2.2 of the Application for SPOD 5,

   ii. and an additional surety for $60,893,000 payable to the Department of Environmental Quality so that the total surety prior to construction on SPOD 5 would be $146,918,000.

The Permittee shall update the decommissioning and reclamation plan and bond every five years and submit both to the Director for review and approval.

Condition #16. The Decommissioning and Reclamation for this project shall be conducted in accordance with the reclamation plan. The Permittee has approval to use:

- BLM's standard for re-vegetative requirements on all non-federal land rather than the requirements defined in the Rules and Regulations of the Industrial Siting Council Rules and Regulations (ISC),

- BLM's requirement to remove the pedestal portion of the foundation on all non-Federal Land rather than ISC's requirement of removing turbine foundations to a depth of 48 inches,

- and BLM's acceptance of leaving the underground cable in place on all non-federal land rather than ISC requirement of removing all cable to a depth of 48 inches.

Condition #17. During the construction of the facility, the Council shall consider requests by local government parties to change the distribution of impact assistance funds upon a showing of good cause as provided in the Regulations.

Condition #18. The Permittee commits to its housing plan as stated in the application and will construct the specified construction camp and RV site at the facility. Updates, changes and/or improvement to the housing plan shall be reported annually to the Director and the Director may authorize changes and/or improvements to the housing plan.

Condition #19. At least 30 days prior to the start of construction, Permittee shall provide a copy of the signed road use agreement between the Permittee and Wyoming Department of Transportation to the Industrial Siting Administrator.

VII. ORDER

IT IS THEREFORE ORDERED that the Industrial Siting Permit Application known as the Chokecherry and Sierra Madre Wind Energy Project, as submitted by the Applicant, as modified by this Council, and as set forth above in Permit Conditions #1 through #19, is **GRANTED**.

DONE this 12TH day of September, 2014.

Shawn Warner

Shawn Warner, Chairman
Industrial Siting Council
Herschler Building, Fourth Floor West
122 West 25th Street
Cheyenne, Wyoming 82002
(307) 777-7170

CERTIFICATE OF SERVICE

I hereby certify that the foregoing document was served by mailing a true and correct copy, postage prepaid, on the 16 day of September, 2014, addressed to the following:

Wyoming Department of Environmental Quality – (ORIGINAL)
Industrial Siting Division
Attn: Kimber Wichmann, Principal Economist
Herschler Building, Fourth Floor West
122 West 25th Street
Cheyenne, Wyoming 82002

Andrew J. Kuhlmann – Attorney for Industrial Siting Division
Wyoming Attorney General's Office
123 State Capitol
Cheyenne, Wyoming 82002

Paul J. Hickey – Attorney for Applicant
Hickey & Evans, LLP
P.O. Box 467
Cheyenne, Wyoming 82003-0467

Karl D. Anderson – Attorney for Council
Wyoming Attorney General's Office
123 State Capitol
Cheyenne, Wyoming 82002

Mayor Greg Salisbury – Town of Encampment
P.O. Box 5
Encampment, Wyoming 82325

Chairman Leo J. Chapman – Board of Carbon County Commissioners
P.O. Box 6
Rawlins, Wyoming 82301

Daniel T. Massey, City Manager – City of Rawlins
P.O. Box 953
Rawlins, Wyoming 82301

Mayor Ronald L. Bedwell – Town of Riverside
P.O. Box 657
Riverside, Wyoming 82323
Mayor Morgan Irene – Town of Elk Mountain
P.O. Box 17
Elk Mountain, Wyoming 82324

Mayor John Zeiger – Town of Saratoga
P.O. Box 486
Saratoga, Wyoming 82331

Mayor Tony D. Poulos – Town of Hanna
P.O. Box 99
Hanna, Wyoming 82327

Janine Jordan, City Manager – City of Laramie
P.O. Box C
Laramie, Wyoming 82073

Joseph Elder, Vice President – Voices of the Valley
P.O. Box 769
Saratoga, Wyoming 82331

Mayor Kevin Coleman – Town of Medicine Bow
P.O. Box 156
Medicine Bow, Wyoming 82329-0156

Mayor Michelle Serres – Town of Sinclair
P.O. Box 247
Sinclair, Wyoming 82334

Leanne Correll – Saratoga-Encampment-Rawlins Conservation District
P.O. Box 633
Saratoga, Wyoming 82331

Jennifer K. Stone, Deputy County & Prosecuting Attorney – County of Albany
525 Grand Avenue, Suite 100
Laramie, Wyoming 82070

Douglas C. Thomas, Pres. – Wyo. Building & Construction Trades Council
P.O. Box 50308
Casper, Wyoming 82605

Wally J. Johnson, Chairman – Sweetwater County Bd. of County Comm'ers
80 West Flaming Gorge Way, Suite 109
Green River, Wyoming 82935

Kimber Wichman

Industrial Siting Division

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Power Company
of Wyoming LLC

555 Seventeenth Street
Suite 2400
Denver, CO 80202
Tel 303.298.1000
Fax 303.299.1356

VIA U.S. Postal Service Certified Mail

June 12, 2015

Migratory Bird Permit Office
P.O. Box 25486 DFC(60130)
Denver, CO 80225-0486

Clint Riley, Assistant Regional Director, Migratory Birds and State Programs
Mountain-Prairie Region
U.S. Fish and Wildlife Service
134 Union Blvd.
Lakewood, CO 80228

Tyler Abbott, Deputy Field Supervisor
U.S. Fish and Wildlife Service
Ecological Services Wyoming Field Office
5353 Yellowstone Road, Suite 308A
Cheyenne, WY 82009

Re: Application for Eagle Take – associated with but not the purpose of an activity, Chokecherry and Sierra Madre Wind Energy Project, Phase I Programmatic Take

Dear Messrs. Riley and Abbott:

Reflecting more than five years of collaboration and cooperation with the U.S. Fish and Wildlife Service (USFWS), Power Company of Wyoming LLC (PCW) is pleased to submit the enclosed 2015 Phase I Eagle Conservation Plan (Phase I ECP) for Phase I of the Chokecherry and Sierra Madre Wind Energy Project (Phase I), along with its formal application for a programmatic eagle take permit. A check for the required $36,000 application fee is also enclosed. The Phase I ECP refines and replaces both the project-wide Eagle Conservation Plan that PCW submitted to the USFWS on August 14, 2011, and the draft Phase I ECP chapters that PCW subsequently provided in support of USFWS's work to prepare an Environmental Impact Statement, a process that began on December 4, 2013, with publication of the Notice of Intent.

The Phase I ECP supports PCW's request for a Bald and Golden Eagle Protection Act (BGEPA) 30-year programmatic eagle take permit covering Phase I of the CCSM Project, which consists of 500 wind turbines and associated infrastructure. The document outlines the comprehensive scientific data that was gathered and used to inform PCW's project design, and how the design, coupled with extensive conservation and mitigation measures, assures that Phase I is consistent with the USFWS's goal of maintaining stable or increasing breeding populations of eagles.

The Phase I ECP demonstrates that the project avoids and minimizes impacts to eagles such that the remaining take is unavoidable; therefore, meeting the legal criteria for a permit.

Power Company of Wyoming LLC

PCW's Phase I ECP is built on a foundation of over seven years of rigorous study and analysis specific to the CCSM Project, including Phase I. Thousands of hours of surveys were completed consistent with the USFWS's recommendations and protocols to ensure a science-based, site-specific approach to the Phase I design. As described in the Phase I ECP, Phase I has been carefully designed to comply with the USFWS's 2013 Eagle Conservation Plan Guidance and the 2012 Land-Based Wind Energy Guidelines. In addition, PCW has addressed USFWS's project-specific and site-specific recommendations made over the last 5 years, which are outlined in the correspondence included as Appendix H.

PCW believes that through thousands of hours of survey data collected, Phase I achieves the necessary standard for characterizing and addressing risks to eagles. As noted in Chapter 5 of the Phase I ECP, for example, PCW has conducted extensive eagle use surveys, eagle nest surveys, and prey base surveys to assess the potential risk to eagles from Phase I. Some of these surveys include:

- Nearly 2,500 hours of long-watch raptor surveys at 25 locations within the CCSM Project Site, including 100% survey coverage of the Phase I wind turbine layout, over 16 months. The data collected was used to understand and identify areas of high eagle use for the purposes of micrositing turbines and other facilities.

- Over 1,626 hours of 800-meter raptor surveys, conducted for 12 months at up to 60 locations within the CCSM Project site, including 866 hours of survey in the Phase I area alone. As recommended in the ECP Guidance, these surveys were conducted within 800-meter radius plots in order to maintain high confidence in detecting raptors and recording their flight paths. In the Phase I area, the most golden eagle flight minutes observed in a three-month survey period was 51 minutes out of 282 hours of observation, or 0.0030 flight minutes per minute of survey. Only 2 minutes of bald eagle flight were observed in all 866 hours of survey.

- Two years of continuous 24/7 avian and bat monitoring with an avian radar system operating at 9 different locations across the CCSM Project Site. Due to the radar's limitations in distinguishing between species, the radar dataset did not help in quantifying species use on the CCSM Project Site, but it did help PCW analyze broad-front migratory movements and eagle use around occupied nests.

- Five years of springtime helicopter-based aerial nest surveys, with four years of covering not only the entire CCSM Project Site but also a 5-mile area beyond the site, surveying about 700 square miles in total.

Chapter 6 outlines PCW's work to use science and the site-specific data to avoid and minimize potential risks to eagles, in large part by substantially redesigning its original proposed turbine layout in consideration of eagles and their habitat as well as other environmental factors. For instance:

- Hundreds of proposed turbines were relocated or removed during six major project redesigns; in the sixth redesign alone, PCW moved over 110 turbines to accommodate requirements and recommendations from USFWS and from the Bureau of Land Management (BLM).

- PCW has excluded more than 105,000 acres from development through the creation of "Turbine No-Build Areas" across the CCSM Project site; these areas were specifically designed to substantially reduce the risk to eagles. Eagle use within the designated Turbine No-Build Areas represents approximately 80% of all eagle use observed.

In addition to the avoidance and minimization measures outlined in Chapter 6, Chapter 8 details numerous conservation measures, Best Management Practices (BMPs), and experimental Advanced Conservation Practices (ACPs) for Phase I that will further reduce risk to eagles. For example, PCW will forego installing wind turbines on about 27,500 acres of private land owned by The Overland Trail Cattle Company LLC, and leased by PCW for wind energy development, and instead will work with TOTCO to place this land into a conservation easement, in conjunction with constructing and operating the CCSM Project, including Phase I. Also, PCW will construct the CCSM Project in phases and stages. This approach will provide greater flexibility for avoiding impacts to avian and other wildlife species, and it will reduce the area being constructed at any given time to minimize disruption in important habitat. Specific BMPs recommended by the Wind Energy Guidelines also are incorporated into Phase I construction, operations, maintenance, and decommissioning plans.

In compliance with Stage 3 of the ECP Guidance, Chapter 7 of the Phase I ECP identifies predictions of eagle take. Through the application of conservation measures, BMPs, ACPs, and compensatory mitigation to offset the predicted take, PCW believes that Phase I meets the USFWS standards. Finally, PCW has committed to conducting comprehensive post-construction monitoring to implement an adaptive management process. Collectively, the measures applied to Phase I, as described in the Phase I ECP, will avoid and minimize risks to bald and golden eagles to the extent practicable such that any remaining take is unavoidable despite the application of ACPs.

In summary, PCW has fully complied with USFWS's guidance and has avoided and minimized impacts to eagles from Phase I such that the remaining take is unavoidable. The commitments in the Phase I ECP, in combination with the various applicant-committed conservation measures and conservation plans described in the ECP, along with the requirements outlined in the BLM's Environmental Impact Statement, avoid and minimize impacts to bald and golden eagles as well as many other avian, wildlife and fish species within the project site. PCW's data collection, planning and conservation commitments are setting the standard for developing renewable resources in an environmentally responsible manner.

We look forward to USFWS's completion of the Environmental Impact Statement to analyze the environmental impacts associated with your decision on whether to issue a Phase I programmatic eagle take permit. In the meantime, we appreciate the time and effort that U.S. Fish and Wildlife Service officials devoted to providing recommendations to PCW. PCW looks forward to continuing this cooperation as we work toward responsibly developing Phase I to ensure that clean, renewable energy supplies are available to power our nation while also conserving the wildlife we all value.

Sincerely,

Garry L. Miller
Vice President, Land and Environmental Affairs

Encl. as referenced

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Department of the Interior
U.S. Fish and Wildlife Service

OMB Control No. 1018 - 0022
Expires 5/31/2017

Federal Fish and Wildlife Permit Application Form

Click here for addresses.

Return to: U.S. Fish and Wildlife Service (USFWS)

Migratory Bird Permit Office
P.O. Box 25486 DFC(60130)
Denver, CO 80225-0486

Type of Activity: Eagle Take – Associated With But Not the Purpose of an Activity

☑ **New Application**
☐ **Requesting Renewal or Amendment of Permit #** ________________

Complete Sections A or B, and C, D, and E of this application. U.S. address may be required in Section C, see instructions for details.
See attached instruction pages for information on how to make your application complete and help avoid unnecessary delays.

A. Complete if applying as an individual			
1.a. Last name	1.b. First name	1.c. Middle name or initial	1.d. Suffix
2. Date of birth (mm/dd/yyyy)	3. Social Security No.	4. Occupation	5. Affiliation/ Doing business as (see instructions)
6.a. Telephone number	6.b. Alternate telephone number	6.c. Fax number	6.d. E-mail address

B. Complete if applying on behalf of a business, corporation, public agency, Tribe, or institution			
1.a. Name of business, agency, tribe, or institution: Power Company of Wyoming LLC	1.b. Doing business as (dba): N/A		
2. Tax identification no.: 26-1443919	3. Description of business, agency, or institution: Wind Energy Company		
4.a. Principal officer Last name: Miller	4.b. Principal officer First name: Garry	4.c. Principal officer Middle name/ initial: L.	4.d. Suffix
5. Principal officer title: Vice President, Land and Environmental Affairs	6. Primary contact name: Garry L. Miller		
7.a. Business telephone number: 303-299-1546	7.b. Alternate telephone number	7.c. Business fax number: 303-299-1356	7.d. Business e-mail address: garry.miller@tac-denver.com

C. All applicants complete address information				
1.a. Physical address (Street address; Apartment #, Suite #, or Room #; no P.O. Boxes): 555 Seventeenth Street, Suite 2400				
1.b. City: Denver	1.c. State: CO	1.d. Zip code/Postal code: 80202	1.e. County/Province: Denver	1.f. Country: USA
2.a. Mailing Address (include if different than physical address; include name of contact person if applicable): Same				
2.b. City	2.c. State	2.d. Zip code/Postal code:	2.e. County/Province	2.f. Country

D. All applicants MUST complete

1. Attach check or money order payable to the U.S. FISH AND WILDLIFE SERVICE **in the amount of (see attached fee schedule)** nonrefundable processing fee. Federal, Tribal, State, and local government agencies, and those acting on behalf of such agencies, are exempt from the processing fee – ***attach documentation of fee exempt status as outlined in instructions.*** (50 CFR 13.11(d))
2. Do you currently have or have you ever had any Federal Fish and Wildlife permits?
Yes ☐ If yes, list the number of the most current permit you have held or that you are applying to renew/re-issue: ________________ No ☑
3. Certification: I hereby certify that I have read and am familiar with the regulations contained in ***Title 50, Part 13 of the Code of Federal Regulations*** and the other ***applicable parts in subchapter B of Chapter I of Title 50***, and I certify that the information submitted in this application for a permit is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to the criminal penalties of 18 U.S.C. 1001.

[signature] 06/12/2015

Signature (**in blue ink**) of applicant/person responsible for permit (No photocopied or stamped signatures) Date of signature (mm/dd/yyyy)

Please continue to next page

SECTION E. EAGLE TAKE – ASSOCIATED WITH BUT NOT THE PURPOSE OF AN ACTIVITY (EAGLE NON-PURPOSEFUL TAKE)

(Bald and Golden Eagle Protection Act, 50 CFR 22.26)

Note: A Federal eagle non-purposeful take permit authorizes the disturbance or other take of eagles where the take results from but is not the purpose of an otherwise lawful activity. Permits are available to individuals, agencies, businesses, and other organizations. This permit does not authorize possession of any eagle, eagle parts, or eagle nests. Please read "What You Should Know About a Federal Permit for Non-Purposeful Eagle Take" and the pertinent regulations at 50 CFR 22.26 before you sign and submit your application.

Please provide the information requested below on a separate sheet of paper. You should be as thorough and specific as possible in your responses. Incomplete applications will be returned, delayed or abandoned. Processing time depends on the complexity of the request and completeness of the application.

Although you may submit supplemental documents that contain the required information, you must respond to each application requirement below specifically in a single attachment that includes all and only the information required by the application. Enumerate each response in accordance with the question numbers below. Please do not send pages that are over 8.5" x 11" or DVDs.

1. The name and contact information for any U.S. Fish and Wildlife Service employee(s) who has provided technical assistance or worked with you on this project.
2. The species and number of eagles that are likely to be taken and the likely form of that take (e.g., disturbance, other take).
3. The dates the activity will start and is projected to end. If the project has begun, describe the stage of progress.
4. A detailed description of the activity that will likely cause the disturbance or other take of eagles.
5. An explanation of why the take of eagles is necessary, including what interests will be protected by the project or activity.
6. Maps, digital photographs, county/city information, and latitude/longitude geographic coordinates of the proposed activity.
7. Maps, digital photographs, county/city information, and latitude/longitude geographic coordinates of eagle-use areas in the vicinity of the activity, including nest site(s), roost areas, foraging areas, and known migration paths. Provide the specific distance and locations of nests and other eagle-use areas from the project footprint.
8. If the projected take of eagles is in the form of disturbance, answer the following two questions:
   a. Will the activity be visible to eagles in the eagle-use areas, or are there visual buffers such as screening vegetation or topography that blocks the view?
   b. What is the extent of existing activities in the vicinity that are similar in nature, size, and use to your activity, and if so, what is the distance between those activities and the important eagle use areas
9. A detailed description of all avoidance and minimization measures that you have incorporated into your planning for the activity that you will implement to reduce the likelihood of take of eagles.
10. You must retain records relating to the activities conducted under your permit for at least 5 years from the date of expiration of the permit. Please provide the address where these records will be kept.
11. Any permit issued as a result of this application is not valid unless you also have any required State or Tribal permits associated with the activity. Have you obtained all required State or Tribal permits or approvals to conduct this activity? Indicate "Yes," Have applied," or None Required." If "Yes," attach a copy of the approval(s). If "Have applied," submit a copy when issued.
12. If you have received technical assistance for your project from your State wildlife agency, please provide the name and contact information for the individual(s).
13. **Disqualification factor**. A conviction, or entry of a plea of guilty or nolo contendere, for a felony violation of the Lacey Act, the Migratory Bird Treaty Act, or the Bald and Golden Eagle Protection Act disqualifies any such person from receiving or exercising the privileges of a permit, unless such disqualification has been expressly waived by the Service Director in response to a written petition. (50 CFR 13.21(c)) Have you or any of the owners of the business, if applying as a business, been convicted, or entered a plea of guilty or nolo contendere, forfeited collateral, or are currently under charges for any violations of the laws mentioned above? Indicate "Yes" or "No." If you answered "Yes" provide: a) the individual's name, b) date of charge, c) charge(s), d) location of incident, e) court, and f) action taken for each violation.

Fee Schedule for Eagle Take – Associated with but not the purpose of an Activity

Type of Permit	Permit Application Fee	Administration Fee[1]	Amendment Fee
Eagle Take—Associated With But Not the Purpose of an Activity	$500		$150
Eagle Take—Associated With But Not the Purpose of an Activity—Programmatic, low-risk projects, 5- to 30-year tenure[1]	$8,000	$500	$1,000
Eagle Take—Associated With But Not the Purpose of an Activity—Programmatic, up to 5-year tenure	$36,000	$2,600	$1,000
Eagle Take—Associated With But Not the Purpose of an Activity—Programmatic, over 5-year to 10-year tenure	$36,000	$5,200[2]	$1,000
Eagle Take—Associated With But Not the Purpose of an Activity—Programmatic, over 10-year to 15-year tenure	$36,000	$7,800[2]	$1,000
Eagle Take—Associated With But Not the Purpose of an Activity—Programmatic, over 15-year to 20-year tenure	$36,000	$10,400[2]	$1,000
Eagle Take—Associated With But Not the Purpose of an Activity—Programmatic, over 20-year to 25-year tenure	$36,000	$13,000[2]	$1,000
Eagle Take—Associated With But Not the Purpose of an Activity—Programmatic, over 25-year to 30-year tenure	$36,000	$15,600[2]	$1,000
Eagle Take—Associated With But Not the Purpose of an Activity—Transfer of a programmatic permit	$1,000		

[1] "Low-risk" means a project or activity is unlikely to take an eagle over a 30-year period and the applicant for a permit for the project or activity has provided the Service with sufficient data obtained through Service-approved models and/or predictive tools to verify that the take is likely to be less than 0.03 eagles per year.
[2] $2,600 assessed upon approval of permit, and for each 5-year review.

PERMIT APPLICATION FORM INSTRUCTIONS

The following instructions pertain to an application for a U.S. Fish and Wildlife Service or CITES permit. The General Permit Procedures in 50 CFR 13 address the permitting process. For simplicity, all licenses, permits, registrations, and certificates are referred to as a permit.

GENERAL INSTRUCTIONS:

- Complete all blocks/lines/questions in Sections A or B, and C, D, and E.
- **An incomplete application may cause delays in processing or may be returned to the applicant. Be sure you are filling in the appropriate application form for the proposed activity.**
- Print clearly or type in the information. Illegible applications may cause delays.
- Sign the application in blue ink. Faxes or copies of the original signature will not be accepted.
- Mail the original application to the address at the top of page one of the application or if applicable on the attached address list.
- **Keep a copy of your completed application.**
- **Please plan ahead. Allow at least 60 days for your application to be processed. Some applications may take longer than 90 days to process. (50 CFR 13.11)**
- Applications are processed in the order they are received.
- Additional forms and instructions are available from http://permits.fws.gov/.

COMPLETE EITHER SECTION A OR SECTION B:

Section A. **Complete if applying as an individual:**

- Enter the complete name of the responsible individual who will be the permittee if a permit is issued. Enter personal information that identifies the applicant. *Fax and e-mail are not required if not available.*
- If you are applying on behalf of a client, the personal information must pertain to the client, and a document evidencing power of attorney must be included with the application.
- **Affiliation/ Doing business as (dba)**: business, agency, organizational, or institutional affiliation *directly* related to the activity requested in the application (e.g., a taxidermist is an individual whose business can *directly* relate to the requested activity). The Division of Management Authority (DMA) will **not** accept *doing business as* affiliations for individuals.

Section B. **Complete if applying as a business, corporation, public agency, Tribe, or institution:**

- Enter the complete name of the business, agency, Tribe, or institution that will be the permittee if a permit is issued. Give a brief description of the type of business the applicant is engaged in. Provide contact phone number(s) of the business.
- **Principal Officer** is the person in charge of the listed business, corporation, public agency, Tribe, or institution. The principal officer is the person responsible for the application and any permitted activities. Often the principal officer is a Director or President. **Primary Contact** is the person at the business, corporation, public agency, Tribe, or institution who will be available to answer questions about the application or permitted activities. Often this is the preparer of the application.

ALL APPLICANTS COMPLETE SECTION C:

- For all applications submitted to the Division of Management Authority (DMA) a physical U.S. address is **required**. Province and Country blocks are provided for those USFWS programs which use foreign addresses and are not required by DMA.
- **Mailing address** is address where communications from USFWS should be mailed if different than applicant's physical address.

ALL APPLICANTS COMPLETE SECTION D:

Section D.1 **Application processing fee:**

- An application processing fee is required at the time of application; unless exempted under 50 CFR13.11(d)(3). The application processing fee is assessed to partially cover the cost of processing a request. **The fee does not guarantee the issuance of a permit. Fees will not be refunded for applications that are approved, abandoned, or denied.** We may return fees for withdrawn applications prior to any significant processing occurring.
- **Documentation of fee exempt status is not required for Federal, Tribal, State, or local government agencies; but must be supplied by those applicants acting on behalf of such agencies.** Those applicants acting on behalf of such agencies must submit a letter on agency letterhead and signed by the head of the unit of government for which the applicant is acting on behalf, confirming that the applicant will be carrying out the permitted activity for the agency.

Section D.2 **Federal Fish and Wildlife permits:**

- List the number(s) of your most current FWS or CITES permit or the number of the most recent permit if none are currently valid. If applying for re-issuance of a CITES permit, the original permit must be returned with this application.

Section D.3 CERTIFICATION:

- **The individual identified in Section A, the principal officer named in Section B, or person with a valid power of attorney (documentation must be included in the application) must sign and date the application in blue ink.** This signature binds the applicant to the statement of certification. This means that you certify that you have read and understand the regulations that apply to the permit. You also certify that everything included in the application is true to the best of your knowledge. Be sure to read the statement and re-read the application and your answers before signing.

ALL APPLICANTS COMPLETE SECTION E.

Please continue to next page

APPLICATION FOR A FEDERAL FISH AND WILDLIFE PERMIT

Paperwork Reduction Act, Privacy Act, and Freedom of Information Act – Notices

In accordance with the Paperwork Reduction Act of 1995 (44 U.S.C. 3501, *et seq.*) and the Privacy Act of 1974 (5 U.S.C. 552a), please be advised:

1. The gathering of information on fish and wildlife is authorized by:
   (Authorizing statutes can be found at: http://www.gpoaccess.gov/cfr/index.html and http://www.fws.gov/permits/ltr/ltr.html.)

   a. Bald and Golden Eagle Protection Act (16 U.S.C. 668), 50 CFR 22;
   b. Endangered Species Act of 1973 (16 U.S.C. 1531-1544), 50CFR 17;
   c. Migratory Bird Treaty Act (16 U.S.C. 703-712), 50 CFR 21;
   d. Marine Mammal Protection Act of 1972 (16 U.S.C. 1361, *et. seq.*), 50 CFR 18;
   e. Wild Bird Conservation Act (16 U.S.C. 4901-4916), 50 CFR 15;
   f. Lacey Act: Injurious Wildlife (18 U.S.C. 42), 50 CFR 16;
   g. Convention on International Trade in Endangered Species of Wild Fauna and Flora (TIAS 8249), http://www.cites.org/ , 50 CFR 23;
   h. General Provisions, 50 CFR 10;
   i. General Permit Procedures, 50 CFR 13; and
   j. Wildlife Provisions (Import/export/transport), 50 CFR 14.

2. Information requested in this form is purely voluntary. However, submission of requested information is required in order to process applications for permits authorized under the above laws. Failure to provide all requested information may be sufficient cause for the U.S. Fish and Wildlife Service to deny the request. We may not conduct or sponsor and you are not required to respond to a collection of information unless it displays a currently valid OMB control number.

3. Certain applications for permits authorized under the Endangered Species Act of 1973 (16 U.S.C. 1539) and the Marine Mammal Protection Act of 1972 (16 U.S.C. 1374) will be published in the **Federal Register** as required by the two laws.

4. Disclosures outside the Department of the Interior may be made without the consent of an individual under the routine uses listed below, if the disclosure is compatible with the purposes for which the record was collected. (Ref. 68 FR 52611, September 4, 2003)

   a. Routine disclosure to subject matter experts, and Federal, Tribal, State, local, and foreign agencies, for the purpose of obtaining advice relevant to making a decision on an application for a permit or when necessary to accomplish an FWS function related to this system of records.
   b. Routine disclosure to the public as a result of publishing **Federal Register** notices announcing the receipt of permit applications for public comment or notice of the decision on a permit application.
   c. Routine disclosure to Federal, Tribal, State, local, or foreign wildlife and plant agencies for the exchange of information on permits granted or denied to assure compliance with all applicable permitting requirements.
   d. Routine disclosure to Captive-bred Wildlife registrants under the Endangered Species Act for the exchange of authorized species, and to share information on the captive breeding of these species.
   e. Routine disclosure to Federal, Tribal, State, and local authorities who need to know who is permitted to receive and rehabilitate sick, orphaned, and injured birds under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act; federally permitted rehabilitators; individuals seeking a permitted rehabilitator with whom to place a bird in need of care; and licensed veterinarians who receive, treat, or diagnose sick, orphaned, and injured birds.
   f. Routine disclosure to the Department of Justice, or a court, adjudicative, or other administrative body or to a party in litigation before a court or adjudicative or administrative body, under certain circumstances.
   g. Routine disclosure to the appropriate Federal, Tribal, State, local, or foreign governmental agency responsible for investigating, prosecuting, enforcing, or implementing statutes, rules, or licenses, when we become aware of a violation or potential violation of such statutes, rules, or licenses, or when we need to monitor activities associated with a permit or regulated use.
   h. Routine disclosure to a congressional office in response to an inquiry to the office by the individual to whom the record pertains.
   i. Routine disclosure to the Government Accountability Office or Congress when the information is required for the evaluation of the permit programs.
   j. Routine disclosure to provide addresses obtained from the Internal Revenue Service to debt collection agencies for purposes of locating a debtor to collect or compromise a Federal claim against the debtor or to consumer reporting agencies to prepare a commercial credit report for use by the FWS.

5. For individuals, personal information such as home address and telephone number, financial data, and personal identifiers (social security number, birth date, etc.) will be removed prior to any release of the application.

6. The public reporting burden on the applicant for information collection varies depending on the activity for which a permit is requested. The relevant burden for an Eagle Non-Purposeful Take (standard) permit application is 16 hours, and 6 hours for a standard amendment. For an Eagle Non-Purposeful Take (programmatic) permit application, the relevant burden is 452 hours and70 hours for an amendment. This burden estimate includes time for reviewing instructions, gathering and maintaining data and completing and reviewing the form. You may direct comments regarding the burden estimate or any other aspect of the form to the Service Information Clearance Officer, U.S. Fish and Wildlife Service, Mail Stop 222, Arlington Square, U.S. Department of the Interior, 1849 C Street, NW, Washington D.C. 20240.

Freedom of Information Act – Notice

For organizations, businesses, or individuals operating as a business (i.e., permittees not covered by the Privacy Act), we request that you identify any information that should be considered privileged and confidential business information to allow the Service to meet its responsibilities under FOIA. Confidential business information must be clearly marked "Business Confidential" at the top of the letter or page and each succeeding page and must be accompanied by a non-confidential summary of the confidential information. The non-confidential summary and remaining documents may be made available to the public under FOIA [43 CFR 2.26 – 2.33].

U.S. Fish & Wildlife Service

Migratory Bird Regional Permit Offices

FWS REGION	AREA OF RESPONSIBILITY	MAILING ADDRESS	CONTACT INFORMATION
Region 1	Hawaii, Idaho, Oregon, Washington	911 N.E. 11th Avenue Portland, OR 97232-4181	Tel. (503) 872-2715 Fax (503) 231-2019 Email permitsR1MB@fws.gov
Region 2	Arizona, New Mexico, Oklahoma, Texas	P.O. Box 709 Albuquerque, NM 87103	Tel. (505) 248-7882 Fax (505) 248-7885 Email permitsR2MB@fws.gov
Region 3	Iowa, Illinois, Indiana, Minnesota, Missouri, Michigan, Ohio, Wisconsin	5600 American Blvd. West Suite 990 Bloomington, MN 55437-1458 (Effective 5/31/2011)	Tel. (612) 713-5436 Fax (612) 713-5393 Email permitsR3MB@fws.gov
Region 4	Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virgin Islands, Puerto Rico	P.O. Box 49208 Atlanta, GA 30359	Tel. (404) 679-7070 Fax (404) 679-4180 Email permitsR4MB@fws.gov
Region 5	Connecticut, District of Columbia, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Virginia, Vermont, West Virginia	P.O. Box 779 Hadley, MA 01035-0779	Tel. (413) 253-8643 Fax (413) 253-8424 Email permitsR5MB@fws.gov
Region 6	Colorado, Kansas, Montana, North Dakota, Nebraska, South Dakota, Utah, Wyoming	P.O. Box 25486 DFC(60154) Denver, CO 80225-0486	Tel. (303) 236-8171 Fax (303) 236-8017 Email permitsR6MB@fws.gov
Region 7	Alaska	1011 E. Tudor Road (MS-201) Anchorage, AK 99503	Tel. (907) 786-3693 Fax (907) 786-3641 Email permitsR7MB@fws.gov
Region 8	California, Nevada	2800 Cottage Way Room W-2606 Sacramento, CA 95825	Tel. (916) 978-6183 Fax (916) 414-6486 EmailpermitsR8MB@fws.gov

SECTION E. EAGLE TAKE – ASSOCIATED WITH BUT NOT THE PRUPOSE OF AN ACTIVITY (EAGLE NON-PURPOSEFUL TAKE) (Bald and Golden Eagle Protection Act, 50 CFR 22.26)

Question 1.	The name and contact information for any U.S. Fish and Wildlife Service employee(s) who has provided technical assistance or worked with you on this project.
Answer 1.	Clint Riley, Casey Stemler, Kevin Kritz, Kelly Hogan, Region 6, Denver, Colorado Tyler Abbott, Nathan Darnall, Wyoming Ecological Services Field Office, Cheyenne, Wyoming Emily Bjerre, Division of Migratory Bird Management, Patuxent Wildlife Research Center, Laurel, Maryland Brian Millsap, Division of Migratory Bird Management, Albuquerque, New Mexico
Question 2.	The species and number of eagles that are likely to be taken and the likely form of that take (e.g., disturbance, other take).
Answer 2.	This application by Power Company of Wyoming LLC (PCW) is for programmatic take that may occur during operation of Phase I of the Chokecherry and Sierra Madre Wind Energy Project (CCSM Project). PCW is applying for a 30 year programmatic permit under 50 CFR 22.26. <u>Direct Take (as estimated by the USFWS)</u> At the 80% UCI, the USFWS model predicts 10-14 golden eagle fatalities and 1.4-2 bald eagle fatalities annually for Phase I of the Chokecherry and Sierra Madre Wind Energy Project (CCSM Project). *See Section 7.1.1 of the Chokecherry and Sierra Madre Wind Energy Project Phase I Eagle Conservation Plan (ECP) and Appendix I of the ECP* At the average (50% UCI), the USFWS model predicts 6.8-9.2 golden eagle fatalities and 0.9-1.3 bald eagle fatalities annually for Phase I of the CCSM Project. *See Section 7.1.1 and Appendix I of the ECP.* <u>Disturbance Take</u> Disturbance take may occur for bald or golden eagles, the number of which has not been determined. *See Section 7.1.1 of the Chokecherry and Sierra Madre Wind Energy Project Phase I Eagle Conservation Plan (ECP).* In addition to this application for a programmatic Eagle Take Permit (ETP) for Phase I, PCW has applied to USFWS for a standard ETP for disturbance take that may occur during Phase I construction.
Question 3.	The dates the activity will start and is projected to end. If the project has begun, describe the stage of progress.
Answer 3.	Construction of Phase I of the CCSM Project is expected to begin in 2016 and be complete by 2020 at which time commercial operations will commence. Following construction, Phase I has a proposed life of 30 years after which, subject to market conditions, it may be repowered as necessary to continue its operations. *See Section 3.1.4 and Table 3.2 of the ECP.*

Question 4.	A detailed description of the activity that will likely cause the disturbance or other take of eagles.
Answer 4.	Phase I consists of 500 wind turbines located in the western portions of two Wind Development Areas (WDAs) referred to as "Chokecherry" and "Sierra Madre" and associated infrastructure including the Road Rock Quarry, West Sinclair Rail Facility and Phase I Haul Road and Facilities. *See Section 3.1 of the ECP*
Question 5.	An explanation of why the take of eagles is necessary, including what interests will be protected by the project or activity.
Answer 5.	The Eagle Act authorizes the Secretary to permit take of eagles "necessary for the protection of …other interests in any particular locality." This statutory language accommodates a broad spectrum of public and private interests (such as utility infrastructure development and maintenance, road construction, operation of airports, commercial or residential construction, resource recovery, recreational use, etc.) that might "take" eagles as defined under the Eagle Act. PCW's objectives for the CCSM Project are to help satisfy the projected future market for power from renewable energy sources by extracting the maximum potential wind energy from the site and developing a 3,000 MW wind farm consisting of up to 1,000 wind turbines. PCW has determined that developing the CCSM Project in two phases will achieve its purpose and need for the CCSM Project. Generally, PCW's objectives for Phase I of the CCSM Project are to permit and build an economically viable project and to extract the maximum potential wind energy from the site by developing the first phase of the CCSM Project. Phase I of the CCSM Project consists of 500 wind turbines with an installed capacity of 1,500 megawatts, which is enough energy to power almost 400,000 households, resulting in a reduction in carbon dioxide (CO_2) emissions of 3.5 to 5.5 million tons per year. PCW is applying for a permit for take of bald and golden eagles that is associated with, but not the purpose of, Phase I of the CCSM Project. Issuance of an ETP will protect the interests of PCW in Phase I of the CCSM Project. As documented in the Phase I ECP, PCW has identified potential risks to bald and golden eagles and reduced those risks through implementation of conservation measures, experimental Advanced Conservation Practices (ACPs), and avoidance and minimization measures such that the remaining take is unavoidable.
Question 6.	Maps, digital photographs, county/city information, and latitude/longitude geographic coordinates of the proposed activity.
Answer 6.	The proposed activity is located in unincorporated Carbon County, Wyoming (no city location). The following coordinates define a central location for Phase I. Latitude (decimal) 41.683056 N; Longitude -107.2 W Latitude (degrees, minutes, seconds) 41 41' 0" N; Longitude – 107 12' 0" W A map showing an overview of the CCSM Project is attached as Exhibit 1. A map showing the Phase I layout is attached as Exhibit 2.

<table>
<tr><td>Question 7.</td><td>Maps, digital photographs, county/city information, and latitude/longitude geographic coordinates of eagle-use areas in the vicinity of the activity, including nest site(s), roost areas, foraging areas, and known migration paths. Provide the specific distance and locations of nests and other eagle-use areas from the project footprint.</td></tr>
<tr><td>Answer 7.</td><td>The Phase I development area is over 74,000 acres. Locations of nests and other eagle use areas in relation to the project footprint are described in the ECP. To assess the potential risk to eagles, PCW conducted numerous surveys beginning in 2008. See Table 5.1 of the ECP. These surveys include:
1. Eagle use surveys designed to characterize eagle use and identify important eagle use areas including those related to nesting activity, migration, foraging, and roosting;
2. Eagle nest surveys designed to characterize the local area nesting population; and
3. Prey base surveys to identify significant prey resources and potential foraging areas.
In addition, PCW conducted migratory bird surveys and breeding bird surveys, and deployed an avian radar system to further characterize how avian species use the Phase I project site.
The results of the extensive site-specific surveys conducted by PCW, along with maps and locational information, are presented in Chapter 5 of the ECP.</td></tr>
<tr><td>Question 8.</td><td>If the projected take of eagles is in the form of disturbance, answer the following two questions:
a. Will the activity be visible to eagles in the eagle-use areas, or are there visual buffers such as screening vegetation or topography that blocks the view?
b. What is the extent of existing activities in the vicinity that are similar in nature, size, and use to your activity, and if so, what is the distance between those activities and the important eagle use areas?</td></tr>
<tr><td>Answer 8.</td><td>a. Some activities will be visually screened to eagles in the eagle use areas; however, visual buffers, such as vegetation and topography, within the Phase I project site are limited. See Section 7.2 of the ECP.
b. There are other existing wind farms in Carbon County, the closest of which (Seven Mile Hill) is located approximately 44 miles from Phase I. The distance between those existing facilities and Phase I important eagle use areas varies.</td></tr>
<tr><td>Question 9.</td><td>A detailed description of all avoidance and minimization measures that you have incorporated into your planning for the activity that you will implement to reduce the likelihood of take of eagles.</td></tr>
<tr><td>Answer 9.</td><td>PCW has worked cooperatively with USFWS to avoid and minimize impacts to eagles from Phase I. See Appendix H of the ECP. PCW used the best available scientific data, including the extensive data collected for Phase I using protocols approved by the USFWS, to develop the specific avoidance and minimizations measures that were incorporated into the Phase I wind turbine layout.   Chapter 6 of the ECP outlines the avoidance and minimization measures that PCW implemented during siting of Phase I consistent with the USFWS Region 6 Guidance, including the following:
1. Considering alternative sites for reducing eagle/raptor/migratory bird risk in the</td></tr>
</table>

	Phase I siting and design process. 2. Removing and/or relocating wind turbines or potential wind turbine sites from the Phase I design using site-specific eagle and avian use data. 3. Modifying, removing, and/or relocating other infrastructure from the Phase I design using site-specific eagle and avian use data. 4. Adjusting the Phase I design using site-specific eagle and avian use data. 5. Incorporating the USFWS Region 6 Recommendations for Avoidance and Minimization of Impacts to Golden Eagles at Wind Energy Facilities as well as complying with project-specific recommendations made by USFWS. Additional best management practices and conservation measures are described in Chapter 8 of the ECP. The Phase I wind turbine layout - when combined with the best management practices, conservation measures, experimental ACPs and monitoring and adaptive management described in the Phase I ECP - avoids and minimizes impacts to bald and golden eagles such that additional take is unavoidable.
Question 10.	You must retain records relating to the activities conducted under your permit for at least 5 years from the date of expiration of the permit. Please provide the address where these records will be kept.
Answer 10.	Power Company of Wyoming LLC, 555 Seventeenth Street, Suite 2400, Denver, CO 80202
Question 11.	Any permit issued as a result of this application is not valid unless you also have any required State or Tribal permits associated with the activity. Have you obtained all required State or Tribal permits or approvals to conduct this activity? Indicate “Yes,” Have applied,” or None Required.” If “Yes,” attach a copy of the approval(s). If “Have applied,” submit a copy when issued.
Answer 11.	Pursuant to Wyo. Stat. Ann. §35-12-101 et seq., PCW is required to have a permit from the Wyoming Industrial Siting Council (ISC) to construct and operate the CCSM Project. On May 12, 2014, PCW filed its application with the Department of Environmental Quality, Industrial Siting Division for the required permit. On July 18, 2014, the Division determined that PCW’s application was complete pursuant to Wyo. Stat. Ann. § 35-12-109. The ISC held a two-day administrative hearing beginning on August 5, 2014, in Saratoga, Wyoming. At the end of the hearing, the ISC deliberated in public and unanimously voted to grant PCW a permit for the CCSM Project. The ISC issued the permit on September 12, 2014, and it requires PCW to comply with all applicable federal permits. *See Section 1.2.3 of the ECP.* A copy of the ISC’s approval is attached as Exhibit 3. No Tribal permits are required.
Question 12.	If you have received technical assistance for your project from your State wildlife agency, please provide the name and contact information for the individual(s).

Answer 12.	Scott Gamo Staff Terrestrial Biologist Habitat Protection Program Wyoming Game and Fish 5400 Bishop Blvd Cheyenne, WY 82006 307-777-4509
Question 13.	**Disqualification factor.** A conviction, or entry of a plea of guilty or nolo contendere, for a felony violation of the Lacey Act, the Migratory Bird Treaty Act, or the Bald and Golden Eagle Protection Act disqualifies any such person from receiving or exercising the privileges of a permit, unless such disqualification has been expressly waived by the Service Director in response to a written petition. (50 CFR 13.21(c)) Have you or any of the owner of the business, if applying as a business, been convicted, or entered a plea of guilty or nolo contendere, forfeited collateral, or are currently under charges for any violations of the laws mentioned above? Indicate “Yes” or “No.” If you answered “Yes” provide: a) the individual’s name, b) date of charge, c) charge(s), d) location of incident, e) court, f) action take for each violation.
Answer 13.	No.

EXHIBIT 1

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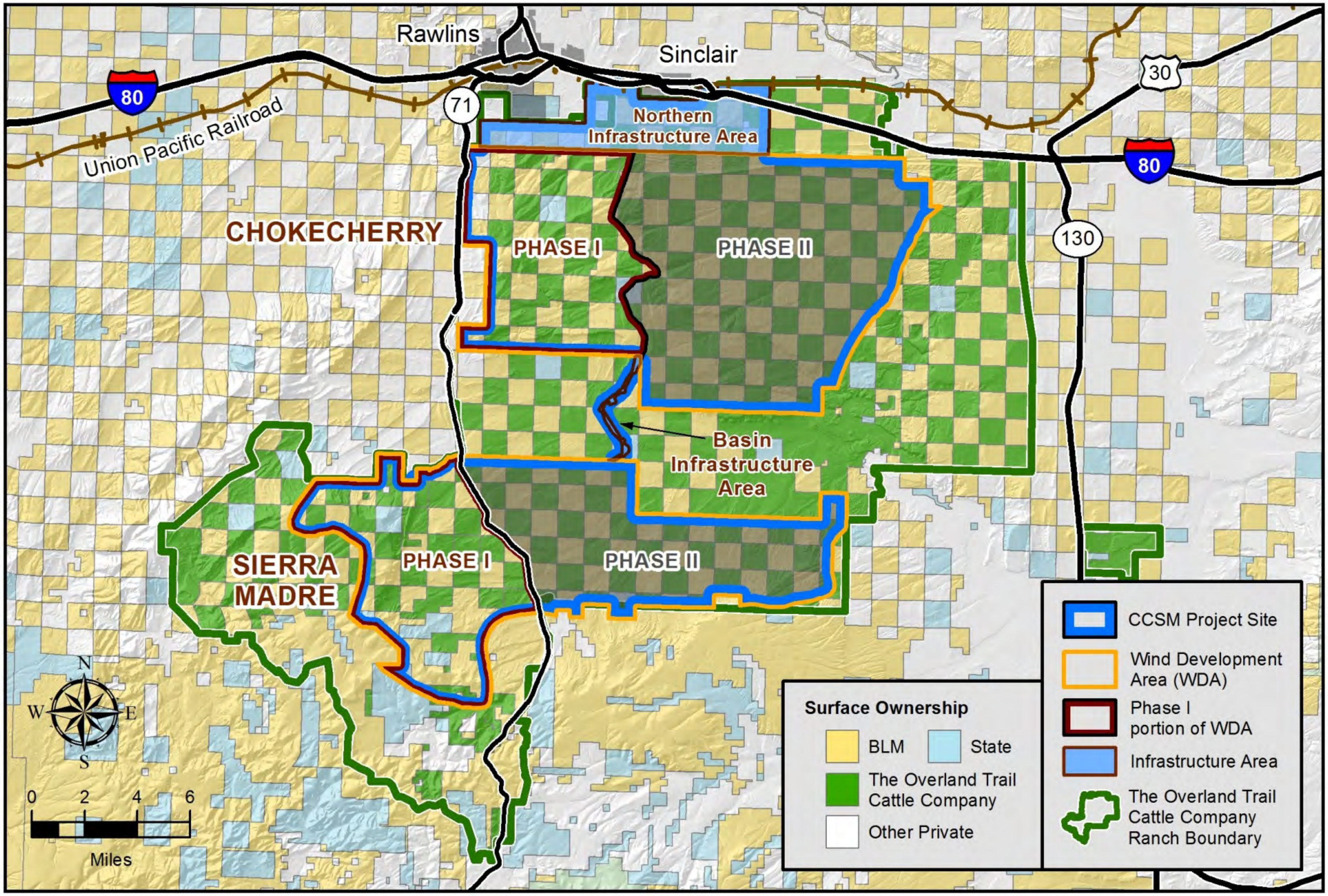

CCSM Project Overview

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EXHIBIT 2

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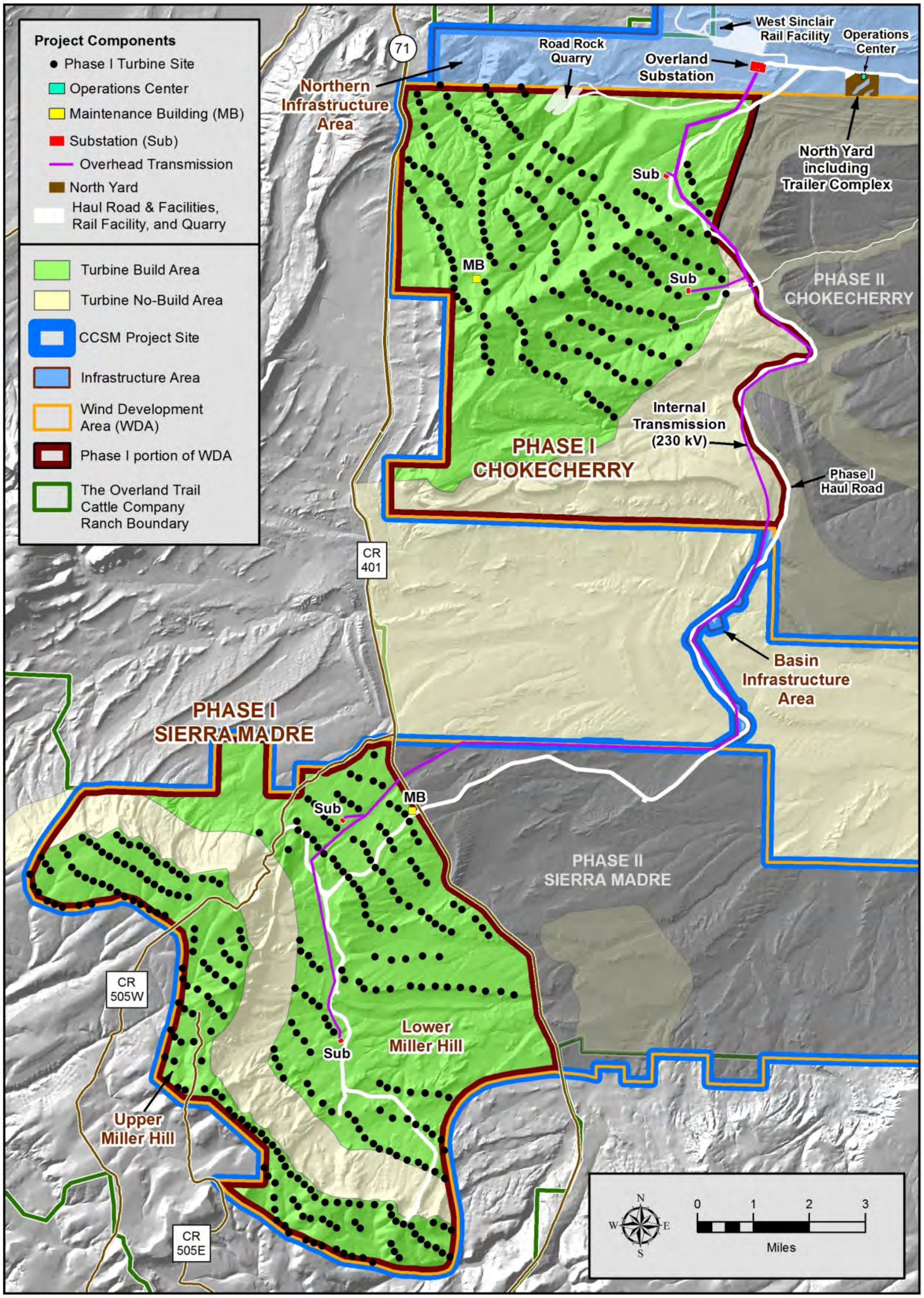

Phase I Layout

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EXHIBIT 3

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BEFORE THE WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY INDUSTRIAL SITING DIVISION

STATE OF WYOMING

IN THE MATTER OF THE INDUSTRIAL	)	OAH DOCKET NO. 14-097-020
SITING PERMIT APPLICATION OF	)	DOCKET NO. DEQ/ISC 12-07
POWER COMPANY OF WYOMING, LLC	)	

FINDINGS OF FACT, CONCLUSIONS OF LAW, AND ORDER GRANTING PERMIT APPLICATION WITH CONDITIONS, AND ALLOCATING IMPACT ASSISTANCE FUNDS

THIS MATTER came before the Industrial Siting Council (Council) on August 5 – 6, 2014, for a contested case evidentiary hearing on whether the Council should issue a permit for the construction and operation of the Chokecherry and Sierra Madre Wind Energy Project. Council members present for the proceedings included Chairman Shawn Warner, Sandy Shuptrine, Gregg Bierei, James Miller, Richard O'Gara, Peter Brandjord, and John Corra. Karl D. Anderson, Senior Assistant Attorney General, was also present on the Council's behalf. Deborah A. Baumer from the Office of Administrative Hearings served as the Hearing Examiner in the proceedings.

The Applicant, Power Company of Wyoming, LLC (PCW), appeared by and through counsel, Paul J. Hickey, O'Kelley H. Pearson and Roxane J. Perruso. The Industrial Siting Division (Division) appeared by and through counsel, Assistant Attorney General Andrew J. Kuhlmann. Fifteen entities filed notices to become parties and fourteen of those entities participated in the evidentiary hearing, including the Carbon County Commissioners, represented by Chairman Leo J. Chapman; Albany County

Commissioners, represented by Commissioner Tim Chestnut; Sweetwater County Commissioners, represented by Marc Dedenbach; the Voices of the Valley, represented by Vice President Joseph Elder; Saratoga-Encampment-Rawlins Conservation District, represented by Leanne Correll; City of Rawlins, represented by City Attorney Amy L. Bach; the City of Laramie, represented by Assistant City Manager David Derragon; the Town of Saratoga, represented by Mayor John Zeiger; the Town of Encampment, represented by Mayor Greg Salisbury; the Town of Riverside, represented by Mayor Ronald L. Bedwell; the Town of Elk Mountain, represented by Linda Crane; the Town of Hanna, represented by Council member Linda Wagner; the Town of Sinclair, represented by Major Michelle Serres; and the Wyoming Building and Construction Trades Council, represented by Scott Norris. The Town of Medicine Bow timely filed notice to become a party but failed to appear at the hearing. PCW's Exhibits 1 through 16, the Division's Exhibits 1 through 3, and the Carbon County Board of County Commissioners' Exhibit 1 were admitted for purposes of the contested care hearing. The Council received one limited appearance statement in this case prior to the close of the evidentiary hearing. The Council has considered the evidence and arguments of the Applicant and the parties and makes the following findings:

I. JURISDICTION

Wyoming Statutes Annotated § 35-12-106(a) (LexisNexis 2013) provides that "[n]o person shall commence to construct a facility, as defined in this chapter, in this state without first obtaining a permit for that facility from the council."

"Industrial facility" or "facility" means any industrial facility with an estimated construction cost of at least one hundred ninety-three million eight hundred thousand dollars ($193,800,000.00) and any commercial facility generating electricity from wind and associated collector systems that consists of 30 or more wind turbines. *See* Wyo. Stat. Ann. § 35-12-102(a)(vii) (LexisNexis 2013).

Wyoming Statutes Annotated § 35-12-110(d) (LexisNexis 2013) provides that "[o]n receipt of an application, the director shall conduct a review of the application to determine if it contains all the information required by W.S. 35-12-109 and the rules and regulations."

Wyoming Statutes Annotated § 35-12-110(f) (LexisNexis 2013) provides that not more than ninety (90) days after receipt of an application for a permit, the director shall:

> (i) Schedule and conduct a public hearing, provided that no hearing shall be held until the state engineer has submitted a preliminary and final opinion as to the quantity of water available for the proposed facility pursuant to W.S. 35-12-108;
>
> (ii) Notify the applicant and local governments of the hearing . . . ;
>
> (iii) Cause notice of the hearing to be published in one (1) or more newspapers of general circulation within the area to be primarily affected by the proposed facility; and
>
> (iv) Hold the hearing at a community as close as practicable to the proposed facility. The provisions of W.S. 35-12-111, 35-12-112 and 35-12-114 apply to the hearing.

The contested case procedures of the Wyoming Administrative Procedure Act apply to the hearing. Wyo. Stat. Ann. § 35-12-112 (LexisNexis 2013).

Wyoming Statutes Annotated § 35-12-113(a) (LexisNexis 2013) provides that "[w]ithin forty-five (45) days from the date of completion of the hearing the council shall make complete findings, issue an opinion and render a decision upon the record, either granting or denying the application as filed, or granting it upon terms, conditions or modifications of the construction, operation or maintenance of the facility as the council deems appropriate."

On May 12, 2014, PCW submitted an application to the Division for an Industrial Siting permit to allow construction and operation of the Chokecherry and Sierra Madre Wind Energy Project (the CCSM Project) to be located in Carbon County, Wyoming, on portions of the private land mostly owned and operated by Overland Trail Cattle Ranch and federal land managed by the Bureau of Land Management (BLM). At a previously held jurisdictional meeting on April 25, 2012, PCW showed cost estimates for the total construction were in excess of the $193.8 million statutory jurisdictional limit of the Council. The proposed CCSM Project also will consist of more than 30 electricity generating wind turbines. Therefore, this Council has jurisdiction to hear and decide this matter.

II. STATEMENT OF THE CASE

PCW proposes to construct and operate the CCSM Project which consists of 1,000 wind turbines capable of generating up to 3,000 megawatts (MW) of wind energy. PCW seeks a permit from the Council to construct, operate, maintain, and decommission the CCSM Project.

On May 12, 2014, PCW filed its Application for an Industrial Siting permit pursuant to Wyoming Statutes Annotated § 35-12-109 (LexisNexis 2013) to construct the CCSM Project.

As originally submitted, the Division's staff found that the Application was lacking certain information and notified PCW of the deficiencies. Upon submittal of the additional information, the Division's staff determined that PCW's Application was complete and in full compliance with Wyoming law and was ready for the Council's determination as to whether a permit should be issued. PCW requested that the Council approve the Application as submitted, with the additional conditions proposed by the Division, and also requested four variances from Council rules governing decommissioning, reclamation, and financial assurance prior to construction. Fourteen of fifteen parties appeared at the evidentiary hearing and all were in favor of issuing the permit.

III. ISSUES AND CONTENTIONS

The sole issue in this case is whether PCW has proven, by a preponderance of the evidence, that the Application regarding the CCSM Project meets the requirements of the Wyoming Industrial Development Information and Siting Act, Wyo. Stat. Ann. §§ 35-12-101 through −119 (LexisNexis 2013), and the Industrial Development Information and Siting Rules and Regulations, ch. 1, § 8 (2014) (Division's Rules) governing the proposed CCSM Project. If the Council decides to issue the Industrial Siting permit, it must also decide what, if any, conditions to place on the permit, as well as whether to grant three requested variances from the Division's Rules governing decommissioning and reclamation, and one variance regarding financial assurances.

PCW asserted its Application (in conjunction with the supplemental exhibits) was complete and in compliance with all applicable laws, would not pose a threat of serious injury to the environment, and would not substantially impair the health, safety, or welfare of the inhabitants in the affected area. PCW agreed with the conditions proposed by the Division to be placed upon the CCSM Project. PCW requested three variances from the Division's Rules with regard to the removal of turbine foundations, cabling, and vegetative reclamation, in favor of the Bureau of Reclamation's (BLM) standards. PCW also requested a variance with regard to financial assurance prior to construction of the project in favor of a graduated bonding regime.

The Carbon County Commissioners, Albany County Commissioners, Sweetwater County Commissioners, Cities of Rawlins and Laramie, and the Towns of Saratoga, Encampment, Riverside, Elk Mountain, Hanna, Sinclair, and Medicine Bow, as well as the Voices of the Valley and the Wyoming Building and Construction Trades Council were all in support of the CCSM Project.

The Saratoga-Encampment-Rawlins Conservation District was generally in support of the CCSM Project but was opposed to the request for three variances regarding decommissioning and reclamation.

IV. FINDINGS OF FACT

A. Procedural Background

1. PCW is a limited liability company organized in Delaware and authorized to do business in Wyoming. The company is, indirectly, wholly-owned by The Anschutz Corporation. PCW proposes to construct and operate the CCSM Project located in Carbon County, Wyoming, on checkerboard portions of the private land mostly owned and operated by Overland Trail Cattle Ranch and federal land managed by the BLM. The CCSM Project consists of 1,000 wind turbines capable of generating up to 3,000 MW of wind energy, along with all associated facilities necessary to generate and deliver electricity to the desert Southwest through the transmission grid. *PCW Exs. 1, 2.*

2. This case dates back to a jurisdictional meeting held with the Division on April 25, 2012, in which PCW established that cost estimates for the CCSM Project exceeded the statutory dollar threshold of $193,800,000.00 and consisted of at least 30 wind turbines in all phases of construction. On September 7, 2012, the ISD issued its Notice of Jurisdiction, advising PCW that the project was subject to the jurisdiction of the Wyoming Industrial Development Information and Siting Act, Wyo. Stat. Ann. §§ 35-12-101 through –119, and that a permit was required to construct and operate the CCSM Project. *Division's Ex. 1, p. 4.*

3. On October 2, 2012, the Carbon County Board of County Commissioners, after opportunity for public hearing, voted unanimously to approve PCW's application for a Conditional Use Permit with regard to the CCSM Project. *CCC's Ex. 1.*

4. A pre-application filing meeting was held on October 25, 2012. PCW initially intended to file its Application in January 2013 but ultimately determined it would be more appropriate to file in 2014. Thereafter, on April 22, 2014, PCW met with the Division for its final pre-application filing meeting. PCW filed its Application, with Appendices A through V, with the Division on May 12, 2014. PCW initially filed Appendix G, containing documentation of financial capability, as confidential. On June 27, 2014, PCW resubmitted Appendix G as a public document. *PCW Exs. 1, 2.*

5. All of the materials constituting the filing of the Application were received by the Division on May 12, 2014. The Application consisted of 75 hard copies of the Application document, *Wyoming Industrial Development Information and Siting Act Section 109 Permit Application;* 45 electronic copies of that document and all appendices; the payment of the application fee in the amount of $70,076.00, as required by Wyoming Statutes Annotated § 35-12-109(b); a certification by Roxane J. Perruso, Vice-President and Secretary of PCW, attesting to the truthfulness and accuracy of the Application; and a transmittal letter by Joseph H. Tippetts, Associate General Counsel. *PCW's Ex. 2, §§ 15-1, p. 482.*

6. The Division staff checked the contents of the Application against the applicable statutes and Division Rules and determined that additional information was necessary. On June 11, 2014, the Division sent PCW a Notice of Deficiency requesting information regarding ten separate, enumerated items. On July 10, 2014, PCW provided a response to the Division's Notice of Deficiency, which the Division's staff and PCW incorporated into the Application. On July 18, 2014, PCW was notified by the Division

that the Application was complete. The Division also recommended 19 permit conditions should the Council grant the permit. *Division's Ex. 1, §§ E; H.*

7. Upon review of the Application, the Administrator of the Division determined the study area for potential impacts of the CCSM Project included Carbon County, Sweetwater County, Albany County, and Natrona County. The Administrator determined the areas primarily affected were the facility site, the municipalities of Rawlins, Baggs, Dixon, Elk Mountain, Encampment, Hanna, Medicine Bow, Riverside, Saratoga, Sinclair, Laramie, Rock River, and Wamsutter, and the inclusive areas of Carbon, Albany, and Sweetwater Counties. Examination copies of the Application were then filed on May 13, 2014, with the Carbon, Albany, and Sweetwater County Clerks. *Division's Ex. 1, p. 5.*

8. Also on May 13, 2014, the Division's staff distributed copies of the Application to the various state agencies, local governments, and school districts within the area primarily affected pursuant to Wyo. Stat. Ann. § 35-12-110(b) (LexisNexis 2013) in order to obtain information and recommendations relative to the impact of the proposed CCSM Project as it applied to each agency's area of expertise. Sixteen of the eighteen state agencies provided timely responses. Only the State Engineer's Office initially recommended denial of the Application until PCW estimated water usage by the entire workforce inclusive of the workers located off-site. In a letter dated July 9, 2014, PCW provided the estimated water usage. The State Engineer's Office responded to the Division on July 14, 2014, that PCW's response satisfied the concerns raised and

recommended that the application process proceed. *Division's Ex. 1, pp. 5 – 6; Division's Ex. 2, p. 9.*

9. Pursuant to Wyo. Stat. Ann. § 35-12-110, the Division's staff placed two separate legal advertisements in five newspapers, publishing the location and description of the CCSM Project, the locations where the Application was available for review, and notice of the Council's hearing on the Application. *Division's Ex. 1, p. 7.*

10. Prior to submitting its Application, PCW notified and described the CCSM Project to local governments in the study area and held open houses for the public to gain information regarding the CCSM Project and to provide comments. A list of all meetings and details of the public and government involvement is found in Section 4 and Appendix K of the Application, titled Public Outreach and Involvement. In summary, PCW conducted 49 public meetings and presentations between 2008 and 2013 regarding the proposed project; 12 of those meetings took place in 2013. *PCW's Ex. 2, Application, § 4, Public Outreach and Involvement; App. K; Division's Ex. 1, p. 4.*

B. <u>Project Specific Documentary Evidence</u>

11. The CCSM Project is a single project to be constructed in two phases. PCW plans to construct Phase I, consisting of approximately 500 wind energy turbines and an associated railway distribution facility, access road, and rock quarry, from approximately the fourth quarter of 2014 to 2018. Phase II will consist of 500 wind energy turbines and their associated access roads constructed from approximately 2018 to August 2021. Construction is anticipated to peak at 945 workers during the third quarter of 2017. PCW estimates that the long-term operations workforce will consist of 114 workers, including

supervisors, operators, maintenance staff, electricians, and environmental monitors. *PCW's Ex. 2, § 7.*

12. PCW plans to construct a rail distribution facility and a road network that are internal to the CCSM Project. To reduce the effects on local roadways that transporting equipment, components, and materials necessary to build the CCSM Project might have, PCW will bring as many of those items as practical to the CCSM Project by rail. Since the existing nearby rail facilities cannot support the load requirements of the CCSM Project, PCW plans to build the West Sinclair Rail Facility adjacent to the Union Pacific main line located along the northern boundary of the CCSM Project site. The West Sinclair Rail Facility will transport construction materials, wind turbine components, and other equipment to the CCSM Project site. The primary delivery staging area will be located adjacent to the rail facility. Any materials and equipment for the CCSM Project that arrive outside the rail facility are expected to use I-80 and Exit 221 (East Sinclair) to reach the CCSM Project's northern entrance. The main thoroughfare between the CCSM Project facilities and entrances is the haul road. An internal road network will be established to interconnect the CCSM Project facilities, including wind turbines, operations and maintenance buildings, substations, and access points. *PCW's Ex. 2, Application at pp. 6-8 – 6-12.*

13. PCW plans to construct a rock quarry to provide a portion of the aggregate materials for the construction of the CCSM Project. The rock quarry will be developed on private land at the location of a previous rock quarry. The quarry is internal to the CCSM

Project, so there will be no impact on local roads from quarry operations. *PCW's Ex. 2, Application at p. 6-9.*

14. The water supply needed for dust suppression, road compaction, concrete production, and domestic and sanitary uses was estimated at approximately 635 acre-feet of water over the eight-year construction period. Estimates of long-term water demand for the CCSM Project are for less than 50 acre-feet of water per year during operations and maintenance and less than 100 acre-feet per year during the three-year decommissioning period. Because the CCSM Project proposes to use less than 800 acre-feet of water of the state annually, PCW was not required to submit a water yield or water supply analysis to the State Engineer in accordance with Wyo. Stat. Ann. § 35-12-108 (LexisNexis 2013). *PCW's Ex. 2, Application at pp. 12-14 – 12-28.*

15. PCW developed a Workforce Housing Plan as depicted in Section 11 of its Application. PCW anticipated a split of the workforce requiring a variety of housing options including hotel/motel rooms, RV sites, rental units, and a construction camp housing 250 employees. PCW also provided confirmations and commitments from hotels in the area primarily affected to accommodate the workforce. *PCW's Ex. 2, Application at § 11; App. Q; PCW's Ex. 16.*

C. <u>Financial Assurance</u>

16. PCW originally filed Appendix G, containing documentation of financial capability, as confidential. On June 27, 2014, PCW resubmitted Appendix G as a public document. PCW submitted the following information to establish financial capability to construct, operate, maintain, decommission, and reclaim the CCSM Project:

(1) A commitment letter from PCW's parent company, The Anschutz Corporation, which describes the corporation's reputation for success as a large project developer, commitment to the CCSM Project, its financial capabilities and the resources the corporation has already expended on behalf of the CCSM Project.

(2) The affidavit of Wayne Barnes, Vice-President and Chief Financial Officer of Anschutz Company, which wholly owns The Anschutz Corporation. Mr. Barnes attests to the fact that the Anschutz Company and The Anschutz Corporation are highly-experienced project development companies with substantial resources and relationships and a strong track record with large development projects.

(3) A letter from KPMG LLP, the independent financial auditors of the Anschutz Company, which provided that, according to the consolidated financial statements of the Anschutz Company as of December 31, 2013, the stockholders' equity was in excess of $1.5 billion.

(4) A letter from an investment bank sharing its view that the necessary capital (both debt and equity) can be raised to successfully finance the CCSM Project.

(5) Letters from Travelers Casualty and Surety Company of America and Zurich North America Insurance Company regarding providing surety bonding for the decommissioning and reclamation of the CCSM Project. Those letters attested to the Anschutz Company's ability to provide adequate surety bonds for the estimated costs of decommissioning and reclamation.

PCW's Ex. 2, Application, App. G.

D. <u>PCW's Request for Variances</u>

17. The CCSM Project is located primarily within an ownership region known as the "checkerboard," in which land ownership alternates between private land (mostly owned by the Overland Trail Cattle Ranch) and federal land managed by BLM. The BLM has jurisdiction over the federal lands within the CCSM Project and will require

PCW to provide satisfactory financial assurance for PCW's decommissioning and reclamation obligations before authorizing PCW to conduct material surface disturbance activities on those federal lands. Likewise, the Council has jurisdiction over PCW's decommissioning and reclamation obligations on the private land, as well as financial assurance requirements. *PCW's Ex. 2, Application at p. 8-1.*

18. As a result of BLM and Council overlapping jurisdictions, PCW has requested four variances with regard to decommissioning, reclamation, and financial assurance. *PCW's Ex. 2, Application, pp. 8-2 – 8-9.*

19. With respect to decommissioning, PCW requested variances from certain prescriptive decommissioning requirements listed in the Division's Rules, Chapter 1, Section 9(a)(i) to make state and federal standards for decommissioning consistent with a BLM requirement removing wind turbine foundations to a depth of 42 inches and allowing underground cable to remain undisturbed. *Id. at pp. 8-2 – 8-3.*

20. With respect to reclamation, PCW requested a variance from Council standards in favor of BLM reclamation standards. The Council requires that all surface disturbances be regraded and revegetated with a uniform perennial vegetative cover with a density of 90 percent native or adaptive background vegetative cover. BLM requires reclamation of 80 percent of predisturbance ground cover and 90 percent dominant species. *Id. at pp. 8-4 – 8-5.*

21. Finally, PCW must provide a site reclamation and decommissioning plan and associated financial assurances to ensure proper decommissioning and reclamation of the CCSM Project. As set forth more fully in Section 8.4.4 of the Application, PCW

requested a variance from the Division's Rules, Chapter 1, Section 9(d)(i), which requires that all financial assurances be in place prior to the commencement of construction, in favor of the graduated bonding regime proposed by PCW in Section 8 of the Application. Accordingly, PCW requested that the Council approve a variance that will allow PCW to provide a series of surety bonds that are commensurate with and correspond to each individual BLM right-of-way grant. The variance to allow graduated bonding would insure that adequate financial resources are in place prior to construction but will not require PCW to post bonds potentially years ahead of initiation of surface disturbance activities undertaken pursuant to a particular right-of-way grant. *Id. at pp. 8-6 – 8-9.*

E. <u>Impact Assistance Funds</u>

22. The PCW and the Division developed a forecast of impact assistance payments by quarter that will be distributed throughout the construction period because of the sales and use tax contribution to the state from the CCSM Project. The forecasted average quarterly impact assistance payment is $1.67 million. The forecasted yearly impact assistance payment is $6.05 million. The Division recommended the distribution of the funds, as was agreed to between the counties and their affected municipalities, at 94 percent to Carbon County, 3 percent to Albany County, and 3 percent to Sweetwater County. *PCW's Ex. 2, Application, Table 10-34 at p. 10-67; Division's Ex. 1, p. 15; Attach. 9.*

F. **Hearing Testimonial Evidence**

i. Applicant's Witnesses

(a) Bill Miller

23. Bill Miller (Miller) is the Senior Vice-President of Energy and Land Resources for the Anschutz Corporation, and the President and CEO of PCW and the Overland Trail Cattle Company. Miller has been employed with the corporation for 34 years. The Anschutz Company is a highly diversified enterprise that has operations across a huge array of industries including oil and gas exploration and production; pipeline development and operations; ranching and farming operations; rural energy and electrical transmission; lodging, recreation, and entertainment businesses; and the newspaper business. The CCSM Project is the first renewable energy project in Anschutz's portfolio. [Transcript of Proceedings (hereinafter Tr.) at pp. 16 – 18; 38]

24. Miller confirmed that PCW has a great deal of experience in developing, constructing, financing, and operating large infrastructure, oil and gas, and ranching projects around the world. Examples include the Pacific Pipeline Group, Staples Center in downtown Los Angeles, the LA Live Entertainment District, Anschutz Exploration Corporation, arenas in England and Germany, and several large ranching and other agricultural assets in Wyoming. [Tr. at pp. 17 – 22]

25. According to Miller, PCW began developing the CCSM Project in 2006. The CCSM Project will consist of 1,000 turbines and will be capable of generating up to 3,000 MW of electricity. The project is sited mostly within the Overland Trail Cattle Ranch. The Ranch is comprised of a combination of private, federal and state lands. The

project will involve establishing an on-site quarry for construction materials for the roads and turbine locations, a rail distribution facility, a haul road, electrical collector lines, substations, and a maintenance and operation facility within the project. [Tr. at pp. 23 – 26]

26. The initial markets for the CCSM Project will be the desert Southwest, which will include the states of California, Nevada, and Arizona. This is due to the population and commercial load growth of that area, and a recognized increase in the percentage of renewable energy due to federal and state policies dealing with emissions and greenhouse gases. The project is dependent upon the development, construction, and completion of the Transwest Express transmission lines which will run from Rawlins to an area south of Las Vegas, Nevada. [Tr. at pp. 26 – 27; 43]

27. To date, PCW has expended in excess of $45 million in the permitting and development process for the CCSM Project. The estimated cost for the wind project to be operating and commissioned is $5 billion. The revenues the project will generate for the local governments, Carbon County, and State of Wyoming are estimated at $800 million from property taxes, sales and use tax, and the wind generation tax. [Tr. at pp. 28 – 29]

(b) Wayne Barnes

28. Wayne Barnes (Barnes) is the Vice-President of Finance and Chief Financial Officer for both Anschutz Company and The Anschutz Corporation. Barnes explained that the Anschutz Company is the parent of The Anschutz Corporation. Wyoming Renewable Resources and the Overland Trail Cattle Company are owned by

the Anschutz Company. Wyoming Renewable Resources owns Power Company of Wyoming. [Tr. at pp. 46 – 47]

29. Barnes testified in conjunction with PCW's Exhibit 4 consisting of documents supporting PCW's financial capability and assurances. Based upon considerations that include discussions with Morgan Stanley, who is acting as financial advisor for the Anschutz Company, Anschutz has concluded that an appropriate capital structure for the CCSM Project would be to fund it with 35 percent equity (approximately $1.68 billion) and 65 percent debt (approximately $3.11 billion). As evidence of its financial strength, the Anschutz Company obtained a letter dated April 7, 2014 from KPMG, Anschutz's independent auditor, stating that Anschutz's stockholder equity as of December 31, 2013 (the date of the most recent KPMG annual audit) was in excess of $1.5 billion. *PCW's Ex. 4;* [Tr. at pp. 48 – 51]

30. Barnes confirmed that decommissioning and reclamation of the project is estimated at a range from $265 million to $345 million. Barnes confirmed that Travelers Insurance Company and Zurich Surety each provided letters of commitment to issue surety bonds in an amount up to $500 million. [Tr. at pp. 52 – 54]

31. Finally, Barnes testified that based upon his financial knowledge and experience, PCW had the financial capability to construct, maintain, operate, decommission, and reclaim the CCSM Project. [Tr. p. 54]

(c) Ryan Jacobson

32. Ryan Jacobson (Jacobson) is a professional engineer licensed in the states of Wyoming, Colorado, and North Dakota and is the Director of Engineering and

Construction for PCW. Jacobson testified that PCW has been monitoring the wind data on 34 separate sites in the project area since 2007. The data confirmed that the project site is very conducive to high power production that matches well with the electrical demand of the West. The wind class is between Class 5, which is considered excellent, and Class 7, which is the top end of the curve. The project capacity factor is at 40 to 45 percent, which is extraordinary considering the size of the project. [Tr. pp. 56 – 62]

33. Jacobson explained that the rotor portion of the turbine will be up to 120 meters, which is just under 400 feet in diameter. The top of the turbine tower will be 100 meters, which is about 328 feet. About one-third of the turbines will have flashing red lights on the top of the cell. The turbines are connected together via a buried cable, and once a series of turbines connect together on that cable and generate enough electricity, the cable fills and goes back to the nearby substation. As the power is collected at the substation, it will travel by an overhead transmission line to an interconnected substation on the north end of the project where it connects to the grid. [Tr. pp. 66 – 67]

34. Jacobson confirmed that PCW intends to bring many of the components of the construction materials to the site by rail, avoiding heavy reliance on I-80 and other local highways, thereby reducing overall traffic impacts. Additionally, an on-site quarry will be used to construct a road network for the project. The north entrance to the project will be I-80 at Exit 221. Additionally, sections of County Roads 441 and 505 will be utilized and are covered through a road use agreement with Carbon County Road and Bridge Department entered into in June 2014. [Tr. pp. 68 – 71; 99]

35. In response to comments expressed by the Wyoming State Geological Survey regarding landslides, expansive soils, and seismic characteristics, Jacobson clarified that PCW's geotechnical engineers agreed that establishing a turbine setback of 500 feet from steep terrain was appropriate. *PCW's Ex. 9;* [Tr. pp. 75 – 77]

36. With respect to monthly workforce during construction of the project, Jacobson testified the project had an overall average of 282 workers. Phase I peaks at 945 workers of which 776 would be nonlocal. In 2017, the workforce was estimated to peak at 925 workers, of which 761 would be nonlocal. Once the project is completed, 114 full-time technicians, operators, and office staff will be employed year-round. [Tr. pp. 79 – 81]

37. PCW puts a high priority on safety by utilizing a health and safety plan, including an emergency response plan in coordination with the project and local emergency services. PCW also has a fire prevention and suppression plan. [Tr. pp. 81 – 82]

38. Jacobson testified that based upon his knowledge and experience, the project will not significantly impair the health, safety, or welfare of the workers or the public. Additionally, the project complied with applicable law and standards of good engineering practice.

39. With regard to the workforce housing plan, PCW balanced two priorities. The first was to promote economic development by utilizing temporary vendors in the communities. The second was to develop on-site accommodations so PCW would not overload the local accommodations. PCW anticipated that local workforce levels would

exceed the available local accommodations in nearby communities so decided to mobilize an on-site construction camp for 250 workers, as well as 100 RV sites. At the end of construction, PCW will demobilize the construction camp and reclaim both the camp site and the RV sites. [Tr. pp. 83 – 88]

40. According to Jacobson, decommissioning of the project will occur in approximately 30 years and will take three years to complete, at a total cost of $265 million. PCW is requesting two variances of the Council's decommissioning requirements due to two different methods mandated by state and federal rules governing revegetation. The federal requirements for reclamation require that PCW remove the pedestal portion of the turbine 42 inches, while the state requires 48 inches of the foundation to be removed. PCW requested a variance to use the federal standard so that only one standard would apply to the entire project and would avoid unnecessary ground disturbance. The Department of Environmental Quality, Land Quality Division, had no objection to PCW using the federal standard. If the variance is granted, the cost saving to PCW would be approximately $50 million. *PCW's Ex. 6;* [Tr. pp. 88 – 92; 112]

41. The other decommissioning variance requested by PCW concerned buried electrical cables. Federal guidelines require the cables to remain in place and buried at 36 inches or deeper. The Division's Rules require removal of the cables. The variance is requested to leave the cables in place to avoid disturbing ground that would have been reclaimed for 30 years. Again, the Land Quality Division had no objection to the requested variance. If the variance is granted, the resulting cost savings to PCW would be $30 million. *PCW's Ex. 6; Division's Ex. 2, p. 6;* [Tr. pp. 92 – 93; 112]

42. For waste management, PCW plans to use the Sweetwater County and Rock Springs landfill. Additionally, noise levels were analyzed with regard to construction near residences. The nearest turbines are 4,000 feet away from any homes, two and one-half miles from Rawlins, three miles from Sinclair, and over nine miles from Saratoga. Therefore, no potential noise impact will occur with this project. [Tr. pp. 95; 100 – 101]

(d) Nathan Wojcik, PhD

43. Dr. Nathan Wojcik is an ecologist for SWCA, Inc, Environmental Consultants. Dr. Wojcik has a bachelor's of science degree in ecology, evolution and conservation biology, and a PhD in biochemistry. Dr. Wojcik has been working for PCW for five years, with a crew of field biologists conducting baseline surveys to support project planning, including vegetation and soil sampling, vegetation and habitat modeling, and wildlife surveys. Dr. Wojcik testified that he "literally walked nearly every inch of [the] project site, 200,000 acres, and also areas around the project site[.]" [Tr. pp. 123 – 125]

44. Dr. Wojcik addressed three areas – vegetation, soils, and reclamation. With regard to vegetation, Dr. Wojcik determined the project site was predominately sagebrush, and there were approximately 25 unique vegetative communities across the site. Dr. Wojcik and his crew conducted more than 1,500 transects to identify and count the composition, species, diversity, and other indexes of vegetation. [Tr. pp. 125 – 126]

45. Soils on the project were predominately loamy, which is a rich soil mixture that plants like. Dr. Wojcik and his crew dug holes into the ground and have completed

240 soil pits and 80 geotechnical borings across the project site. The data collected provides information to guide the reclamation process and wildlife management. Due to the involvement of federal land, and based upon his analysis of the data collected, Dr. Wojcik recommended utilizing the BLM reclamation standards to include: (1) to reclaim 80 percent of native vegetative ground cover; (2) species diversity has to represent the vegetation cover that was previously there; (3) no noxious weeds on federal lands; and (4) control and minimize erosion. [Tr. pp. 127 – 130]

46. Dr. Wojcik explained that the BLM and state share the same objectives for reclamation – to successfully reconstruct the landscape. However, the federal and state standards for reclamation differ in that the state requires 90 percent native or adaptive background cover, which means not all species have to be native, versus BLM's requirement of 80 percent native species only, thus keeping noxious weeds out. It is not practical to have two different standards on the checkerboard land. One standard also provides more consistent monitoring. PCW's plan applies a more stringent standard than the state requires. [Tr. pp. 133 – 135; 151 – 153]

47. With respect to PCW's request for a variance regarding removal of the turbine foundations, Dr. Wojcik testified that a ten-fold increase in disturbance of the area would occur if the variance is not granted. From a reclamation viewpoint, the BLM standard would reduce additional disturbance to areas that have already been reclaimed from the passage of time. The same holds true for leaving the underground cables in place so that no additional disturbance occurs on ground that has already been reclaimed from the passage of time. Based upon Dr. Wojcik's experience and education, PCW's

reclamation plan effectively prevents injury to the soil and vegetation and leads to successful reclamation. [Tr. pp. 135 – 139]

(e) Joseph Hammond

48. Joseph Hammond (Hammond) is a principal project manager in CH2M HILL's environmental group. Hammond prepared the socioeconomic analysis reflected in Section 10 of the Application. [Tr. pp. 157 – 158]

49. Hammond's group analyzed each of the resource areas affected, population, economic and physical conditions, housing, public education, public safety, healthcare, municipal services, and government and human services facilities. Potential social and economic impacts of the project were evaluated using common methods in the industry. [Tr. pp. 159 – 161]

50. Hammond confirmed the workforce employment numbers, occupations, and average wages as reflected in Section 10 of the Application, as well as the economic benefits of the project to the areas of influence. Those figures will not be repeated in this Order, but can be found in PCW's Exhibit 2, Section 10. Hammond also confirmed that the estimates for sales and use tax, property tax, and excise tax over the construction and operation of the project was $781 million. [Tr. pp. 163 – 172]

51. With regard to estimated impact assistance payments, Hammond testified that there would be peaks and valleys in those numbers because of the fluctuation of construction workforce. Hammond confirmed the figures in Section 10, Table 10-34 in the Application showing a range from $24,612 in the first three quarters to $3.2 million in

later quarters. The annual average of impact assistance is $6.05 million. [Tr. pp. 172 – 173]

52. Hammond discussed the housing plan in great detail and testified in accordance with the housing analysis reflected in Section 10 of the Application. Those figures will not be repeated in this Order. Hammond testified that Appendix Q in the Application contained an outdated version of housing availability data and was substituted with PCW's Exhibit 16 which contained figures from 2014. Hammond concluded that the overall analysis determined that adequate temporary accommodations exist in the area of influence to meet the needs of nonlocal workers during peak and nonpeak periods. [Tr. pp. 173 – 182]

53. Hammond's analysis also concluded that the project would have a negligible impact on the Carbon County school system and that two additional law enforcement officers in the Carbon County Sheriff's Office and two additional officers in the Rawlins Police Department would be needed during peak construction periods between 2017 and 2021. Hammond admitted there is currently a shortage of healthcare providers in the area of influence, but did not believe there would be an overall significant effect upon the system. Additionally, Hammond believed the impact to municipal services was negligible. [Tr. pp. 182 – 185]

54. Cumulative impacts were also analyzed by Hammond's team, and 41 projects in the area were evaluated. The analysis appears in Sections 9 and 10 of the Application. The primary cumulative impacts related to the availability of temporary housing. PCW developed a plan for minimizing those impacts by proposing to mobilize

an on-site construction camp for 250 workers, as well as an on-site RV camp for 100 workers. [Tr. pp. 187 – 193]

55. Finally, in Hammond's professional opinion, the Application complied with the requirements of the Council; the project did not pose a threat of serious injury to the economic condition of the present or expected inhabitants in the areas of influence; and the project would not substantially impair the health, safety, or welfare of the present or expected inhabitants in the areas of influence. [Tr. pp. 195 – 196]

(f) Garry Miller

56. Garry Miller (Miller) is the President of Land and Environmental Affairs for PCW. Miller testified to the land ownership and control regarding the project. According to Miller approximately 49 percent of the 170,000 acre project site is private ownership, a majority of which is owned by the Overland Trail Cattle Company. Approximately 4 percent of the project site is state-owned lands, and PCW has an agreement with the state to install 42 turbines on the state land. Finally, approximately 47 percent of the project site is on BLM land. An Environmental Impact Statement for the project reflected no conflicts with oil and gas development on federal land. [Tr. pp. 241 – 245]

57. The Carbon County Board of County Commissioners found that the project complies with all applicable zoning and county land use regulations and authorized a conditional use permit for the project. In July 2014, the Carbon County Commissioners voted unanimously to grant a request from PCW for a one-year extension on the requirement to begin construction. [Tr. pp. 248; 251]

58. In terms of long-term disturbance to the 320,000 acre ranch, the long-term disturbance is 1,545 acres, which is less than 1 percent. Ranching operations will be allowed to continue as they have in the past. Additionally, the project will have no affect on adjacent property landowners due to property line setbacks, and the road use agreement successfully mitigates the impacts of the project on the use of county roads. [Tr. pp. 249 – 252]

59. Miller confirmed that PCW did not object to the 19 conditions proposed by the Division to be placed on the permit, with a correction of a typographical error to Condition 15. [Tr. p. 252]

60. Miller testified regarding the conservation plan reflected in PCW's Exhibit 8. The conservation plan addresses wildlife, including sage grouse, mule deer, birds and bats, and aquatics. PCW has agreed to submit a report every year to a technical advisory committee (TAC) composed of PCW, Overland Trail Cattle Ranch, Wyoming Game and Fish, and other vital parties. The TAC will review that report, look at monitoring results, assess any trends, and make recommendations for modifications, improvements, or other necessary measures that may be advisable for wildlife protection. Miller detailed the research and monitoring conducted by PCW with regard to the various wildlife located on the project site. The Application at Appendix U contains a full summary of all the environmental commitments and requirements for the project. [Tr. pp. 257 – 265]

61. Based upon Miller's knowledge and experience, the project will not have a significant detriment on economics, recreation, cultural resources, and wildlife areas. [Tr. pp. 265 – 266]

62. Miller also addressed BLM's bonding requirements for federal land. BLM's requirements include posting a bond prior to construction of the project. Bonding would be synchronized with federal permit approval and would occur prior to the initiation of particular activities as the project progresses. The request for a variance with regard to bonding is to prevent double bonding for federal lands and overbonding for construction that has not started, while protecting the State's interests. Miller testified that the CCSM Project is unique in that it is the only wind project in Wyoming that involves the checkerboard and mix of federal and private lands. [Tr. pp. 339 – 343]

(g) Kelly Cummins

63. Kelly Cummins (Cummins) is a senior landman and environmental engineer. Cummins has a bachelor's degree in chemical engineering and is a licensed professional engineer in environmental engineering. Cummins is responsible for supporting the permit of the CCSM project. Cummins testified regarding several areas of the Application, including air quality, water resources, water quality, and scenic resources. [Tr. p. 275]

64. With regard to air quality, Cummins testified there were two primary sources of air pollution for the project – fugitive dust from ground disturbance, vehicles and equipment traveling on roadways, and tailpipe emissions from equipment and vehicles. Cummins testified that, as reflected in Appendix L of the Application, the project will not increase the concentrations of air pollutants over legal limits. Additionally, the BLM's air quality analysis concluded that neither the federal nor the

state ambient air quality standards would be exceeded. *PCW's Ex. 2, Application, App. L;* [Tr. pp. 275 – 276]

65. Cummins further testified that water usage for the project was estimated at 635 acre-feet over the eight-year construction period. The peak usage in any one year would be 110 acre-feet. The vast majority of water would be used for dust suppression, as well as road compaction and concrete production. PCW plans to minimize water usage by using magnesium chloride for dust suppression which would potentially decrease water usage by 30 percent. The water supply would come from a combination of water sources, including surface water, groundwater, as well as municipal supplies. The project's water usage is based upon the use of existing water rights and, therefore, should not impact the North Platte water, Colorado River basin, or other existing water usage. The State Engineer requested additional information regarding the water use of the workers staying in the local communities outside of the project site. PCW provided the State Engineer an estimate of that operation and the State Engineer provided a letter to the Division indicating they were satisfied with the response. [Tr. pp. 277 – 280]

66. Additionally, both PCW and the BLM evaluated potential impacts to the scenic resources. BLM concluded that the project was consistent with the visual resource management plans for the area. [Tr. pp. 281 – 282]

(h) Kara Choquette

67. Kara Choquette (Choquette) is the Director of Communications and Public Outreach for PCW. Choquette has been responsible for producing PCW brochures and handouts, managing PCW's website, attending public meetings, and serving as a

community's liaison for PCW. From 2008 through the end of 2013, Choquette participated in 49 public meetings throughout Wyoming, the majority of which were in Carbon County. Four additional meetings were held in 2014, all in an effort to have the public learn about the project. Some meetings were held in conjunction with BLM open houses. Appendix K in the Application provides a summary of the public meetings and open houses held in conjunction with the project. [Tr. pp. 285 – 290]

68. In addition to the public meetings and open houses, Choquette held events at the Carbon County Higher Education Center for three years at the Celebration of Wind event, participated in the Carbon County Industry Round Table held in Rawlins for four years, spoke at local school groups, hosted science students at the ranch, and spoke at the Rawlins Rotary Clubs and Lions Clubs over the years about the project. Additionally, PCW sponsored community events regarding the project. [Tr. pp. 291 – 292]

69. Finally, PCW has involved environmental groups in its development process, including Audubon Wyoming, Wyoming Outdoor Council, the Wyoming Wildlife Federation, the Nature Conservancy, the Sonoran Institute, Wilderness Society, Defenders of Wildlife, Sierra Club, Natural Resources Defense Council, and Western Resource Advocates. [Tr. pp. 292 – 293]

70. As a result of the extensive outreach efforts conducted by PCW, groups, vendors, and individuals were provided information on the project and how to obtain employment with PCW. Choquette also talked to hundreds of media over the years about covering the project and learning about the project. [Tr. pp. 294 – 297]

71. Due to Choquette's comprehensive outreach program, no environmental groups or other entities objected to the CCSM Project. [Tr. pp. 297 – 299]

ii. Division's Witnesses

(a) Kimber Wichmann

72. Kimber Wichmann (Wichmann) is the Principal Economist with the Department of Environmental Quality, Industrial Siting Division. Wichmann received and processed the Application and the Division's Exhibits 1 through 3 in this case. Wichmann confirmed that as part of the process, a jurisdictional meeting was held with the Applicant on April 25, 2012. A determination was made that the CCSM Project cost was in excess of the statutory threshold for obtaining an Industrial Siting permit, and that more than 30 wind turbines would be constructed. The Application for the Project was subsequently filed on May 12, 2014. [Tr. pp. 302 – 304]

73. According to Wichmann, after review of the Application, the Division issued a June 11, 2014, Notice of Deficiency to PCW identifying ten items requiring further information. The Division requested additional documentation as outlined on pages A-13 – A-14 of the Division's Exhibit 1. PCW's response to the request for additional information was provided as A-078 – A-104 in the Division's Exhibit 1, and as a result, the Application was thereafter deemed complete and contained the statutory requirements and criteria pursuant to Wyo. Stat. Ann. § 35-12-109. [Tr. pp. 307 – 309]

74. Wichmann further testified that all state agencies, with the exception of the University of Wyoming and the Department of Education, responded to a request for comments on the Application. All agencies' comments are reflected in the Division's

Exhibit 2. Several agencies requested additional information, which was provided by PCW. After receipt of additional information requested from PCW, no state agency recommended denial of the Application. [Tr. pp. 310 – 314]

75. Wichmann confirmed that PCW requested five variances which are located on page 8 of the Division's Exhibit 1. Those variances included a request to remove the federal lands from bonding; a request for graduated bonding; a request to use the BLM revegetative requirements during decommissioning and reclamation; a request to use BLM requirements for removing just the pedestal portion of the turbines rather than the state requirement to go to a depth of 48 inches; and a request to use BLM standards to leave cabling in the ground rather than the state requirement to remove cabling. [Tr. pp. 306 – 307]

76. Wichmann recommended permit conditions as set forth in the Division's Exhibit 3, as the Application was complete per the statutory requirements. The permit conditions set forth in paragraphs 1 through 14 are standard permit conditions for a wind project. Wichmann also recommended five additional permit conditions found in Conditions 15 through 19. Wichmann clarified that Condition 15 contained a typographical error, and the figure depicted in that condition should be corrected from $146,918,000 to $20,673,000. [Tr. pp. 303; 315 – 318]

77. Finally, Wichmann testified as to the distribution of impact assistance funds. The split recommended by the areas primarily affected was agreeable to the Division as is reflected in the Division's Exhibit 1, p. 15. [Tr. p. 314 – 315]

(b) Luke Esch

78. Luke Esch (Esch) is the Administrator of the Industrial Siting Division, and of the Solid and Hazardous Waste Division for the Environmental Quality Division. Esch provided an historical perspective to the CCSM Project. According to Esch, well before the April 2012 jurisdictional meeting, the Division and PCW representatives met on several occasions and discussed the variances regarding bonding and reclamation issues. Esch also had discussions with BLM in an effort to enter into a memorandum of understanding (MOU) regarding the differing state and federal bonding and reclamation standards. Ultimately, the parties were unable to enter into a MOU. [Tr. pp. 323 – 325]

79. Esch explained that the Division's Rules require bonding to be in place prior to the commencement of construction. The BLM also requires bonding, which would result in a dual bonding situation. The Division's Rules also provide for specific reclamation standards. The project is unique from past wind projects in that it lies on a checkerboard of BLM and privately owned land. The BLM reclamation standard requires cabling to remain buried. The Division's Rules requires cabling to be removed, making the reclamation a very difficult, if not impossible process. Additionally, the BLM standards for reclamation include removal of the turbine pedestal to 42 inches, while the state requires removal to 48 inches. Esch testified that the Division's Rules regarding removal of the turbine pedestals to a depth of 48 inches was based upon public comment and not based upon any scientific evidence. Regardless, the Division's Rules also allow the Council to provide a variance for the requirements regarding the bonding and reclamation standards. It remains a Council decision whether to grant PCW's requests for

variances based upon a site-specific inquiry and case-by-case analysis. [Tr. pp. 325 – 329; 334 – 335; 393]

iii. Parties' Witnesses

(a) Carbon County Commissioner's Witnesses

Leo Chapman

80. Leo Chapman (Chapman) is the Chairman of the Carbon County Commission. Chapman testified that the Carbon County Commissioners support the CCSM Project and the opportunity for the impact assistance funds resulting from the project. The funds will be necessary for increased emergency services and law enforcement, and will benefit the schools in the county. Chapman also expressed his appreciation in the avian and wildlife studies conducted by PCW. [Tr. pp. 350 – 352]

81. Chapman complimented PCW for its public outreach and confirmed that the Carbon County Commissioners extended a conditional use permit for beginning construction of the project. [Tr. p. 351]

John Espy

82. John Espy (Espy) is Vice-Chairman of the Carbon County Commission. Espy complimented PCW in putting together a comprehensive housing plan to take care of its workers. [Tr. p. 354]

(b) Voices of the Valley's Witness

Joseph Elder

83. Joseph Elder (Elder) is the Vice-President of the Voices of the Valley, a nonprofit organization in the upper North Platte Valley that tries to foster public

engagement and awareness of various projects that are developing in the area. [Tr. p. 355]

84. Elder expressed the group's initial concern over the possible housing shortage due to the influx of project workers, and the concern over impact on tourism and enough hotel/motel space during the construction months of the project. Elder believed that PCW met those concerns and requested the Council approve Condition #18 regarding the commitment of PCW to mobilize a construction camp and RV site at the facility. [Tr. pp. 355 – 356]

(c) Saratoga-Encampment-Rawlins Conservation District

Leanne Correll

85. Leanne Correll (Correll) was the Saratoga-Encampment-Rawlins Conservation District's representative. Correll explained that the Conservation District's mission statement is to develop and direct programs to promote long-term conservation and enhancement of the District's natural resources, while contributing to the economic stability of the District and its residents. Correll addressed the Conservation District's disapproval of the variances requested by PCW regarding decommissioning and reclamation and requested the Council deny those requested variances. [Tr. pp. 358 – 359]

86. Specifically, Correll testified that in order to revegetate the land, a combination of native and non-native species, as permitted by the Division's Rules, accomplished greater soil stabilization. According to Correll, the soils in the project area have a moderate to high erodibility. Correll testified that the BLM has had mixed success

in previous reclamation efforts and recommended that both native and non-native species be utilized to stabilize the soil during reclamation. Correll testified that there should be two different seed mixtures used for reclamation, one for the BLM portions of the checkerboard and one for the private lands on the checkerboard. [Tr. pp. 360 – 362; 369]

87. Correll also expressed concerns regarding watershed monitoring during the operations phase of the project, as she believed there would be continued impacts not recognized by PCW. According to Correll, the impacts to cattle and wildlife are unknown at this time for changes in the water usage from agricultural use to making concrete. [Tr. pp. 363 – 364]

88. A third concern expressed by Correll related to the possibility that bonding was not sufficient for reclamation in 30 years. Correll requested the Council reconsider the bonding every five years during the life of the project. [Tr. p. 365]

89. With regard to PCW's requested variance on the decommissioning of the foundations of the turbines, Correll testified there would be a significant detriment to the environment for the long-term reclamation success in 50 years if the variance was granted to allow BLM standards to govern. Correll stated there would be a decline in the sagebrush if the reclamation was to a depth of 42 inches versus 48 inches. [Tr. p. 366]

90. Correll concluded by asking the Council to deny the requested variances and hold PCW to the state standards for reclamation, rather than allowing the federal BLM standards to control. [Tr. pp. 365; 368 – 369]

(d) Town of Saratoga's Witness

John Zeiger

91. John Zeiger (Zeiger) is the Mayor of Saratoga. Mayor Zeiger expressed his support of the project on behalf of the Town of Saratoga. Mayor Zeiger testified that PCW addressed his concerns regarding the housing impact on hotels/motels and tourism by agreeing to a construction camp for its workers. [Tr. pp. 373 – 374]

(e) Town of Encampment's Witness

Greg Salisbury

92. Greg Salisbury (Salisbury) is the Mayor of the Town of Encampment. Mayor Salisbury testified in support of the project and stated that the Town of Encampment had expanded its infrastructure and was prepared for the growth in the valley as a result of the project. [Tr. p. 375]

(f) Town of Riverside's Witness

Ronald Bedwell

93. Ronald Bedwell (Bedwell) is the Mayor of the Town of Riverside. Mayor Bedwell expressed his support of the project on behalf of Riverside. [Tr. p. 376]

(g) Town of Sinclair's Witness

Michelle Serres

94. Michelle Serres (Serres) is the Mayor of the Town of Sinclair. Mayor Serres echoed her support of the project but expressed concerns regarding the housing in the area of influence. Mayor Serres' main concern was that the temporary workers at the Sinclair Refinery were not considered as part of the impact with housing in the area for

PCW workers. According to Mayor Serres, 500 to 2,500 temporary workers are occasionally brought in for certain projects and would create a very large housing crunch. Serres did not believe the housing study conducted by PCW was accurate due to this large fluctuation of workers. [Tr. pp. 377 – 379]

(h) Town of Hanna's Witness

Linda Wagner

95. Linda Wagner (Wagner) is a Hanna council member. Wagner testified that despite what she believed to be an inadequate housing study conducted by PCW, she was in favor of the project. Wagner testified that after voicing her concerns regarding the housing study, representatives from PCW came to Hanna and personally spoke to the Town Clerk and investigated housing opportunities in Hanna that were not identified in the housing study. Wagner commended PCW for its outreach and strongly urged the Council to approve the project with its requested variances. [Tr. pp. 379 – 380]

(i) Town of Elk Mountain's Witness

Linda Crane

96. Linda Crane (Crane) is the Treasurer for the Town of Elk Mountain. Crane echoed her support of the project and requested the permit be issued. [Tr. p. 383]

(j) City of Rawlins' Witness

Amy Bach

97. Amy Bach (Bach) is the Rawlins City Attorney. Bach testified that the City of Rawlins was generally in support of the project and was working cooperatively with PCW to address housing concerns which Bach characterized as a "crisis." [Tr. p. 384]

(k) City of Laramie's Witness

David Derragon

98. David Derragon (Derragon) is the Assistant City Manager for Laramie. Derragon expressed his support of the project and gratitude for the information supplied by PCW concerning the cumulative effects of impacts of multiple projects in the area. Derragon also expressed his appreciation for the information received from the Division staff throughout the permitting process. [Tr. p. 385]

(l) Wyoming Building and Construction Trades Council

Scott Norris

99. Scott Norris (Norris) testified on behalf of the Wyoming Building and Construction Trades Council (WBCTC). Norris testified that WBCTC believes the CCSM Project is important to the State of Wyoming in many different aspects, including adding value and a positive outcome for the power industry, and value to state and local economies. [Tr. p. 386]

(m) Albany County Board of County Commissioners' Witness

Tim Chestnut

100. Tim Chestnut (Chestnut) is an Albany County Commissioner. Chestnut expressed his appreciation of the impact assistance funds to Albany County as a result of the project and Albany County's full support of the project. [Tr. pp. 387 – 388]

(n) Sweetwater County Commissioner's Witness

Marc Dedenbach

101. Marc Dedenbach (Dedenbach) appeared on behalf of the Sweetwater County Commissioner's and stated that the Sweetwater County Commission had no objection to the project. Dedenbach expressed concern over the potential for workers to "pour-over" into the Wamsutter area and the effect it would have on housing and law enforcement. Dedenbach requested that if there is a disproportionate amount of burden, the impact assistance funds be re-negotiated between the parties. [Tr. p. 389]

102. All findings of fact set forth in the following Conclusions of Law section shall be considered a finding of fact and are fully incorporated into this paragraph.

V. CONCLUSIONS OF LAW

A. Principles of Law

103. PCW bears the burden of proof in the proceedings herein. "The general rule in administrative law is that, unless a statute otherwise assigns the burden of proof, the proponent of an order has the burden of proof." *JM v. Dep't of Family Servs.,* 922 P.2d 219, 221 (Wyo. 1996) (citation omitted); *Penny v. State, Wyo. Mental Health Professions Licensing Bd.*, 2005 WY 117, 120 P.3d 152 (Wyo. 2005).

104. Wyoming Statutes Annotated § 35-12-109(a)(i)-(xxi) (LexisNexis 2013) provides that an application for a permit shall be filed with the Division and contain the following information:

> (i) The name and address of the applicant, and, if the applicant is a partnership, association or corporation, the names and addresses of

the managers designated by the applicant responsible for permitting, construction or operation of the facility;

(ii) The applicant shall state that to its best knowledge and belief the application is complete when filed and includes all the information required by W.S. 35-12-109 and the rules and regulations, except for any requirements specifically waived by the council pursuant to W.S. 35-12-107;

(iii) A description of the nature and location of the facility;

(iv) Estimated time of commencement of construction and construction time;

(v) Estimated number and job classifications, by calendar quarter, of employees of the applicant, or contractor or subcontractor of the applicant, during the construction phase and during the operating life of the facility. Estimates shall include the number of employees who will be utilized but who do not currently reside within the area to be affected by the facility;

(vi) Future additions and modifications to the facility which the applicant may wish to be approved in the permit;

(vii) A statement of why the proposed location was selected;

(viii) A copy of any studies which may have been made of the environmental impact of the facility;

(ix) Inventory of estimated discharges including physical, chemical, biological and radiological characteristics;

(x) Inventory of estimated emissions and proposed methods of control;

(xi) Inventory of estimated solid wastes and proposed disposal program;

(xii) The procedures proposed to avoid constituting a public nuisance, endangering the public health and safety, human or animal life, property, wildlife or plant life, or recreational facilities which may be adversely affected by the estimated emissions or discharges;

(xiii) An evaluation of potential impacts together with any plans and proposals for alleviating social and economic impacts upon local governments or special districts and alleviating environmental impacts which may result from the proposed facility. The evaluations, plans and proposals shall cover the following:

(A) Scenic resources;

(B) Recreational resources;

(C) Archaeological and historical resources;

(D) Land use patterns;

(E) Economic base;

(F) Housing;

(G) Transportation;

(H) Sewer and water facilities;

(J) Solid waste facilities;

(K) Police and fire facilities;

(M) Educational facilities;

(N) Health and hospital facilities;

(O) Water supply;

(P) Other relevant areas;

(Q) Agriculture;

(R) Terrestrial and aquatic wildlife;

(S) Threatened, endangered and rare species and other species of concern identified in the state wildlife action plan as prepared by the Wyoming game and fish department.

(xiv) Estimated construction cost of the facility;

(xv) What other local, state or federal permits and approvals are required;

(xvi) Compatibility of the facility with state or local land use plans, if any;

(xvii) Any other information the applicant considers relevant or required by council rule or regulation;

(xviii) A description of the methods and strategies the applicant will use to maximize employment and utilization of the existing local or in-state contractors and labor force during the construction and operation of the facility;

(xix) Certification that the governing bodies of all local governments which will be primarily affected by the proposed facility were provided notification, a description of the proposed project and an opportunity to ask the applicant questions at least thirty (30) days prior to submission of the application;

(xx) For facilities permitted pursuant to W.S. 35-12-102(a)(vii)(E) or (F), a site reclamation and decommissioning plan, which shall be updated every five (5) years, and a description of a financial assurance plan which will assure that all facilities will be properly reclaimed and decommissioned. All such plans, unless otherwise exempt, shall demonstrate compliance with any rules or regulations adopted by the council pursuant to W.S. 35-12-105(d) and (e);

(xxi) Information demonstrating the applicant's financial capability to decommission and reclaim the facility.

105. Wyoming Statutes Annotated § 35-12-110(b)(i)-(xxiii) (LexisNexis 2013) requires that the division obtain information and recommendations from the following state agencies relative to the impact of the proposed facility as it applies to each agency's area of expertise:

(i) Wyoming department of transportation;

(ii) Public service commission;

. . . .

(iv) Game and fish department;

(v) Department of health;

(vi) Department of education;

(vii) Office of state engineer;

. . . .

(ix) Wyoming state geologist;

(x) Wyoming department of agriculture;

(xi) Department of environmental quality;

. . . .

(xiv) The University of Wyoming;

(xv) Department of revenue;

(xvi) The Wyoming business council;

(xvii) Department of workforce services;

(xviii) Office of state lands and investments;

(xix) Department of workforce services;

(xx) Department of state parks and cultural resources;

(xxi) Department of fire prevention and electrical safety;

(xxii) Department of family services;

(xxiii) Oil and gas conservation commission.

106. Wyoming Statutes Annotated § 35-12-110(c) (LexisNexis 2013) provides:

> The information required by subsection (b) of this section shall be provided by the agency from which it is requested not more than sixty (60) days from the date the request is made and shall include opinions as to the advisability of granting or denying the permit together with reasons therefor, and recommendations regarding appropriate conditions to include in a permit, but only as to the areas within the expertise of the agency. Each agency which has regulatory authority over the proposed facility shall provide to the council a statement defining the extent of that agency's jurisdiction to regulate impacts from the facility, including a statement of the agency's capability to address cumulative impacts of the facility in conjunction with other facilities. The statement of jurisdiction from each agency is binding on the council.

107. Wyoming Statutes Annotated § 35-12-110(d) (LexisNexis 2013) provides that:

> On receipt of an application, the director shall conduct a review of the application to determine if it contains all the information required by W.S. 35-12-109 and the rules and regulations. If the director determines that the application is incomplete, he shall within thirty (30) days of receipt of the application notify the applicant of the specific deficiencies in the application. The applicant shall provide the additional information necessary within thirty (30) days of a receipt of a request for additional information from the director.

108. Wyoming Statutes Annotated § 35-12-110(f)(i)-(iv) (LexisNexis 2013) provides that not more than ninety (90) days after receipt of an application for a permit, the director shall:

> (i) Schedule and conduct a public hearing, provided that no hearing shall be held until the state engineer has submitted a preliminary and final opinion as to the quantity of water available for the proposed facility pursuant to W.S. 35-12-108;
>
> (ii) Notify the applicant and local governments of the hearing . . .;

(iii) Cause notice of the hearing to be published in one (1) or more newspapers of general circulation within the area to be primarily affected by the proposed facility; and

(iv) Hold the hearing at a community as close as practicable to the proposed facility. The provisions of W.S. 35-12-111, 35-12-112 and 35-12-114 apply to the hearing.

109. Pursuant to Wyo. Stat. Ann. § 35-12-111(a)-(e) (LexisNexis 2013), the parties to a permit proceeding include:

(i) The applicant;

(ii) Each local government entitled to receive a copy of the application under W.S. 35-12-110(a)(i);

(iii) Any person residing in a local government entitled to receive a copy of the application under W.S. 35-12-110(a)(i) including any person holding record title to lands directly affected by construction of the facility and any nonprofit organization with a Wyoming chapter, concerned in whole or in part to promote conservation or natural beauty, to protect the environment, personal health or other biological values, to preserve historical sites, to promote consumer interests, to represent commercial, agricultural and industrial groups, or to promote the orderly development of the areas in which the facility is to be located. In order to be a party the person or organization must file with the office a notice of intent to be a party not less than twenty (20) days before the date set for the hearing.

(b) Any party identified in paragraph (a)(iii) of this section waives his right to be a party if he does not participate orally at the hearing. Any party identified in paragraph (a)(ii) of this section waives its right to be a party unless the local government files a notice of intent to be a party with the office not less than twenty (20) days before the date set for the hearing.

(c) Any person may make a limited appearance in the proceeding by filing a statement in writing with the council prior to adjournment of the hearing. A statement filed by a person making a limited appearance shall become part of the record and shall be made available to the public. No person making a limited appearance under this subsection is a party to the proceeding.

(d) No state agency other than the industrial siting division shall act as a party at the hearing. Members and employees of all other state agencies and departments may file written comments prior to adjournment of the hearing but may testify at the hearing only at the request of the council, the industrial siting division or any party.

(e) Any person described in W.S. 35-12-111(a)(ii) or (iii) who participated in the public hearing under W.S. 35-12-107 may obtain judicial review of a council decision waiving all or part of the application requirements of this chapter.

110. Pursuant to Wyo. Stat. Ann. § 35-12-113(a)-(f) (LexisNexis 2013), the council shall:

(a) Within forty-five (45) days from the date of completion of the hearing the council shall make complete findings, issue an opinion and render a decision upon the record, either granting or denying the application as filed, or granting it upon terms, conditions or modifications of the construction, operation or maintenance of the facility as the council deems appropriate. The council shall not consider the imposition of conditions which address impacts within the area of jurisdiction of any other regulatory agency in this state as described in the information provided in W.S. 35-12-110(b), unless the other regulatory agency requests that conditions be imposed. In considering the imposition of conditions requested by other agencies upon private lands, the council shall consider in the same manner and to the same extent any comments presented by an affected landowner. The council may consider direct or cumulative impacts not within the area of jurisdiction of another regulatory agency in this state. The council shall grant a permit either as proposed or as modified by the council if it finds and determines that:

(i) The proposed facility complies with all applicable law;

(ii) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition or inhabitants or expected inhabitants in the affected area;

(iii) The facility will not substantially impair the health, safety or welfare of the inhabitants; and

(iv) The applicant has financial resources to decommission and reclaim the facility. . . .

(b) No permit shall be granted if the application is incomplete.

(c) If the council determines that the location of all or part of the proposed facility should be modified, it may condition its permit upon that modification, provided that the local governments, and persons residing therein, affected by the modification, have been given reasonable notice of the modification.

(d) The council shall issue with its decision, an opinion stating in detail its reasons for the decision. If the council decides to grant a permit for the facility, it shall issue the permit embodying the terms and conditions in detail, including the time specified to commence construction, which time shall be determined by the council's decision as to the reasonable capability of the local government, most substantially affected by the proposed facility, to implement the necessary procedures to alleviate the impact. A copy of the decision shall be served upon each party.

(e) A permit may be issued conditioned upon the applicant furnishing a bond to the division in an amount determined by the director from which local governments may recover expenditures in preparation for impact to be caused by a facility if the permit holder does not complete the facility proposed. The permit holder is not liable under the bond if the holder is prevented from completing the facility proposed by circumstances beyond his control.

(f) Within ten (10) days from the date of the council's decision, a copy of the findings and the council's decision shall be served upon the applicant, parties to the hearing and local governments to be substantially affected by the proposed facility and filed with the county clerk of the county or counties to be primarily affected by the proposed facility. Notice of the decision shall be published in one (1) or more newspapers of general circulation within the area to be affected by the proposed facility.

111. The Industrial Development Information and Siting Rules and Regulations (2014), Chapter 1 provide, in part:

> Section 8. **Application Information to be Submitted.**
>
> In accordance with W.S. 35-12-109, the application shall contain the information required by the Act with respect to both the construction period and online life of the proposed industrial facility and the following information the Council determines necessary:
>
> (a) The application shall state the name, title, telephone number, mailing address, and physical address of the person to whom communication in regards to the application shall be made.
>
> (b) A description of the specific, geographic location of the proposed industrial facility. The description shall include the following:
>
> (i) Preliminary site plans at an appropriate scale indicating the anticipated location for all major structures, roads, parking areas, on-site temporary housing, staging areas, construction material sources, material storage piles and other dependent components; and
>
> (ii) The area of land required by the industrial facility and a land ownership map covering all the components of the proposed industrial facility.
>
> (c) A general description of the major components and dependent components of the proposed industrial [sic].
>
> (d) A description of the operating nature of the proposed industrial facility, the expected source and quantity of its raw materials, and energy requirements. The description shall include, but is not limited to, the following:
>
> (i) The proposed on-line life of the industrial facility and its projected operating capacity during its on-line life; and, for transmission lines exceeding one hundred fifteen thousand (115,000) volts included as part of the proposed industrial facility, a projection indicating when such lines will become insufficient to meet the future demand and at what time a

need will exist to construct additional transmission lines to meet such demands; and

(ii) Products needed by facility operations and their source.

(e) A statement that shall be a reasonable estimate of the calendar quarter in which construction of the industrial facility will commence, contingent upon the issuance of a permit by the Council.

(f) A statement that shall be a reasonable estimate of the maximum time period required for construction of the industrial facility and an estimate of when the physical components of the industrial facility will be ninety (90) percent complete, and the basis for that estimate.

(g) The applicant shall identify what it deems to be the area of site influence and recommends as the local governments primarily affected by the proposed industrial facility as defined in Sections 2(b), (c) and (d). The immediately adjoining area(s) and local governments shall also be identified with a statement of the reasons for their exclusion from the list of area(s) or local governments primarily affected by the proposed industrial facility.

(h) Using tables, provide a detailed tally of the estimated work force to construct and to operate the facility showing the following information:

(i) All workers providing direct labor and direct support; (safety, supervision, inspection) at the work site;

(ii) Information by calendar quarter and year from the commencement of construction through the first year of operation;

(iii) Identify and provide totals of those which are construction and those which are permanent;

(iv) Identify and provide quarterly totals of the number, job classification and recurrence; of those which are estimated to be in-migrating (from outside the study area at the time of hire for the facility) and of those pre-existing employees of the applicant engaged in construction;

(v) Provide estimates of wages; and

(vi) Provide estimates of paid benefits including per diem and paid fees.

(i) The social and economic conditions in the area of site influence. The social and economic conditions shall be inventoried and evaluated as they currently exist, projected as they would exist in the future without the proposed industrial facility and as they will exist with the facility. Prior to submitting its application, each applicant shall confer with the Administrator to define the needed projections, the projection period and issues for socioeconomic evaluation. The evaluation may include, but is not limited to:

(i) An analysis of whether or not the use of the land by the industrial facility is consistent with state, intrastate, regional, county and local land use plans, if any. The analysis shall include the area of land required and ultimate use of land by the industrial facility and reclamation plans for all lands affected by the industrial facility or its dependent components;

(ii) A study of the area economy including a description of methodology used. The study may include, but is not limited to, the following factors:

(A) Employment projections by major sector;

(B) Economic bases and economic trends of the local economy;

(C) Estimates of basic versus non-basic employment;

(D) Unemployment rates;

(iii) A study of the area population including a description of methodology used. The study may include, but is not limited to, an evaluation of demographic characteristics for the current population and projections of the area population without the proposed industrial facility;

(iv) An analysis of housing facilities by type, including a quantitative evaluation of the number of units in the area and a discussion of vacancy rates, costs, and rental rates of the units. The analysis should include geographic location, including a quantitative evaluation of the number of units in the area required by the construction and operation of the proposed industrial facility and a discussion of the effects of the proposed industrial facility on vacancy rates, costs, and rental rates of the units. Specific housing programs proposed by the applicant should be described in detail;

(v) An analysis of effects on transportation facilities containing discussion of roads (surface type), and railroads (if applicable);

(vi) Public facilities and services availability and needs, which may include, but are not limited to:

(A) Facilities required for the administrative functions of government;

(B) Sewer and water impacts shall describe the distribution and treatment facilities including the capability of these facilities to meet projected service levels required due to the proposed industrial facility. Use of facilities by the proposed industrial facility should be assessed separately from population related increases in service levels. If required pursuant to W.S. 35-12-108, the application shall contain the Water Supply and Water Yield Analysis and Final Opinion of the State Engineer;

(C) Solid waste collection and disposal services including the capability of these facilities to meet projected service levels required due to the proposed industrial facility. Use of facilities by the proposed industrial facility should be assessed separately from population related increases in service levels;

(D) Existing police and fire protection facilities including specific new demands or increases in service levels created by the proposed industrial facility;

(E) An analysis of health and hospital care facilities and services;

(F) Human service facilities, programs and personnel, including an analysis of the capacity to meet current demands and a description of problems, needs, and costs of increasing service levels;

(G) An analysis of community recreational facilities and programs and urban outdoor recreational opportunities;

(H) Educational facilities, including an analysis based upon enrollment per grade, physical facilities and their capacities and other relevant factors with an assessment of the effect that the new population will have on programs and facilities;

(I) Problems due to the transition from temporary, construction employees to operating workforces should be addressed. Changes in levels of services required as a result of thc proposed industrial facility should specifically be addressed. Cumulative impacts of the proposed industrial facility and other developments in the area of site influence should be addressed separately. This assessment should examine increased demands associated with the construction and operational phases of the proposed industrial facility, as well as effects on the level of services as the construction or operational workforces decline;

(J) A copy of any studies that may have been made of the social or economic impact of the industrial facility.

(vii) A fiscal analysis over the projection period for all local governments and special districts identified by the applicant as primarily affected by the proposed industrial facility, including revenue structure, expenditure levels, mill levies, services provided through public financing, and the problems in providing public services. The analysis may include, but is not limited to:

(A) An estimate of the cost of the facility.

(B) An estimate of the cost of the facility construction subject to sales and use taxes.

(C) An estimate of sales and use taxes by year for each county if the facility is located in more than one county.

(D) Estimates of impact assistance payments which will result from the project.

(E) An estimate of the cost of components of the industrial facility which will be included in the assessed value of the industrial facility for purposes of ad valorem taxes for both the construction and operations periods. This estimate should include a breakdown by county if the components of the industrial facility will be located in more than one county.

(j) An evaluation of the environmental impacts as they would exist if the proposed industrial facility were built. Each evaluation should be followed by a brief explanation of each impact and the permit issued that regulates the impact. If the impact is not regulated by a state regulatory agency or federal land management agency, the application must include plans and proposals for alleviating adverse impacts. Cumulative impacts of the proposed industrial facility and other projects in the area of site influence should be addressed separately.

(k) The applicant shall describe the procedures proposed to avoid constituting a public nuisance, endangering the public health and safety, human or animal life, property, wildlife or plant life, or recreational facilities which may be adversely affected by the proposed facility, including:

(i) Impact controls and mitigating measures proposed by the applicant to alleviate adverse environmental, social and economic impacts associated with construction and operation of the proposed industrial facility;

> (ii) Monitoring programs to assess effects of the proposed industrial facility and the overall effectiveness of impact controls and mitigating actions.

112. Wyoming Statutes Annotated § 18-5-502 (LexisNexis 2013) provides further guidance in the regulation of wind energy projects including, in relevant part:

> (a) It is unlawful to locate, erect, construct, reconstruct or enlarge a wind energy facility without first obtaining a permit from the board of county commissioners in the county in which the facility is located.

113. With regard to variances, the Rules Indus. Dev. Info. & Siting, ch. 1 (2014) provides, in part:

> Section 9. **Additional Application Requirements for Wind Energy Facilities.**
>
> (a) Facility Decommissioning. The applicant shall provide a facility decommissioning plan.
>
> > (i) The facility decommissioning plan shall include provisions regarding the removal and proper disposal of all wind turbines, towers, substations, buildings, cabling, electronic components, foundations to a depth of forty-eight (48) inches, and any other associated or ancillary equipment or structures within the facility boundary above and below ground.
>
> . . . .
>
> (f) The Council may give a case-by-case variance to requirements of this Section after considering evidence by the Applicant or landowner.

114. In addition to the requirements of Wyo. Stat. Ann. § 35-12-109(a)(xx) (LexisNexis 2013) reflected in paragraph 104 of this Order, Rules Indus. Dev. Info. & Siting, ch. 1, § 9 (2014) also addresses financial assurances requiring, in part:

> (d) Financial Assurance: The applicant shall provide financial assurances for a wind energy facility, sufficient to assure complete decommissioning and site reclamation of the facility in accordance with the provisions of these rules[.]
>
> > (i) All financial assurances shall be in place prior to commencement of construction of any wind energy facility, and shall be adjusted up or down every five years from the date of permit issuance by the Council based on the results of paragraph (e) of this section.
>
> (e) Cost Estimation for Decommissioning and Site Reclamation of the facility:
>
> > . . . .
> >
> > (ii) Decommissioning and site reclamation estimates shall be submitted to the Division in the application and every five years after the date of permit issuance until the completion of final reclamation.

B. Application of Principles of Law

115. This Council has considered all the evidence, testimony, and arguments presented at the August 5 and 6, 2014 evidentiary hearing. Through the evidence and testimony, this Council finds that PCW has shown, by a preponderance of the evidence, that it filed a complete Application with the Division regarding the proposed CCSM Project, which included the requirements in Wyo. Stat. Ann. § 35-12-109(a) and Chapter 1, Section 8 of the Industrial Development Information and Siting Rules and Regulations, and that the proposed CCSM Project complies with all applicable law. The completeness of the Application is supported by the testimony of Jacobson, Garry Miller, Choquette, Wichmann, and Chairman Chapman of the Carbon County Board of County Commissioner's.

116. PCW has shown, through the exhibits and testimony of all its witnesses, the proposed CCSM Project will not pose a threat of serious injury to the environment nor to the social and economic conditions of inhabitants in the affected area, and that the project will not substantially impair the health, safety, and welfare of those inhabitants. The testimony of Jacobson, Hammond, and Garry Miller all indicated that to be the case.

117. PCW has also shown, by a preponderance of the evidence, that its request for variances with regard to bonding, decommissioning, and reclamation should be granted. PCW's evidence of the reasonableness of the variances was proven through the testimony of Jacobson and Dr. Wojcik, both of whom had the knowledge, education, and expertise in formulating an effective reclamation plan which prevents injury to the soil and vegetation, leading to successful reclamation. Those variances are incorporated into this Order through Conditions #15 through #19 as set forth below on pages 55 and 56 of this Order. This Council was not persuaded by the Saratoga-Encampment-Rawlins Conservation District's request to apply different standards on the checkerboard portions of the land within the CCSM Project area. Applying two different standards for decommissioning and reclamation will lead to additional, unnecessary disturbance of the lands and additional, unnecessary costs to the applicant.

118. With respect to the concerns expressed by the Saratoga-Encampment-Rawlins Conservation District that the reclamation bonding was potentially inadequate, this Council is satisfied that those concerns are sufficiently addressed in the statutes and rules governing financial assurance for decommissioning and site reclamation. Specifically, Wyo. Stat. Ann. § 35-12-109(a)(xx) (LexisNexis 2013) and the Rules Indus.

Dev. Info. & Siting, ch. 1, § 9 (d) and (e)(2014) require a review of PCW's financial assurance plan every five years to assure complete decommissioning and site reclamation of the facility.

119. The Division proposed 19 enumerated conditions should the permit be issued. PCW had no objections to the conditions, with a minor correction to a typographical error in Condition #15.

120. Finally, with regard to the allocation of the impact assistance funds, this Council finds the Division's recommendation to allocate 94 percent of the impact funds to Carbon County, 3 percent of the impact funds to Albany County, and 3 percent of the impact funds to Sweetwater County is reasonable. The parties agreed to the recommended allocation of funds.

VI. DECISION

Pursuant to the authority vested in the Industrial Siting Council by Wyo. Stat. Ann. § 35-12-113 (LexisNexis 2013), this Council hereby **GRANTS** the Industrial Siting Permit Application filed by Power Company of Wyoming to construct and operate the Chokecherry and Sierra Madre Wind Energy Project to be located at the Overland Trail Cattle Company Ranch in Carbon County, Wyoming.

The Council specifically finds, with the imposition of the following conditions, that:

(1) The proposed facility complies with all applicable law;

(2) The facility will not pose a threat of serious injury to the environment nor to the social or economic condition of inhabitants or expected inhabitants of the affected area;

(3) The facility will not substantially impair the health, safety, or welfare of the inhabitants;

(4) The Applicant has the financial resources to decommission and reclaim the facility;

(5) The variance requested by the Applicant to leave in place the underground cables buried to a depth of 36 inches is reasonable and granted;

(6) The variance requested by the Applicant to reclaim the turbine pads at the pedestal level is reasonable and granted;

(7) The variance requested by the Applicant to reclaim the vegetation at BLM standards is reasonable and granted; and

(8) The variance requested by the Applicant for graduated bonding for the project is reasonable and granted.

(9) Pursuant to its authority, this Council allocates the impact assistance funds as follows:

Carbon County, Wyoming: 94%
Albany County, Wyoming: 3%
Sweetwater County, Wyoming: 3%

(10) Finally, pursuant to its authority, this Council places the following terms and conditions on the facility, as modified, from the *Division's Ex. 3*:

STANDARD WIND PERMIT CONDITIONS

Condition #1. Power Company of Wyoming, LLC (Permittee) shall obtain and maintain all required State and local permits and approvals in accordance with W. S. 35-12-109(a)(xv), 35-12-113(a)(i), and 35-12-115 during the term of this permit.

Condition #2. Permittee shall commence to construct within three years following the date of the award of this permit.

Condition #3. Before engaging in any activity over which the Industrial Siting Council (ISC) has jurisdiction which could significantly affect the environment external to Permittee's permit area, or the social, or economic, or environmental conditions of the area of site influence and which was not evaluated in the permit process, the Permittee shall prepare and file an evaluation of such activity with the Industrial Siting Division (ISD). When in the opinion of the Director of the Department of Environmental Quality (Director), the evaluation indicates that such activity may result in significant adverse impacts that were not considered in the permit, the Permittee shall file a permit amendment in accordance with W. S. 35-12-106.

Condition #4. The Permittee shall develop a written compliance plan and program to ensure compliance with voluntary commitments of this Permit, testimony, agreements with local governments, and these permit conditions. A compliance coordinator shall be designated and identified to the ISD prior to the onset of construction. This individual shall present himself/herself and meet with the ISD staff before construction commences and review the permit requirements with the ISD staff. This coordinator shall assume the responsibility for assuring that contractors and subcontractors are aware of and enable the Permittee to meet all permit requirements.

Condition #5. The ISC may review any adverse social, economic, or environmental impacts either within or outside the area primarily affected that are attributed to the Permittee:

a. Which adversely affect the current level of facilities or services provided by the local community;

b. Which cannot be alleviated by financing through ordinary sources of revenue, given due consideration to bonding history and capacity of the jurisdiction involved;

c. Which were not evaluated or foreseen at the time the permit was granted and can be attributed in whole or in part to the permitted facility; and

d. Which are not or cannot be resolved by voluntary measures by industrial representatives in the community.

Then by order issued in accordance with the Wyoming Administrative Procedures Act, the ISC may require additional mitigation by the Permittee in cooperation with other basic industries (existing and future) provided that:

a. A local government has requested mitigation assistance; and

b. Such adverse impacts were determined to be a result of the activities of the Permittee.

Permittee shall be required to assist in mitigating any impacts that result from construction or operation of the Chokecherry and Sierra Madre Wind Energy Project (Facility), including those resulting from direct and indirect employment. For purposes of determining additional mitigation measures by the Permittee, consideration shall be given to previous mitigation efforts. However, in any event, Permittee shall not be required to provide mitigation in excess of the proportion that the Permittee's activities are contributing to the total impacts within the impacted area (as defined by W. S. 35-12-102).

Condition #6. The Permittee shall give written notice to the ISD when construction commences.

Condition #7. The Permittee shall give written notice to the ISD when the physical components of the Facility are 90 percent complete.

Condition #8. As a means of adhering to W. S. 35-12-109(a)(xviii) to provide preference for local and resident hiring, the Permittee, contractors and subcontractors shall follow these hiring guidelines:

a. Procedures to foster local hiring shall be incorporated into the compliance plan.

b. Job postings shall be filed with the local Workforce Center.

Condition #9. The Permittee shall submit an annual report to ISC for the years or portion of a year that includes construction and again for the first year of operation of the facility for each phase. The annual report shall include:

a. Efforts to assure compliance with voluntary commitments, mitigation agreements with local governments, and conditions contained in this permit;

b. The extent to which construction has been completed in accordance with the approved schedule;

c. Any revised time schedules or time tables for construction, operations, and reclamation, and a brief summary of the construction, reclamation, and other activities that will occur in the next one-year period; and

d. Demonstration of compliance with permit conditions.

Condition #10. In order that the ISD may monitor Permittee's performance, the Permittee shall institute the following monitoring program that shall be recorded on a monthly basis and reported to the ISD on a quarterly basis through the construction period of each phase. Monthly data will be in a form prescribed by ISD and shall include:

a. The average and peak number of employees for the Permittee, contractors and subcontractors.

b. Employee city and state of residency at the time of hire and the employee city and state while employed and type of residence while employed.

c. The number of new students enrolled by grade level and school district who are related to Permittee employees, identified as either local (no change of residence) and in-migrants.

d. Wyoming resident versus non-resident workforce.

e. An updated construction schedule in the form of Figure 7-1 and Figure 7-2 as shown on pages 7-2 and 7-3 of the *Section 109 Power Company of Wyoming, LLC, Chokecherry and Sierra Madre Wind Energy Project application* (Application).

Condition #11. The Permittee shall notify the ISD in advance of proposed changes to the scope, purpose, size or schedule of the Facility. The Director may authorize such changes if he or she finds that:

a. The change should not result in any significant adverse environmental, social, and economic impacts in the area of site influence; and

b. No party nor Council Member has requested that the matter be heard before the Council in accordance with the permit procedures of W. S. 35-12-106(c) and (d).

The Director will provide public notice of the proposed change and his intent to approve the request.

Condition #12. The Permittee shall notify the ISD in advance and provide updates to the On-Site Construction Workforce Schedule, Table 7-3 and Figure 7-4 on pages 7-7 and 7-8 of the Application, and all other pages of the Application where changes are expected to occur if:

a. Actual on-site workforce during construction is expected to exceed the peak number estimated in the Application by more than fifteen percent (15%);

b. The Permittee wishes to make changes to the lodging plan as described in the Application.

The Director may authorize such changes or refer the matter to the Siting Council.

Condition #13. As may be subsequently required by the Director, the Permittee shall pay a fee based on the estimated costs to prepare, schedule, and conduct a special hearing or meeting of the Council to remedy any action or inaction by the Permittee. Unused fees shall be refunded to the Permittee.

Condition #14. When the Project is nearing completion, Permittee shall place notice to that effect in the newspapers in the general area of the Facility.

ADDITIONAL PERMIT CONDITIONS

Condition #15. The Permittee shall provide bonding on the permit for only the non-federal lands in the amount of $146,918,000 for decommissioning and reclamation which is a waiver to W.S. 35-12-109(a)(xx) and Rules of the Council. The Permittee shall provide the surety bond in steps outlined below:

a) Step 1: Before the start of any construction, Permittee shall provide a surety bond or similar security acceptable to the Administrator for $20,673,000 payable to the Department of Environmental Quality.

b) Step 2: At least 30 days prior to construction on SPOD 4, Phase I Wind Turbine Development, the Permittee shall provide:

   i. the Division a copy of the ROW grant as described in Section 5.2.2 of the Application for SPOD 4,

   ii. and an additional surety for $65,352,000 payable to the Department of Environmental Quality so that the total surety prior to construction on SPOD 4 would be $86,025,000.

c) Step 3: At least 30 days prior to construction on SPOD 5, Phase II Wind Turbine Development, the Permittee shall provide:

   i. the Division a copy of the ROW grant as described in Section 5.2.2 of the Application for SPOD 5,

   ii. and an additional surety for $60,893,000 payable to the Department of Environmental Quality so that the total surety prior to construction on SPOD 5 would be $146,918,000.

The Permittee shall update the decommissioning and reclamation plan and bond every five years and submit both to the Director for review and approval.

Condition #16. The Decommissioning and Reclamation for this project shall be conducted in accordance with the reclamation plan. The Permittee has approval to use:

- BLM's standard for re-vegetative requirements on all non-federal land rather than the requirements defined in the Rules and Regulations of the Industrial Siting Council Rules and Regulations (ISC),

- BLM's requirement to remove the pedestal portion of the foundation on all non-Federal Land rather than ISC's requirement of removing turbine foundations to a depth of 48 inches,

- and BLM's acceptance of leaving the underground cable in place on all non-federal land rather than ISC requirement of removing all cable to a depth of 48 inches.

Condition #17. During the construction of the facility, the Council shall consider requests by local government parties to change the distribution of impact assistance funds upon a showing of good cause as provided in the Regulations.

Condition #18. The Permittee commits to its housing plan as stated in the application and will construct the specified construction camp and RV site at the facility. Updates, changes and/or improvement to the housing plan shall be reported annually to the Director and the Director may authorize changes and/or improvements to the housing plan.

Condition #19. At least 30 days prior to the start of construction, Permittee shall provide a copy of the signed road use agreement between the Permittee and Wyoming Department of Transportation to the Industrial Siting Administrator.

VII. ORDER

IT IS THEREFORE ORDERED that the Industrial Siting Permit Application known as the Chokecherry and Sierra Madre Wind Energy Project, as submitted by the Applicant, as modified by this Council, and as set forth above in Permit Conditions #1 through #19, is **GRANTED**.

DONE this 12TH day of September, 2014.

Shawn Warner

Shawn Warner, Chairman
Industrial Siting Council
Herschler Building, Fourth Floor West
122 West 25th Street
Cheyenne, Wyoming 82002
(307) 777-7170

CERTIFICATE OF SERVICE

I hereby certify that the foregoing document was served by mailing a true and correct copy, postage prepaid, on the 16 day of September, 2014, addressed to the following:

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Industrial Siting Division
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Kimber Wichman

Industrial Siting Division

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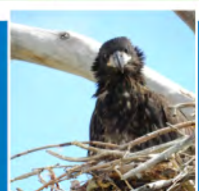
Phase I
Eagle Conservation Plan



Chokecherry and Sierra Madre Wind Energy Project

June 2015

Power Company of Wyoming LLC

555 Seventeenth St., Suite 2400 • Denver, CO 80202 • 303.298.1000 • www.powercompanyofwyoming.com

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ACRONYMS AND ABBREVIATIONS

ACP	Advanced Conservation Practice
ACM	applicant-committed measure
APLIC	Avian Power Line Interaction Committee
APP	Avian Protection Plan
BBCS	Bird and Bat Conservation Strategy
BCR	Bird Conservation Region
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMP	best management practice
BO	Biological Opinion
CCSM Project	Chokecherry and Sierra Madre Wind Energy Project
C.F.R.	Code of Federal Regulations
CUP	Conditional Use Permit
EA	Environmental Assessment
ECP	Eagle Conservation Plan
ECP Guidance	Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy, Version 2
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ETP	Eagle Take Permit
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
GPS	global positioning system
HSR	horizontal scanning radar

ISC	Industrial Siting Council
IM	Instruction Memorandum
MBTA	Migratory Bird Treaty Act
MCP	minimum convex polygon
mph	miles per hour
MW	megawatt
NEPA	National Environmental Policy Act
NREL	National Renewable Energy Laboratory
NTP	notice to proceed
OLE	Office of Law Enforcement
PCW	Power Company of Wyoming LLC
POD	plan of development
PTT	platform terminal transmitter
Ranch	The Overland Trail Ranch
REA	resource equivalency assessment
RFO	Rawlins Field Office
ROD	Record of Decision
ROW	right-of-way
RSZ	rotor swept zone
TOTCO	The Overland Trail Cattle Company LLC
UCI	upper credible interval
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
USFWS Region 6 Guidance	Final Outline and Components of an Eagle Conservation Plan (ECP) for Wind Development: Recommendations from Region 6

USFWS Region 6 Recommendations	Region 6 Recommendations for Avoidance and Minimization of Impacts to Golden Eagles at Wind Energy Facilities, April 11, 2013
VSR	vertical scanning radar
WDA	wind development area
WGFD	Wyoming Game and Fish Department
WHMA	wildlife habitat management area
Wind Energy Guidelines	U.S. Fish and Wildlife Service Land-based Wind Energy Guidelines
WTPD	white-tailed prairie dog

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1.0 Introduction and Purpose

This Eagle Conservation Plan is submitted in conjunction with Power Company of Wyoming LLC's (PCW) applications for Bald and Golden Eagle Protection Act (BGEPA) non-purposeful take permits covering activities at Phase I of the Chokecherry and Sierra Madre Wind Energy Project (CCSM Project). PCW has submitted applications for a 30-year programmatic take permit for Phase I of the CCSM Project, as well as a standard take permit for potential disturbance take that may occur during construction of Phase I.

Phase I is located in the western portions of two Wind Development Areas referred to as "Chokecherry" and "Sierra Madre." *See Figure 1.1*. Phase I will consist of 500 wind turbines generating approximately 1,500 megawatts (MW) of renewable energy. The U.S. Fish and Wildlife Service's (USFWS) "Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy, Version 2," dated April 2013 (ECP Guidance) recommends that eagle take permit (ETP) applications include an Eagle Conservation Plan, or similar documentation, that details the impacts of the non-purposeful (i.e. incidental) take on affected eagle species and how these impacts will be avoided, minimized, and mitigated.[1] The Eagle Conservation Plan must further demonstrate that the project is consistent with the USFWS's goal of maintaining stable or increasing breeding populations of eagles. *See USFWS 2014.*

PCW has worked with USFWS personnel from the Mountain-Prairie Region Office, Lakewood, Colorado, and Wyoming Ecological Services Office, Cheyenne, Wyoming, since 2010 regarding the potential for the CCSM Project to affect migratory birds and eagles. In its April 2011 letter to the Bureau of Land Management (BLM) regarding the CCSM Project, in response to the requirements of Instruction Memorandum (IM) 2010-156, USFWS stated "…we have determined that developing an APP is an appropriate option to avoid and minimize the potential take of eagles …." provided that PCW incorporates appropriate conservation measures into the CCSM Project.[2] *See Appendix A.* Following completion of the Stage 1 initial site assessment under the Draft Eagle Conservation Plan Guidance, January 2011, PCW determined that the CCSM Project met the criteria for Category 2 – High to moderate risk to eagles with an opportunity to mitigate impacts. In accordance with USFWS's Draft Eagle Conservation Plan Guidance, January 2011, PCW prepared and submitted a voluntary, project-wide draft Eagle Conservation Plan dated August 14, 2012. USFWS reviewed the project-wide draft Eagle Conservation Plan and continued to provide technical assistance to PCW in its development of Phase I and this Phase I Eagle Conservation Plan (Phase I ECP).

[1] See section 2.4 for a detailed discussion of USFWS's 2013 ECP Guidance.
[2] The term Avian Protection Plan (APP) is used in BLM IM-2010-156. However, through its Eagle Conservation Plan Guidance, Wind Energy Guidelines, and other related documents USFWS has since indicated its preference for the terms Eagle Conservation Plan (ECP) and Bird and Bat Conservation Strategy (BBCS) to be used in the context of wind energy facilities.

As detailed in this Phase I ECP, PCW has worked in close coordination with USFWS using the extensive CCSM Project and Phase I data to avoid and minimize risks to eagles to the extent practicable such that any remaining take is unavoidable. This Phase I ECP documents PCW's: (a) identification of important eagle use areas; (b) comprehensive actions it has already taken and those it has committed to implement in the future to avoid and minimize adverse effects to eagles, including its commitment to compensatory mitigation; and (c) procedures it will employ to monitor for impacts to eagles during construction and operation of Phase I; based on this, PCW believes Phase I meets the standards in 50 C.F.R. §22.26 for issuance of ETPs for incidental take.

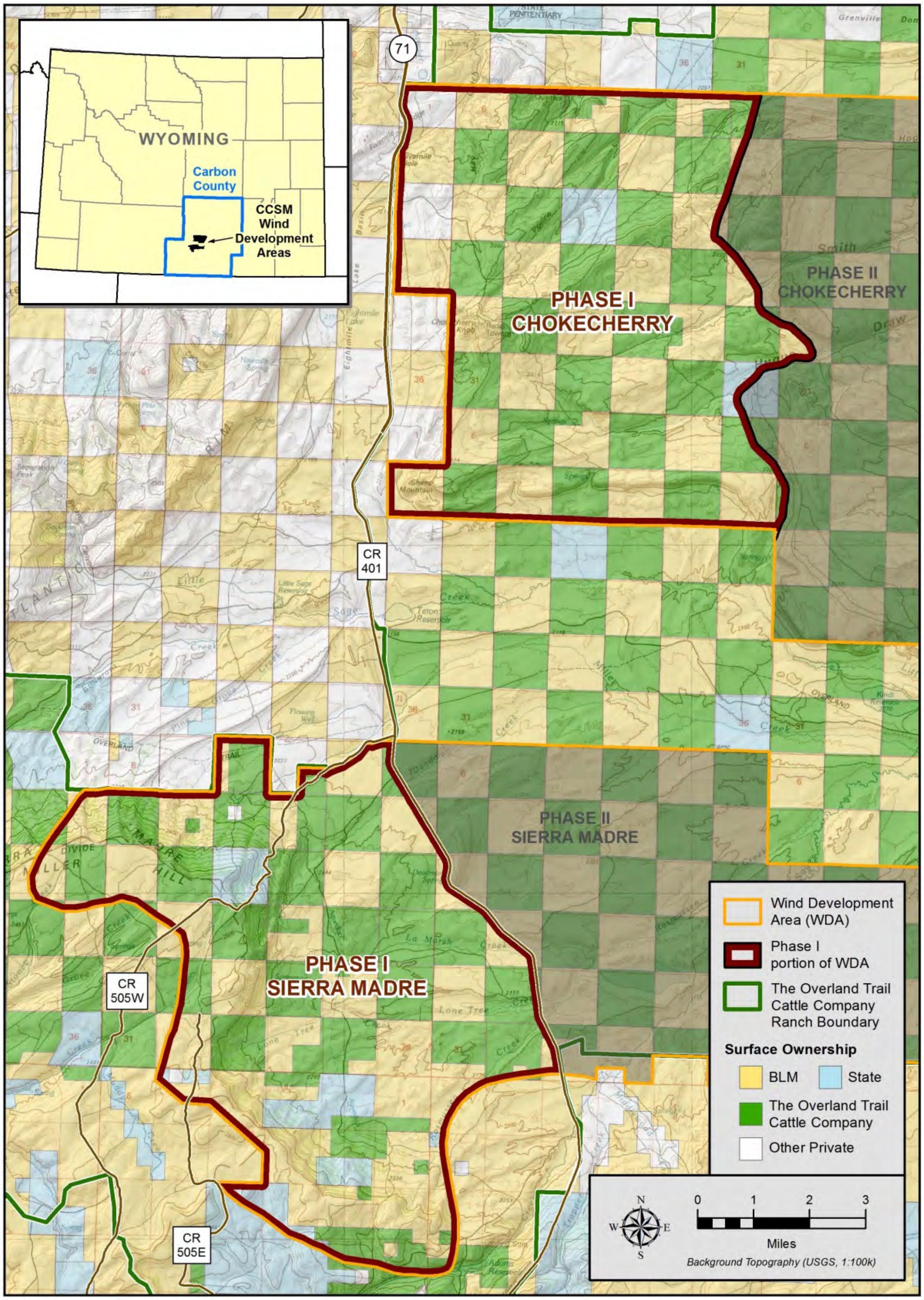

Figure 1.1. Phase I of the Chokecherry and Sierra Madre Wind Energy Project.

1.1 Purpose of the Phase I Eagle Conservation Plan

The purpose of this Phase I ECP is to document PCW's identification of potential risks to bald and golden eagles[3] and its reduction of those risks through implementation of conservation measures, experimental Advanced Conservation Practices (ACPs), and avoidance and minimization measures such that the remaining take is unavoidable. This Phase I ECP also describes the alternate sites, configurations, construction methods and operational practices evaluated by PCW and USFWS during the avoidance and minimization process. Further, this Phase I ECP documents the compensatory mitigation that will be provided for the remaining unavoidable take. This Phase I ECP builds on, refines, and replaces the previously prepared project-wide draft ECP. PCW prepared this Phase I ECP in accordance with USFWS's ECP Guidance and the "Final Outline and Components of an Eagle Conservation Plan (ECP) for Wind Development: Recommendations from Region 6" (USFWS Region 6 Guidance).[4,5]

PCW followed the process outlined in the ECP Guidance to plan Phase I. Consistent with the ECP Guidance, PCW initiated discussions with USFWS in 2010 regarding potential impacts to bald and golden eagles and has maintained communication with USFWS throughout the development process. In implementing the ECP Guidance, PCW worked closely with USFWS, Bureau of Land Management (BLM), Wyoming Game and Fish Department (WGFD), and other stakeholders. As a result, PCW substantially redesigned the CCSM Project, removing wind turbines from hundreds of acres of the original proposed site and relocating, removing, and agreeing to curtail certain wind turbines within the areas of the site that remain slated for wind development. Collectively, the measures applied to Phase I, as described in this Phase I ECP, avoid and minimize risks to bald and golden eagles to the extent practicable such that any remaining take is unavoidable. *See Chapter 6.0.* PCW's purpose and need in applying for ETPs is to comply with federal law and regulations regarding bald and golden eagles while engaging in the lawful activity of wind energy generation.

USFWS's consideration of PCW's applications for ETPs is a discretionary federal action that is subject to the National Environmental Policy Act (NEPA). USFWS has determined that preparation of an Environmental Impact Statement (EIS) is appropriate to comply with NEPA. USFWS began preparation of its EIS on December 4, 2013, with the publication of a Notice of Intent in the Federal Register. *See 78 Fed. Reg. 72,926 (December 4, 2013).* As set forth in the Notice of Intent, USFWS's purpose and need is to respond to PCW's applications and consider whether or not to issue ETPs to PCW. In responding to

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[3] *Haliaeetus leucocephalus* and *Aquila chrysaetos*, respectively.

[4] This Phase I ECP will serve to present the data and establish all avoidance, minimization, and mitigation measures that have been developed for Phase I. A Phase II ECP will be developed following the same criteria established in this document for Phase II of the CCSM Project. Much of the information presented in this Phase I ECP was collected as part of site characterization consistent with Stage 1 and Stage 2 of the ECP Guidance. As such, some information is applicable to both Phase I and Phase II of the CCSM Project.

[5] USFWS Region 6, commonly referred to as the Mountain-Prairie Region, oversees the management of USFWS trust resources in 8 states in the intermountain west and western Great Plains.

PCW's applications for ETPs, USFWS must ensure compliance with BGEPA and its regulations as well as USFWS's goal to maintain stable or increasing breeding populations of bald and golden eagles.

1.2 Relationship with Other Related Documents and Processes

PCW's commitments set out in this Phase I ECP, in combination with the various applicant-committed conservation measures and conservation plans included within the Phase I site-specific plans of development (site-specific PODs), along with the requirements outlined in BLM's Final Environmental Impact Statement and Record of Decision for the CCSM Project, promote the conservation of bald and golden eagles as well as many other avian, wildlife, and fish species at or near Phase I. *See BLM 2012a; 2012b.* The following sections describe the other documents and permitting processes to which this ECP is related.

1.2.1 CCSM Project Background [6]

This ECP is limited in scope to Phase I of the CCSM Project. Phase II of the CCSM Project will have a separate ECP and will be evaluated by USFWS independently; however, this section describes the CCSM Project as a whole to provide context for the discussion that follows on permitting.

The CCSM Project is located in Carbon County, Wyoming, south of the City of Rawlins and Town of Sinclair. The project is sited on the Overland Trail Ranch (Ranch), which is owned and operated by PCW's affiliate The Overland Trail Cattle Company LLC (TOTCO). The Ranch is a 320,000-acre agricultural operation, consisting primarily of cattle ranching and hay production. The Ranch is located in "checkerboard" country, in which land section ownership alternates between private land, mostly owned by TOTCO, and federal land managed by BLM along with a small portion of Wyoming State Land Board and WGFD-managed land. This pattern of land ownership dates back to the land grants made to the railroad under the Union Pacific Railway Act of 1862. The Ranch has some of the nation's best onshore wind energy resources, Class 6 and 7, with annual average winds above 8.8 meters per second (20 mph) as mapped by AWS Truepower for the U.S. Department of Energy's National Renewable Energy Laboratory (NREL).

The CCSM Project will consist of 1,000 wind turbines capable of generating up to 3,000 megawatts (MW) of clean, renewable wind energy. Phase I includes 500 wind turbines and associated infrastructure including the Road Rock Quarry, West Sinclair Rail Facility and Phase I Haul Road and Facilities. The CCSM Project is partially located on federal land administered by BLM's Rawlins Field Office. This federal nexus triggered environmental reviews under NEPA. BLM prepared a Final EIS (FEIS) and issued a Record of Decision (ROD) on the CCSM Project. BLM is also preparing two Environmental Assessments (EA) for Phase I. The EA for the Phase I Infrastructure Components is complete; on December 23, 2014, BLM issued a Decision Record approving the Phase I Infrastructure Components. *See BLM 2014a; BLM*

[6] A more detailed description of the CCSM Project is included in chapter 3.0; however, some background is necessary to provide context for the discussion of the related documents and permitting processes.

2014b. The EA for the remainder of Phase I, the Phase I Wind Turbine Development, is currently underway and a Decision Record is anticipated in the fall of 2015. BLM's process to comply with NEPA and the status of its environmental review of the CCSM Project are described in more detail below.

1.2.2 Federal Environmental Review

BLM's Compliance with NEPA

Development of the CCSM Project began in November 2006 when applications for two right-of-way (ROW) grants for wind energy site testing and monitoring (Type-II Wind Energy Project Area Grants) were filed with BLM. The applications covered two areas of the Ranch, identified as Chokecherry and Sierra Madre. BLM granted the Chokecherry Wind Energy Project Area Grant on June 11, 2007, and the Sierra Madre Wind Energy Project Area Grant on June 15, 2007. By the end of June 2007, the first two meteorological towers were collecting data from the Chokecherry Project Area. Since the Type-II Wind Energy Project Area Grants were issued, PCW has erected over 30 meteorological towers, some located on private land and some located on federal land, collecting wind speed and weather data from diverse areas within Chokecherry and Sierra Madre. PCW has an easement from TOTCO for wind development on the privately owned sections, but a ROW grant for development of a wind energy project (Type-III Wind Energy Development Grant) from BLM is needed in order to use the adjoining federal land for the CCSM Project. Therefore, in January 2008, PCW submitted an application and plan of development (POD) for a Type-III Wind Energy Development Grant to BLM, which would authorize PCW to construct, operate, maintain and decommission the CCSM Project on BLM-administered land. Subsequently, BLM, in compliance with NEPA and in coordination with other state and local governmental agencies, commenced the preparation of an EIS, the most comprehensive form of environmental analysis.

<u>BLM's Environmental Impact Statement</u>

BLM published a Notice of Intent to prepare an EIS and conducted public scoping in August 2008. *See 73 Fed. Reg. 43,469 (July 25, 2008).* The agency action evaluated in the BLM's EIS was "to decide whether the area identified in PCW's proposal would be acceptable for development of a wind farm and identify the appropriate development strategy." *See BLM 2012b at p. ES-1.* On July 22, 2011, BLM segregated approximately 107,175 acres of federal land within the proposed project area and released the Draft EIS for public comment. On July 3, 2012, BLM published the Notice of Availability for the FEIS on the CCSM Project and the segregation of 2,560 acres of federal land in the Federal Register. The BLM FEIS summarized the components of the CCSM Project as follows:

- A 2,000- to 3,000-megawatt (MW) wind farm consisting of approximately 1,000 wind turbine generators (WTGs) with a nameplate capacity ranging from 1.5- to 3-MW;
- Development of step-up transformers, underground and overhead electric collection and communication lines, electric substations, rail distribution facility (RDF), operation and maintenance facilities, and laydown areas;
- Haul road and transmission connection between the two sites;
- Construct new roads and upgrade existing roads; and

- Power from the wind farms would be transmitted via overhead electric transmission lines that would connect to a new substation.

See BLM 2012b at p. ES-1. In addition, PCW will reopen an onsite quarry that will supply aggregate for CCSM Project roads.

BLM prepared a project-wide EIS based on a conceptual POD prepared by PCW. *See BLM 2012b, App. B.* BLM used the conceptual wind turbine and facility sites and conceptual construction schedule in preparing its overall impacts analysis which assumed the "greatest potential for [surface] disturbance" so that impacts identified at the time of micrositing the various project components would most likely not exceed those impacts described in the FEIS. *See BLM 2012a at p. 3-1.* The BLM FEIS recognizes that because BLM's estimates of project-wide impacts are based on conceptual siting and analysis of "the largest possible area of [surface] disturbance," additional NEPA analysis may be necessary for site-specific PODs to examine any impacts that may exceed those analyzed in the project-wide level FEIS. *See BLM 2012b, App. B at pp. 1& 2.* It therefore provides for further NEPA analysis of site-specific PODs to be tiered to the BLM FEIS. *See BLM 2012b, App. B at p. 1.*

The potential impacts to bald and golden eagles at the CCSM Project were analyzed in the BLM FEIS. The BLM FEIS identifies the potential impacts of fatalities caused by: (1) collisions with wind turbines or meteorological towers; (2) electrocution by above-ground power lines; (3) habitat loss and modification stemming from CCSM Project construction; and (4) displacement due to construction or operation of the CCSM Project. It recognizes that "[t]he magnitude of these impacts depends upon the number of wind turbines and other infrastructure constructed for each alternative and the amount of direct and indirect habitat lost due to construction and operation of the project." *See BLM 2012b at p. 4.14-18.* The BLM FEIS evaluates the impacts of granting the requested ROWs based on available data as of June 2012, including an estimate of 46–64 golden eagle fatalities on an annual basis for a 1,000 wind turbine, 3,000 MW project with no specific eagle-related mitigation measures in place, and recognizes that this level of take would constitute a significant impact.[7] *See BLM 2012b at p. 4.14-26.* The BLM FEIS identifies that no significant impacts are expected for bald eagles. *See BLM 2012b at p. 4.14-22.* The BLM FEIS provides that BLM will not issue a Notice to Proceed (NTP) for the CCSM Project until PCW has developed an ECP and USFWS has issued a letter of concurrence for the Eagle Conservation Plan. *See BLM 2012b at p. 4.14-24.* However, the procedure for determining concurrence and issuing an NTP was detailed further in the Decision Record for EA1. *See "BLM's Supplemental Tiered NEPA Analysis."*

[7] "The eagle fatality estimate is based on pre-construction raptor use of the original Application Area (section 6.1.1), species composition of raptors observed during surveys, and raptor fatality estimates at other wind energy facilities in the western U.S., many of which did not develop plans to address eagle fatalities while designing and operating the projects." As discussed in chapter 7.0, the measures included in this Phase I ECP "to avoid and minimize eagle fatalities will likely result in observed eagle fatality rates below those originally predicted" by BLM. *See BLM 2012b at §4.14.2.4.*

BLM's Record of Decision

On October 9, 2012, the U.S. Secretary of the Interior Ken Salazar signed the ROD approving wind energy development in the defined Chokecherry and Sierra Madre Wind Development Areas. In the ROD BLM determined that portions of the areas for which PCW seeks ROWs "are suitable for wind energy development and associated facilities . . . as described under the Preferred Alternative in the CCSM project Final EIS." *See BLM 2012a at p. ES-1.* BLM's Selected Alternative provides for "development of a 2,000- to 3,000- megawatt (MW) project consisting of up to 1,000 wind turbines and ancillary facilities in the two sites, the 109,086-acre Chokecherry site and 110,161-acre Sierra Madre site, and off-site access on 460 acres." *See BLM 2012a at p. ES-1.* The Sierra Madre Wind Development Area consists of two distinct areas located both east and west of Highway 71 - with the majority of the wind development acreage located west of Highway 71. *See BLM 2012a at Figure 3-1.* The portion of Sierra Madre located west of Highway 71 is referred to as Miller Hill, and the portion of Sierra Madre located east of Highway 71 is referred to as Sage Creek Basin. *See BLM 2012a, App. B at pp. 4-25 & 4-26, Figure 4-10.* The Chokecherry Wind Development Area is located east of Highway 71, and is divided into Western and Eastern Chokecherry based on topography. *See BLM 2012a, App. B at p. 4-26, Figure 4-10.*

The BLM FEIS and ROD outline a detailed procedure under which PCW will submit site-specific PODs to BLM for subsequent NEPA analysis tiered "to the analysis and site-specific terms and conditions described in the ROD associated with the project-wide EIS." *See BLM 2012a at p. C-1.* The BLM ROD provides that "BLM will closely evaluate the site-specific [PODs] to determine whether the impacts exceed the [surface] disturbance estimates from the conceptual layouts that served as the basis for determining significance of impacts in the project-wide level EIS." *See BLM 2012a at p. 3-1.*

The BLM ROD therefore provides that future site-specific development plans "will be screened against the analysis conducted in this EIS, and then the appropriate level of subsequent, tiered NEPA analysis will be conducted prior to BLM issuing a decision on ROW applications." *See BLM 2012a at p.3-3; see also BLM 2012a, App. C (outlining tiering procedures).* Thus, the ROD anticipated additional environmental review would be conducted by BLM.

The BLM ROD also recognizes that USFWS has jurisdiction with respect to bald and golden eagles; therefore, the BLM ROD requires action by USFWS before BLM will issue a NTP with construction of the CCSM Project. *See BLM 2012a at pp. 3-1 & 3-4.* The BLM ROD states that "[t]he BLM will work with USFWS and PCW at the specific plan of development stages of this project to identify [ ] practicable measures [to avoid and minimize take]." *See BLM 2012a at p. ES-2.* As explained in the BLM ROD, PCW is to provide ECPs that incorporate "additional data collection activities, avoidance and minimization measures, offsite mitigation strategies that could be implemented, and monitoring to determine effectiveness of mitigation measures." *See BLM 2012a at p. 1-2.* The ROD indicates that once PCW develops an ECP, BLM will incorporate the measures outlined in the ECP "into subsequent NEPA analyses and ROW grants." *See BLM 2012a at pp. ES-2 & 1-2.* The ROD further provides that, "[s]hould PCW decide to apply for an eagle take permit, USFWS will thoroughly evaluate potential impacts of eagle take in NEPA documents." *See BLM 2012a at p. 1-2.*

In sum, the BLM FEIS and ROD contemplated that "conceptual" construction plans would be refined and become "final" plans or site-specific PODs that would be evaluated as part of BLM's tiered NEPA process for the CCSM Project. The ROD also requires action by USFWS with respect to PCW's ECPs. The process set out in the ROD identifies that PCW should work with USFWS in submitting refined wind turbine layouts in the applicable site-specific PODs that implement further eagle avoidance and minimization measures. The ROD further provides that "BLM will not issue ROW grants to PCW [ ] until USFWS issues letters of concurrence for the APPs and ECPs." *See BLM 2012a at p. 3-1.* However, the procedure for determining concurrence and issuing ROW grants and NTP was detailed further in the Decision Record for EA1. *See "BLM's Supplemental Tiered NEPA Analysis."*

<u>BLM's Supplemental Tiered NEPA Analysis</u>

PCW's POD provided that its approach to construction of the CCSM Project would be finalized and detailed in the site-specific PODs submitted to BLM. *See BLM 2012a, App. B at p. 4-1.* PCW's POD also recognized that the "[p]roject design will continue to be updated and refined to utilize the best data and information available." *See BLM 2012a, App. B at p. 4-1.*

PCW submitted four site-specific PODs covering Phase I to BLM for review. In accordance with the ROD, BLM is preparing two EAs evaluating PCW's four Phase I site-specific PODs. These EAs are tiered to the BLM FEIS. EA1 is complete and addresses PCW's site-specific PODs for: (1) Phase I Haul Road and Facilities; (2) West Sinclair Rail Facility; and (3) Road Rock Quarry. A Decision Record for EA1 was issued on December 23, 2014. *See BLM 2014b.* EA2 addresses PCW's site-specific POD for Phase I Wind Turbine Development, including 500 wind turbines or 1,500 MW. EA2 is currently being developed by BLM with a Decision Record anticipated in fall of 2015. USFWS is acting as a cooperating agency on both of the EAs being prepared by BLM.

BLM held four public scoping meetings in September and December 2013 to provide the public with opportunities to provide input on each EA. BLM made a draft of EA1 available to the public for review and comment on August 11, 2014, including a draft Decision Record finding that "no new or significant impacts were identified beyond those already disclosed in the EIS." BLM issued the final Decision Record for EA1 on December 23, 2014, approving the Phase I Infrastructure Components. *See BLM 2014b.* The Decision Record clarifies BLM's intent regarding the ROD's requirements for coordination with USFWS and issuance of Notices to Proceed for the CCSM Project. According to the Decision Record, "[t]he Notice to Proceed (NTP) for individual [site-specific PODs] would be issued as permitting requirements are completed." *See BLM 2014b.* Specific to eagles, the Decision Record states that, "[t]urbine construction will not be allowed before USFWS makes its decision regarding an ETP." *See BLM 2014b.*

USFWS Compliance with NEPA

The issuance of a programmatic ETP is a major federal action that triggers the requirements of NEPA. Accordingly, parallel to BLM's preparation of the EAs for Phase I of the CCSM Project, USFWS is preparing an EIS to analyze the potential impacts to eagles and to evaluate potential issuance of ETPs for

Phase I. USFWS held public scoping meetings for its EIS in Rawlins and Saratoga, Wyoming, on December 16 and 17, 2013, respectively. The USFWS EIS will analyze the measures described in this Phase I ECP as well as consider and incorporate where appropriate other relevant information sources, including BLM's FEIS. In addition, USFWS is a cooperating agency on the two EAs being prepared by BLM. *See "BLM's Supplemental Tiered NEPA Analysis."*

Section 7 Consultation

The Endangered Species Act (ESA) directs all Federal agencies to work to conserve endangered and threatened species and to use their authorities to further the purposes of the Act. Section 7 of the ESA, called "Interagency Cooperation," is the mechanism by which Federal agencies ensure the actions they take, including those they fund or authorize, do not jeopardize the existence of any listed species. Under section 7, Federal agencies must consult with USFWS when any action the agency carries out, funds, or authorizes (such as through a permit) *may affect* a listed endangered or threatened species or designated critical habitat.

For the CCSM Project, BLM formally consulted with USFWS resulting in the issuance of a Biological Opinion (BO). *See BLM 2012a, App. F.* All reasonable and prudent alternatives and terms and conditions for threatened and endangered species listed in the BO will be included by BLM as requirements of any ROW grants BLM issues for the CCSM Project. Implementation of the conservation measures for proposed and candidate species identified in the BO to reduce potential adverse impacts are discretionary. The BO incorporates the applicant-committed measures (ACMs).

Bald and golden eagles are not threatened or endangered species and are therefore not protected under the ESA and are not included in the section 7 consultation process.[8] However, in order to issue an ETP, USFWS may conduct "intra-Service consultation" regarding threatened and endangered species, as well as proposed species, and candidate species such as the greater sage-grouse, which USFWS found warranted but precluded from listing under the ESA. *See 75 Fed. Reg. 13,909 (March 23, 2010).*

Bird and Bat Conservation Strategy

PCW will submit a Bird and Bat Conservation Strategy (BBCS) for Phase I to USFWS, following the "U.S. Fish and Wildlife Service Land-based Wind Energy Guidelines" (Wind Energy Guidelines) and recommendations from USFWS's "Region 6, Outline for a Bird and Bat Conservation Strategy: Wind Energy Projects." *See PCW 2015a; USFWS 2012a.*

1.2.3 State and County Permitting

In addition to complying with the requirements of BLM and USFWS, the CCSM Project is subject to state and county permitting. These permits will not negatively impact the ability of USFWS and BLM to require future modifications to the CCSM Project based on additional environmental analysis, or to

[8] While bald and golden eagles are not protected under the ESA, bald and golden eagles are protected under the federal laws described in chapter 2.0.

enforce such modifications. Although they are distinct processes with their own requirements, they complement and further the goals of BLM and USFWS to avoid, minimize and mitigate the environmental impacts of the CCSM Project. Moreover, they require PCW to comply with all applicable laws, regulations, standards, and any requirements of the federal permitting processes.

Wyoming State Permitting Process

Pursuant to Wyo. Stat. Ann. §35-12-101 *et seq.*, PCW is required to have a permit from the Wyoming Industrial Siting Council (ISC) to construct and operate the CCSM Project. On May 12, 2014, PCW filed its application with the Department of Environmental Quality, Industrial Siting Division for the required permit. On July 18, 2014, the Division determined that PCW's application was complete pursuant to Wyo. Stat. Ann. § 35-12-109. The ISC held a two-day administrative hearing beginning on August 5, 2014, in Saratoga, Wyoming. At the end of the hearing, the ISC deliberated in public and unanimously voted to grant PCW a permit for the CCSM Project. The ISC issued the permit on September 12, 2014, and it requires PCW to comply with all applicable federal permits. Moreover, should BLM or USFWS require modifications to the CCSM Project, the applicable statute and the ISC rules and regulations provide the mechanisms and processes for addressing the required modifications. Enforcement mechanisms are two-fold: (1) if PCW does not make the required modifications, BLM will not issue the ROW grants and the NTPs; and (2) PCW would be in violation of its Wyoming state permit for not meeting the applicable federal permit requirements.

Carbon County Permitting Process

PCW has obtained a Conditional Use Permit (CUP) for the CCSM Project from the Carbon County Board of Commissioners. On September 17, 2012, a public meeting of the Carbon County Planning and Zoning Commission was held, pursuant to section 5.11 of the Carbon County Zoning Resolution of 2003, as amended, in order to provide the opportunity for public comment on PCW's application for a CUP. After considering the Staff Recommendation from the Office of Planning and Development and both written and verbal public comments, the Planning and Zoning Commission voted to recommend approval of the CUP with conditions.

On October 2, 2012, the Carbon County Board of Commissioners (pursuant to section 5.11 of the Carbon County Zoning Regulations of 2003, as amended, and W.S. §18-5-501 *et seq.*) held a public meeting and convened a public hearing for purposes of affording an opportunity for members of the public to comment on the CCSM Project. Following the hearing and the entry of specific findings into the record, the Board voted unanimously to approve PCW's application for a CUP.

On October 18, 2012, at a regularly scheduled meeting, the Board presented, read and adopted the Opinion of Board of County Commissioners Carbon County, Wyoming Regarding the Decision to Approve the CUP – Commercial Wind Energy Facility (C.U.W. Case File #2012-01) Rendered on October 2, 2012, (the Opinion). The Opinion reflects that the Board made specific and detailed findings of fact that:
(1) according to the Carbon County Planning and Zoning Commission, the CCSM Project will comply with standards required by W.S. §18-5-504 and with all applicable zoning and county land use regulations;

(2) the application for the CCSM Project meets all standards and requirements of W.S. §18-5-501 *et seq.* and all applicable zoning and county land use regulations; and (3) the CCSM Project is in general conformance with the Carbon County Comprehensive Land Use Plan, as amended, and otherwise promotes the health, safety and general welfare of the residents of Carbon County.

The CUP contains the following conditions of approval:

- Nothing in this permit's conditions is intended to preempt other applicable State and Federal laws or regulations. All WECS[9] Project facilities shall be constructed to meet and be maintained in compliance with all Federal, State, and County requirements, including all Wyoming Industrial Siting Council requirements.

- This Permit is subject to final approval and issuance of a permit by the Industrial Siting Council and a ROW grant by the Bureau of Land Management. The Applicant(s) shall submit a copy of all subsequent Federal and State approvals, including all required studies, reports and certifications prior to the issuance of any building permits.

These permit conditions ensure that any requirements imposed by BLM or USFWS subsequent to Carbon County's issuance of the CUP will be enforced. On July 15, 2014, the Carbon County Board of County Commissioners approved a one-year extension of the Conditional Use Permit's requirement to commence construction within two years of the original date of issuance.

1.3 PCW's Objectives and Environmental Commitment

PCW is a limited liability company organized in Delaware and authorized to do business in Wyoming. The company is indirectly wholly-owned by The Anschutz Corporation (Anschutz), an energy and natural resource company based in Denver, Colorado. Anschutz is a diversified company with worldwide investments in energy exploration, ranching and agriculture, lodging, transportation, telecommunications, and entertainment including music, sports and film production. PCW was formed to develop the CCSM Project.

1.3.1 Objectives

PCW's objectives for the CCSM Project are detailed in its POD submitted to BLM in conjunction with BLM's preparation of the FEIS and are also detailed in BLM's ROD. *See BLM 2012a at §3.6.2.* Generally, PCW's objectives for the CCSM Project are to help satisfy the projected future market for power from renewable energy sources by extracting the maximum potential wind energy from the site and developing a 3,000 MW wind farm consisting of up to 1,000 wind turbines. As reflected in the ROD, "[t]hrough a confidential economic analysis reviewed by the National Renewable Energy laboratory, the applicant has determined that a project size of up to 1,000 wind turbines for the Application Area would

[9] WECS means Wind Energy Conversion System. See Carbon County §5.11 Wind Energy Overlay-District Regulations, Approved April 5, 2011 at 5.11(c)(1).

provide the greatest return on investment using the highest capacity wind turbines commercially available at the time of development." *See BLM 2012a.* Originally, PCW determined that the Application Area could host up to 2,387 wind turbines. However, 397 wind turbines were removed from greater sage-grouse cores areas designated in Wyoming Executive Order 2011-5, Attachment A, Sage-Grouse Core Breeding Areas Version 3 (Core Areas), 52 wind turbines were removed from below-acceptable wind resource areas, and spacing between wind turbines was increased to avoid significant wake losses further decreasing the potential project size. *See BLM 2012a.* The resulting CCSM Project size of 1,000 wind turbines was considered in the economic analysis reviewed by NREL.

PCW's objectives for Phase I are tied closely to PCW's objective for the CCSM Project as a whole. As described in the site-specific POD for the Phase I Wind Turbine Development, PCW has determined that developing the CCSM Project in two phases of 500 wind turbines (1,500 MW) each will achieve its purpose and need for the CCSM Project. *See PCW 2015b.* This overall size and phased approach is supported by the current market for renewable energy in the Desert Southwest and independent studies by both the National Renewable Energy Laboratory (NREL) and the Western Electricity Coordinating Council (WECC). *See PCW 2015b.* PCW's objectives for Phase I are detailed in its site-specific POD for the Phase I Wind Turbine Development. However, generally, PCW's objectives for Phase I are to permit and build an economically viable project and to extract the maximum potential wind energy from the site by developing the first phase of the CCSM Project consisting of 500 wind turbines with an installed capacity of 1,500 MW.

1.3.2 Environmental Commitment

PCW's approach to development of the CCSM Project is novel because it maintained the flexibility that enabled the company to significantly redesign the Project from what was first proposed. PCW has adjusted wind turbine layouts multiple times when finalizing the site-specific POD for the Phase I Wind Turbine Development as more information became available regarding the applicable environmental and site constraints and wildlife considerations. Through iterative applications of the stages identified in the ECP Guidance, PCW has substantially revised the CCSM Project from the original Wind Energy Application Area and its original Proposed Action to address potential environmental risks to species of concern, including eagles. *See Section 6.1.* The resulting final wind turbine configuration has avoided or minimized risks to eagles from Phase I such that any remaining take is unavoidable despite application of ACPs, consistent with the ECP Guidance and the provisions of the BGEPA.

Further, PCW is in the unique position of being able to partner with an affiliate to use the approximately 320,000-acre Ranch for the development of the CCSM Project. Since the 1990s, PCW affiliate TOTCO has owned and operated one of the largest cattle ranching operations in the West. TOTCO has been a part of the Carbon County community and a steward of the land and wildlife resources on the Ranch for over 15 years. PCW has a wind easement, access easement, transmission easement and other non-exclusive rights with respect to TOTCO's privately-owned land on the Ranch. The CCSM Project will result in long-term surface disturbance of less than 2,000 acres of the 320,000-acre Ranch, and ranching operations will continue without material change during construction and operation of the Project.

In sum, PCW is committed to building the CCSM Project in an environmentally responsible manner. Responsible development includes taking measures, such as those documented in this Phase I ECP to avoid, minimize, and mitigate the CCSM Project's impact to wildlife populations, including eagles, within the CCSM Project Site. The evolution of the CCSM Project illustrates: (1) PCW's attention to the early determination of potential environmental risks at the landscape scale; (2) PCW's adjustment of the CCSM Project siting and design based on species of concern and their habitat; (3) PCW's evaluation of potential environmental risks on the adjusted CCSM Project Site based on site-specific data; and (4) PCW's adjustment/limitation of the areas of potential wind turbine development on the CCSM Project Site to avoid, minimize and mitigate the impacts to eagles and other avian and non-avian species.

2.0 Regulatory Framework

There is a comprehensive and complex existing legal framework to protect bald and golden eagles. This includes statutes in the United States Code (U.S.C.), federal regulations, the ECP Guidance, and the Wind Energy Guidelines. Brief summaries of the components of this legal framework are set out below.

2.1 Migratory Bird Treaty Act[10]

The Migratory Bird Treaty Act (MBTA) is the cornerstone of migratory bird conservation and protection in the United States. The MBTA implements four treaties that provide for international protection of migratory birds. It has been described as a strict liability statute, meaning that proof of intent, knowledge, or negligence is not an element of an MBTA violation. The statute's language is clear that actions resulting in a "taking" or possession (permanent or temporary) of a protected species, in the absence of an USFWS permit or regulatory authorization, are a violation of the MBTA.

The MBTA states, "Unless and except as permitted by regulations . . . it shall be unlawful at any time, by any means, or in any manner to pursue, hunt, take, capture, kill . . . possess, offer for sale, sell . . . purchase . . . ship, export, import . . . transport or cause to be transported . . . any migratory bird, any part, nest, or eggs of any such bird . . . . [The Act] prohibits the taking, killing, possession, transportation, import and export of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior." *See 16 U.S.C. § 703.* The word "take" is defined by regulation as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect." *See 50 C.F.R. § 10.12.*

USFWS maintains a list of all species protected by the MBTA at 50 C.F.R. § 10.13. This list includes over 1,000 species of migratory birds, including eagles and other raptors, waterfowl, shorebirds, seabirds, wading birds, and passerines. The MBTA does not protect introduced species such as the house (English) sparrow, European starling, rock dove (pigeon), Eurasian collared-dove, and non-migratory upland game birds. USFWS maintains a list of introduced species not protected by the Act. *See 70 Fed. Reg. 12,710 (2005)*.

The MBTA provides criminal penalties for persons who commit any of the acts prohibited by the statute in section 703 on any of the species protected by the statute. *See 16 U.S.C. § 707.*

2.2 Bald and Golden Eagle Protection Act[11] and Eagle Take Permits

Under the authority of the Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. §§ 668–668d, bald eagles and golden eagles are afforded additional legal protection. BGEPA prohibits the "take, sale, purchase, barter, offer of sale, purchase, or barter, transport, export or import, at any time or in any

[10]Drawn from USFWS 2012a at p. 2.
[11]Drawn from USFWS 2012a at p. 2 through 3.

manner of any bald or golden eagle, alive or dead, or any part, nest, or egg thereof." *See 16 U.S.C. § 668.* BGEPA also defines take to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb," and includes criminal and civil penalties for violating the statute. *See 16 U.S.C. § 668.* USFWS has further defined the term "disturb" as agitating or bothering an eagle to a degree that causes, or is likely to cause, injury, or either a decrease in productivity or nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior. *See 50 C.F.R. § 22.3*. BGEPA authorizes USFWS to permit the take of eagles for certain purposes and under certain circumstances, including scientific or exhibition purposes, religious purposes of Indian tribes, and the protection of wildlife, agricultural, or other interests, so long as that take is compatible with the preservation of eagles. *See generally, 16 U.S.C. § 668(a).*

In 2009, USFWS promulgated a final rule on two new permit regulations that, for the first time, specifically authorize the non-purposeful (i.e. incidental) take of eagles and eagle nests in a variety of situations under BGEPA. *See 50 C.F.R. §§ 22.26 & 22.27*. The permits authorize limited, incidental take of bald and golden eagles, authorizing individuals, companies, government agencies (including tribal governments), and other organizations to disturb or otherwise take eagles in the course of conducting lawful activities such as operating utilities and airports.

In 2013, USFWS issued a final rule to extend the maximum term for programmatic take permits under BGEPA to 30 years, subject to a recurring five-year review process throughout the permit life. *See 78 Fed. Reg. 73,704 (December 9, 2013)*. The change is designed to facilitate responsible development of renewable energy and other projects that operate for multiple decades, and to provide certainty for project proponents, all while continuing to conserve eagles. The new rule went into effect January 8, 2014.

USFWS's permit program allows for two kinds of non-purposeful take permits for protected eagles: the standard permit and the programmatic permit. The standard permit authorizes the limited take of eagles resulting from a one-time and otherwise lawful activity where the take cannot be practically avoided (*e.g.*, construction of a housing development).[12] *See 50 C.F.R. § 22.26(a)(1)*. The standard permit is subject to numerous conditions, including a limitation on the amount of authorized take that is based on a total authorized nationwide take of eagles, and other permit applicants' requests that may take precedence (*e.g.*, Native American religious use requests).

The programmatic permit authorizes non-purposeful eagle take associated with operations at a facility (*e.g.*, operation of a wind energy facility)[13] where take of eagles is unavoidable even though ACPs are being implemented. *See 50 C.F.R. § 22.26(a)(2).* Programmatic take means take that is recurring, is not caused solely by indirect effects, and that occurs over the long term or in a location or locations that cannot be specifically identified. A key feature of the programmatic take permit is the implementation of ACPs at the facility. An "advanced conservation practice" is defined as: "scientifically supportable

[12]See 74 Fed. Reg. at 46,842 for the example of a housing development's qualification for a standard permit.
[13]See 74 Fed. Reg, at 46,842 for the example of a wind development's qualification for a programmatic permit.

measures that are approved by USFWS and represent the best available techniques to reduce eagle disturbance and ongoing mortalities to a level where remaining take is unavoidable." *See 50 C.F.R. § 22.3.* In general, ACPs would be determined by the permit applicant and USFWS on a case-by-case basis. However, as discussed in the ECP Guidance, at this time there are no proven ACPs for wind energy projects; therefore, all ACPs for wind energy are considered experimental. *See USFWS 2013a.*

2.3 U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines[14]

USFWS's main approach to reducing impacts to migratory birds from wind energy facilities is the use of the voluntary Wind Energy Guidelines. *See USFWS 2012a*. These Wind Energy Guidelines were developed by USFWS working with the Department of the Interior Wind Turbine Guidelines Advisory Committee, a federal advisory committee consisting of representatives of the wind energy industry, conservation groups, state wildlife agencies, and USFWS. They replace interim voluntary guidance published by USFWS in 2003.

The final voluntary Wind Energy Guidelines provide a structured, scientific process for addressing wildlife conservation concerns at all stages of land-based wind energy development. They also promote effective communication among wind energy developers and federal, state, and local conservation agencies and tribes. When used in concert with appropriate regulatory tools, the Wind Energy Guidelines form the best practical approach for conserving species of concern. The Wind Energy Guidelines discuss various risks to "species of concern" from wind energy projects, including collisions with wind turbines and associated infrastructure; loss and degradation of habitat from wind turbines and infrastructure; fragmentation of large habitat blocks into smaller segments that may not support sensitive species; displacement and behavioral changes; and indirect effects such as increased predator populations or introduction of invasive plants. The Wind Energy Guidelines assist developers in identifying species of concern that may potentially be affected by their proposed project, including migratory birds; bats; bald and golden eagles and other birds of prey; prairie grouse and sage-grouse; and listed, proposed, or candidate endangered and threatened species.

The Wind Energy Guidelines use a "tiered approach" for assessing potential adverse effects to species of concern and their habitats. The tiered approach is an iterative decision-making process for collecting information in increasing detail; quantifying the possible risks of proposed wind energy projects to species of concern and their habitats; and evaluating those risks to make siting, construction, and operation decisions. During the pre-construction tiers (Tiers 1, 2, and 3), developers work to identify, avoid and minimize risks to species of concern. During post-construction tiers (Tiers 4 and 5), developers assess whether actions taken in earlier tiers to avoid and minimize impacts are successfully achieving the goals and, when necessary, take additional steps to compensate for impacts. Subsequent tiers refine and build upon issues raised and efforts undertaken in previous tiers. Each tier offers a set of

[14]Drawn from USFWS2012a at vi and vii.

questions to help developers evaluate the potential risk associated with developing a project at the given location.

The tiered approach provides the opportunity for evaluation and decision-making at each stage, enabling a developer to abandon or proceed with project development, or to collect additional information if required. This approach does not require that every tier, or every element within each tier, be implemented for every project. Instead, the tiered approach allows efficient use of developer and agency resources with increasing levels of effort. The Wind Energy Guidelines also provide Best Management Practices (BMPs) for site development, construction, retrofitting, repowering, and decommissioning.

The Wind Energy Guidelines include a Communications Protocol which provides guidance to both developers and USFWS personnel regarding appropriate communication and documentation. Adherence to the Wind Energy Guidelines is voluntary and does not relieve any individual, company, or agency of the responsibility to comply with laws and regulations. However, if a violation occurs, USFWS will consider a developer's documented efforts to communicate with the Service and adhere to the Wind Energy Guidelines in its enforcement decision.

USFWS recommends that a BBCS be prepared in accordance with the Wind Energy Guidelines. USFWS has informed PCW that a BBCS should be prepared for Phase I in accordance with its Wind Energy Guidelines and that both the Phase I BBCS and Phase I ECP should be stand-alone documents. *Region 6, USFWS, personal communication, 2013*.

2.4 U.S. Fish and Wildlife Service Eagle Conservation Plan Guidance[15]

USFWS, in April 2013, released the ECP Guidance to provide direction to USFWS employees and industry during wind energy facility planning. *See USFWS 2013a*. The ECP Guidance outlines the type of analysis and science that should be considered in a robust permit application to provide flexibility to the wind energy industry while protecting bald and golden eagles. *See USFWS 2013a*.

The ECP Guidance describes a process for wind energy developers to use in collecting and analyzing information that could lead to a programmatic permit under BGEPA to authorize incidental take of eagles at wind energy facilities. While acknowledging that all wind projects within the eagles' geographic range pose some risk to eagles, the purpose of using the process in preparing an ECP is to assess that risk and assess how siting, design, and operational modifications can mitigate that risk to the extent practicable.

The ECP Guidance is intended to provide "specific in-depth guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities." The ECP Guidance calls for scientifically rigorous surveys, monitoring, assessment, and research designs proportionate to the

[15] Drawn from USFWS 2013a at xxii-xiii.

risk to eagles. According to the ECP Guidance, an ECP should: (a) document early pre-construction assessments to identify important eagle use areas; (b) document a commitment to avoiding, minimizing, and/or mitigating for potential adverse effects to eagles; and (c) document procedures to monitor for impacts to eagles during construction and operation.

USFWS recommends that ECPs be developed in five stages. Each stage builds on the prior stage, such that together the process is a progressive, increasingly intensive look at likely effects of the development and operation of a particular site and configuration on eagles. The ECP Guidance recommends that at the end of each of the first four stages, project proponents determine which of the following categories the project, as planned, falls into: (1) high risk to eagles, little opportunity to minimize effects; (2) high or moderate risk to eagles, but with an opportunity to minimize effects; or (3) minimal risk to eagles.

The five-stage approach for developing an eagle conservation plan is described in the ECP Guidance, as follows:

- Stage 1 – At the landscape level, identify potential wind facility locations with manageable risk to eagles.

- Stage 2 – Obtain site-specific data to predict eagle fatality rates and disturbance take at wind facility sites that pass Stage 1 assessment. Investigate other aspects of eagle use to consider assessing distribution of occupied nests in the project area, migration, areas of seasonal concentration, and intensity of use across the project footprint.

- Stage 3 – As part of pre-construction monitoring and assessment, estimate the fatality rate of eagles for the facility evaluated in Stage 2, excluding possible additions of conservation measures and advanced conservation practices (ACPs). Consider possible disturbance effects.

- Stage 4 – As part of the pre-construction assessment, identify and evaluate conservation measures and ACPs that might avoid or minimize fatalities and disturbance effects identified in Stage 3. When necessary, identify compensatory mitigation to reduce predicted take to a no-net-loss standard.

- Permit Decision – Determine if regulatory requirements for issuance of a permit have been met.

- Stage 5 – During post-construction monitoring, document mean annual eagle fatality rate and effects of disturbance. Determine if initial conservation measures are working and should be continued, and if additional conservation measures might reduce observed fatalities. Monitor effectiveness of compensatory mitigation. Ideally, assess use of area by eagles for comparison to pre- construction levels.

Although project proponents are not required to use the recommended procedures described in the ECP Guidance, PCW has chosen to follow the recommended procedures for this Phase I ECP. Because data collection and siting decisions for the CCSM Project began prior to the issuance of the ECP Guidance, PCW has coordinated closely with USFWS to ensure adherence with the ECP Guidance.

The ECP Guidance interprets and clarifies the permit requirements in the regulations at 50 C.F.R. §§ 22.26 & 22.27, and it does not impose any binding requirements beyond those specified in the regulations for programmatic take permits. Programmatic take permits will authorize limited, incidental mortality and disturbance of eagles at wind facilities, and provide effective offsetting conservation measures that meet regulatory requirements. To comply with the permit regulations, conservation measures must avoid and minimize take of eagles to the extent practicable, and, for programmatic permits necessary to authorize ongoing take of eagles, ACPs must be implemented such that any remaining take is unavoidable. Further, for eagle populations that cannot sustain additional mortality, any remaining take must be offset through compensatory mitigation such that the net effect on the eagle population is, at a minimum, no change.

Under the ECP Guidance, compensatory mitigation for eagle takes will be calculated on the basis of a Resource Equivalency Assessment (REA), which estimates the number of “eagle-years” lost as a result of the wind energy project. *See USFWS 2013a, App. G*. The REA then assesses the number of “eagle-years” that could be “generated” through offsite mitigation, and in particular, the retrofit of utility power poles with eagle protection systems. A project proponent can either contract for the retrofits directly, or pay an amount of money into a USFWS-approved project or a USFWS-established BGEPA mitigation account.

3.0 Project Description and Environmental Setting

This ECP is limited in scope to Phase I of the CCSM Project. Phase II of the CCSM Project will have a separate ECP and will be evaluated by USFWS independently; however, portions of this chapter describe the CCSM Project as a whole to provide context.

The CCSM Project, as described in this chapter, represents the culmination of more than eight years of data collection, planning, and design, considering the environmental analysis completed by BLM, and collaboration and communication with USFWS, various non-governmental organizations, and state and local agencies.

3.1 Phase I Description

PCW is developing the CCSM Project in two phases. *See Figure 3.1.* When both Phase I and Phase II are complete, the CCSM Project will consist of 1,000 wind turbines capable of generating up to 3,000 MW of clean, renewable wind energy. Phase I consists of 500 wind turbines located in the western portions of two Wind Development Areas (WDAs) referred to as “Chokecherry” and “Sierra Madre” and associated infrastructure including the Road Rock Quarry, West Sinclair Rail Facility and Phase I Haul Road and Facilities. Phase II will include 500 wind turbines and associated infrastructure located in the eastern portions of the Chokecherry and Sierra Madre WDAs. The significance of the WDAs is that these are the only areas in which PCW will install wind turbines. There will be no wind turbines sited outside the WDAs.

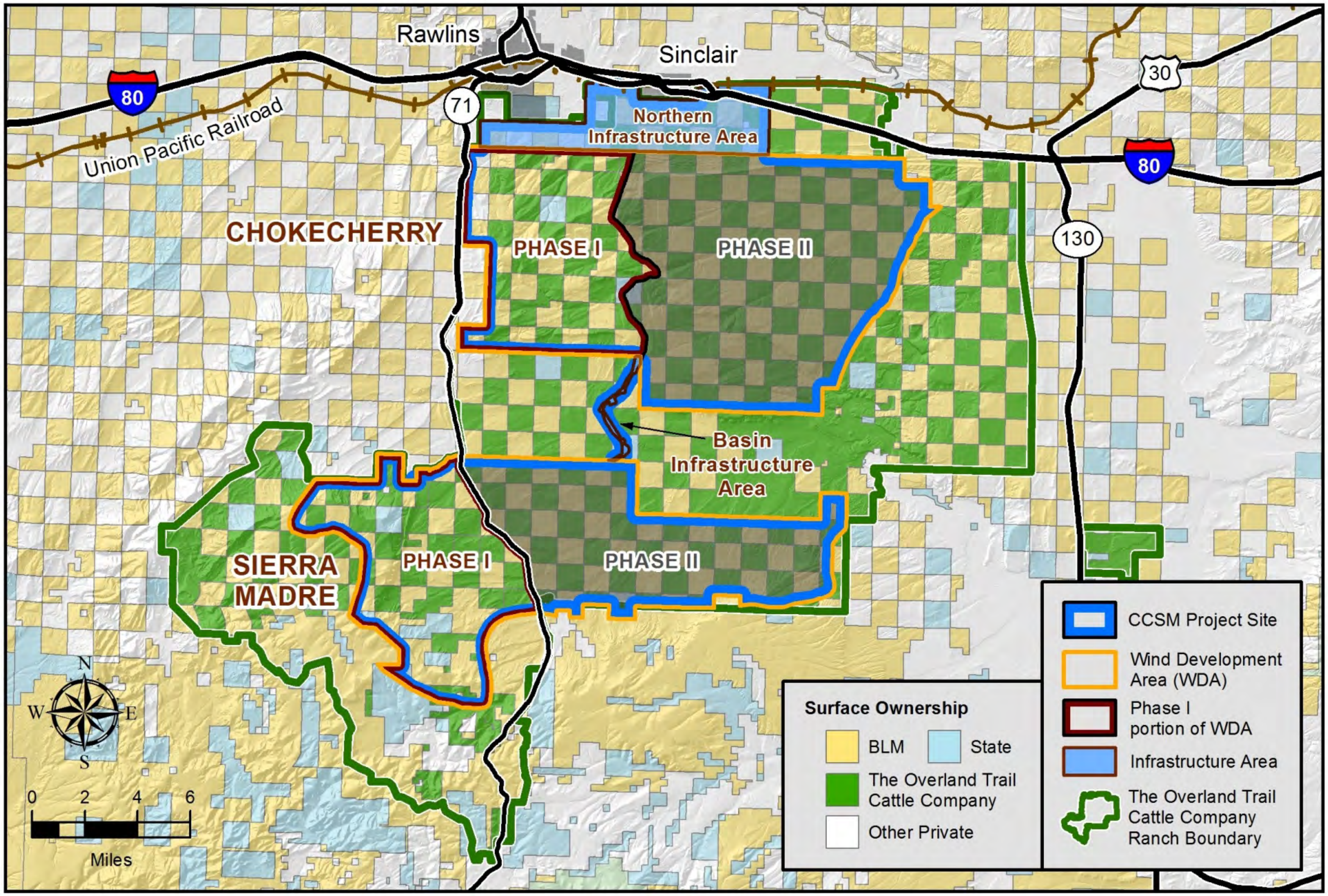

Figure 3.1. CCSM Project Overview.

As shown on Figure 3.2, Phase I within the Chokecherry WDA primarily includes the area west of the Haul Road. Within the Sierra Madre WDA, Phase I includes the area west of Highway 71/County Road 401. PCW has prepared and filed with BLM site-specific PODs for each component of Phase I. *See PCW 2014b; 2014c; 2014d; 2015b*. These components are summarized below and shown on Figure 3.2.

- **Phase I Haul Road and Facilities.** The Phase I Haul Road and Facilities include the Haul Road, certain arterial and facility access roads, water facilities, and laydown yards. *See PCW 2014c.* The Haul Road begins at the northern entrance to the CCSM Project where it connects to County Road [CR] 407. The Haul Road then travels west connecting to the West Sinclair Rail Facility and then south through the center of the Chokecherry WDA and finally through the Sierra Madre WDA.
- **West Sinclair Rail Facility (Rail Facility).** The West Sinclair Rail Facility consists of a rail connection to the Union Pacific Railroad main line between Rawlins and Sinclair and an associated laydown yard to receive, temporarily stage, and deliver components and construction-related materials. *See PCW 2014d.* The Rail Facility connects with the CCSM Project and is designed to minimize impacts on public roadways, provide more cost-effective transportation, and promote efficient project construction activities. The approximately 23 kilometers (14 miles) of track feature a wye, a lead track, a running track, a loop track, and several unloading areas. Vehicle access to the Rail Facility is from Interstate 80 (I-80), Exit 221, and the Haul Road.
- **Road Rock Quarry (Quarry).** Situated on private land within the CCSM Project Site at the location of an existing quarry approximately 3 kilometers (2 miles) south of Rawlins, the Road Rock Quarry will provide road construction material for the CCSM Project. *See PCW 2014b.* The Quarry will improve the efficiency of the CCSM Project by decreasing the number of train and truck trips from offsite quarries to the CCSM Project necessary for road base aggregate. The Quarry will be accessed via the Haul Road. Activities at the Quarry will involve surface rock mining and processing of sandstone and shale. The Quarry includes the excavation area, material processing area, materials storage piles, and the quarry access road (approximately 8 kilometers [5 miles] long).
- **The Phase I Wind Turbine Development.** Phase I Wind Turbine Development includes 500 wind turbines and associated elements for the CCSM Project such as roads, electrical lines, substations, operation and maintenance buildings, meteorological towers, utilities, and temporary construction features. *See PCW 2015b.* The Phase I Wind Turbine Development includes 202 wind turbines in the Chokecherry WDA and 298 wind turbines in the Sierra Madre WDA. The areas within Phase I of the WDAs in which wind turbines will be constructed are referred to as Turbine Build Areas.

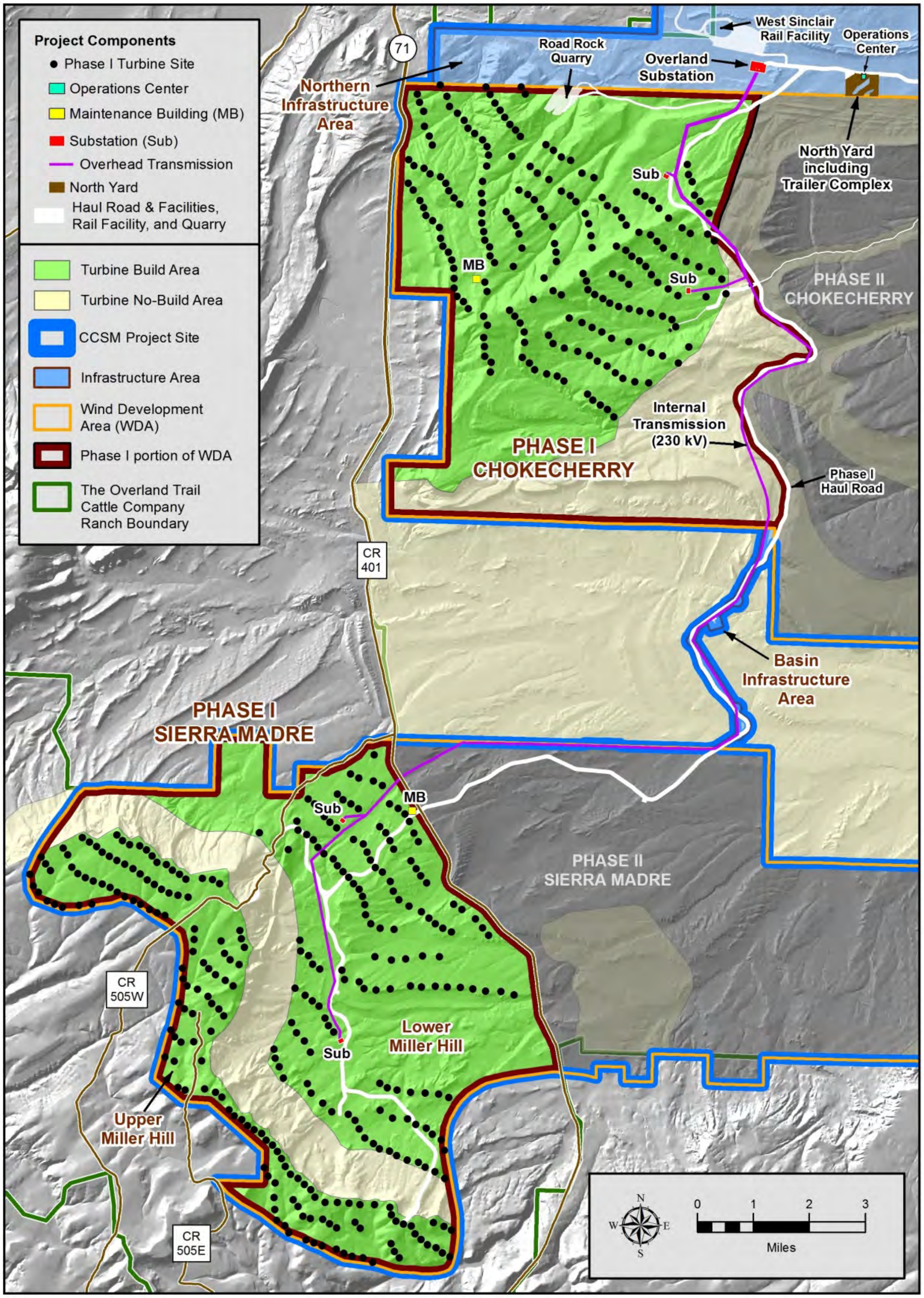

Figure 3.2. Phase I Layout.

3.1.1 Design

The Phase I Wind Turbine Development layout was developed in coordination with BLM and USFWS using detailed site-specific information. The layout was designed to meet the CCSM Project and Phase I goals and objectives while complying with the ROD and guidance from USFWS to avoid and minimize environmental impacts. The ROD considered and adopted numerous environmental constraints, applicant-committed measures, and mitigation measures to avoid or minimize environmental impacts. *See BLM 2012a at p. 3-13*. In addition, USFWS's ECP Guidance and Wind Energy Guidelines recommend extensive measures including collecting site-specific eagle survey data and the application of avoidance and minimization measures. *See USFWS 2012a; 2013a.* In compliance with the ROD and the USFWS guidance, PCW collected site-specific data and used a rigorous micrositing process to design the Phase I Wind Turbine Development.

As an initial matter, PCW's ability to site wind turbines was constrained to the WDAs as designated by BLM in the ROD. Within these designated WDAs, PCW used a four-step process to microsite the wind turbines for the Phase I Wind Turbine Development layout:

1. Gather technical data;
2. Complete field review;
3. Gather resource data; and
4. Incorporate agency input.

In many cases the Phase I wind turbine layout and infrastructure design went through numerous iterations of each step. This process is described in more detail in chapter 6.0 of this Phase I ECP. Figure 3.2 shows the Phase I wind turbine layout resulting from the design process, including PCW's consultation with USFWS as described in this Phase I ECP.

3.1.2 Wind Turbines

Wind turbines are designed according to industry standards to meet a range of wind and site conditions. For utility-scale wind turbines such as those required for the CCSM Project, vendors will review the Project's wind data and offer a model(s) that meet the requirements of the observed and predicted wind conditions. PCW is still evaluating wind turbine options for Phase I; however, all wind turbine models under consideration have the same general configuration, i.e. single-rotor, three-bladed upwind horizontal-axis design on a tubular tower. PCW will select wind turbine model(s) to maximize wind energy development potential while meeting the specifications identified as part of BLM's site-specific NEPA analyses and the specifications identified in this Phase I ECP. Subject to these specifications, PCW will select the most appropriate model(s) for Phase I.

As analyzed in the BLM FEIS, all wind turbine models under consideration for the CCSM Project have a maximum tower height of 100 meters (328 feet) from ground level to the wind turbine hub and a maximum rotor diameter of 120 meters (394 feet). While these dimensions represent the largest wind turbine dimensions under consideration, towers presently being evaluated by PCW range in height from 80 meters (262 feet) to 85 meters (279 feet) with rotor diameters of 101 meters (331 feet) to 112 meters (367 feet). Any wind turbine model selected by PCW will be painted the standard manufacturer color (approximately 5% grey) unless otherwise specified by BLM and approved by the Federal Aviation Administration (FAA).

3.1.3 Surface Disturbance

Phase I surface disturbance includes initial surface disturbance, long-term surface disturbance, and activity areas.[16] Initial surface disturbance is the total area that will be disturbed for construction of Phase I. Initial surface disturbance is inclusive of long-term surface disturbance, which consists of areas that will remain disturbed during operation of Phase I. Finally, activity areas are defined areas where activities may occur that do not require surface disturbance, e.g. locations for personnel to walk holding taglines that stabilize wind turbine component during lifts. Table 3.1 shows the estimated initial and long-term surface disturbance, as well as activity areas for Phase I by site-specific POD and cumulatively.

Table 3.1. Phase I Surface Disturbance and Activity Area Estimates.

Site-specific Plan of Development	Initial Surface Disturbance (acres)	Long-Term Surface Disturbance (acres)	Activity Area (acres)
Phase I Haul Road and Facilities	875	225	0
West Sinclair Rail Facility	370	121	0
Road Rock Quarry	184	18	0
Phase I Wind Turbine Development	3,035	485	440
Total Surface Disturbance	**4,464**	**849**	**N/A**

[16] Initial surface disturbance is defined as the total area of surface disturbance and includes both the areas that would be reclaimed and the long-term surface disturbance. The initial surface disturbance would be reclaimed following construction in accordance with the Master Reclamation Plan, included in the BLM ROD, and the site-specific reclamation plan, included within the Phase I Wind Turbine Development site-specific POD. *See BLM 2012b, App. B at App. E; PCW 2015b at App. L*. Long-term surface disturbance is defined as areas that would be reclaimed in accordance with these plans following decommissioning. Activity areas are areas where activities may occur that do not require ground disturbance (would not be cleared or graded); thick vegetation higher than one foot may be trimmed to allow for safe vehicle access and minimize fire potential.

3.1.4 Schedule

Phase I construction is expected to begin in 2016 and be complete by 2020 as shown in Table 3.2. The Phase I schedule is designed to first open the site to road and rail access, then establish the onsite quarry, and finally proceed with wind turbine construction. In accordance with PCW's objective to develop the highest wind energy potential areas first, the Phase I portion of the Sierra Madre WDA will be constructed first followed by the Phase I portion of the Chokecherry WDA. PCW anticipates the installation of 229 wind turbines in 2019 and another 271 wind turbines in 2020. Following construction, Phase I has a proposed life of 30 years after which, subject to market conditions, it may be repowered as necessary to continue its operations.

Table 3.2. Phase I Construction Schedule.

Facility	2016	2017	2018	2019	2020[1]
Phase I Haul Road and Facilities					
Roads	Construct	Construct			
Laydown yards	Construct	Construct	Operate	Operate	Operate
Water facilities	Construct	Construct	Operate	Operate	Operate
West Sinclair Rail Facility					
Rail Facility		Construct	Construct	Operate	Operate
Access road	Construct				
Laydown yards		Construct	Construct	Operate	Operate
Road Rock Quarry					
Quarry	Construct	Mobilize & Operate	Operate	Operate	Operate
Access road	Construct				
Phase I Wind Turbine Development					
Roads			Construct	Construct	Construct
Wind turbine sites			Construct	Construct	Construct
Wind turbines				Construct/Operate[2]	Construct/Operate[2]
Substations and Transmission				Construct	Construct
Facilities		Construct	Construct	Construct	Construct

Notes:

1. Reclamation activities associated with Phase I construction will begin concurrent with construction in 2016 and may extend beyond 2020.
2. Wind turbines will be brought online as they are constructed. For purposes of this Phase I ECP, commencement of commercial operation is considered to be the date that all 500 Phase I wind turbines are brought online and are available for dispatch. This is anticipated to occur at the end of the 2020 construction season.

3.2 Land Ownership

Phase I is located in Carbon County, Wyoming within the bounds of the Ranch and the CCSM Project Site. The Ranch and CCSM Project Site boundaries are discussed below in relation to Phase I. These boundaries are relevant as they provide context for the environmental setting of Phase I and the conservation measures that will be discussed in subsequent chapters. As previously described, Phase I consists of 4,464 acres of initial surface disturbance, 849 acres of long-term surface disturbance, and 440 acres of activity areas over the approximately 74,066-acre Phase I Development Area. *See Sections 3.2.3 & 3.2.4.*

3.2.1 Overland Trail Ranch

Since the 1990s, PCW affiliate TOTCO has owned and operated the Ranch, one of the largest cattle ranching operations in the West. Located south of the City of Rawlins and Town of Sinclair in Carbon County, Wyoming, the Ranch encompasses approximately 320,000 acres or 500 square miles. *See Figure 3.1.* As described in chapter 1.0, the Ranch is located in Wyoming's "checkerboard" country. The checkerboard consists of alternating square miles of private land, mostly owned by TOTCO, and federal land managed by BLM and leased to TOTCO for grazing, along with a small portion of Wyoming State Land Board and WGFD-managed land.

3.2.2 CCSM Project Site

The CCSM Project Site is located within the Ranch boundary but excludes the western most portions of the Ranch on top of Miller Hill and areas east of the North Platte River. *See Figure 3.1.* The CCSM Project Site expressly excludes any part of: (1) designated greater sage-grouse Core Areas identified by the State of Wyoming under the Governor's Executive Order 2011-5 (EO 2011-5 Version 3 map); and (2) the Red Rim-Grizzly Wildlife Habitat Management Area (WHMA) identified by BLM in the FEIS.

3.2.3 Phase I Development Area

The Phase I Development Area consists of the Phase I portions of the Chokecherry and Sierra Madre WDAs and two infrastructure areas, the Northern and Basin Infrastructure Areas. *See Figure 3.2.* The Phase I portion of each WDA is further divided into Turbine Build Areas and Turbine No-build Areas as designated in chapter 6.0 and shown in Figure 3.2. Table 3.3 shows the total acreage and land ownership within the Phase I Development Area.

Table 3.3. Phase I Development Area Land Ownership.

	Private Land (acres)	Federal Land (acres)	State Land (acres)	Total (acres)
Turbine Build Area	23,401	21,558	1,968	46,927
Turbine No-Build Area	6,665	7,020	1,475	15,160
Infrastructure Components	5,955	4,612	1,412	11,979
Phase I Development Area	**36,021**	**33,190**	**4,855**	**74,066**

3.2.4 Phase I

Phase I is defined as the initial surface disturbance, long-term surface disturbance and activity areas contained within the Phase I Development Area. *See Section 3.1.3.* Phase I surface disturbance and activity area estimates are shown in Table 3.1 and are further broken down by land ownership in Table 3.4.

Table 3.4. Phase I Land Ownership.

	Private Land (acres)	Federal Land (acres)	State Land (acres)	Total (acres)
Initial Surface Disturbance	1,568	1,346	121	**3,035**
Long-term Surface Disturbance	256	211	18	**485**
Activity Areas	264	153	23	**440**

3.3 Environmental Setting

The environmental setting of Phase I is described in the context of either the Ranch or the CCSM Project Site to provide perspective on the siting decisions and avoidance and minimization measures described in chapter 6.0. This section focuses on those elements of the environmental setting most relevant to eagles. The environmental setting for other resources, such as air quality, soils, noxious and invasive weeds, range resources, cultural resources, paleontological resources, visual resources and socio-economics for the CCSM Project are described in detail in BLM's FEIS and tiered EAs.

3.3.1 Land Use

Land use and land management affects eagles. Current land use in Phase I and across the Ranch consists of agricultural operations, including cattle grazing and hay production. The Ranch includes the entire Pine Grove/Bolten grazing allotment as well as portions of 11 other grazing allotments. TOTCO manages the Ranch and each allotment to provide periodic growing season rest from grazing by decreasing stocking density and shortening the grazing period. *See BLM 2008a*. There are two areas of summer and winter range on the Ranch, and multiple potential grazing rotations across the Ranch. The grazing rotations allow rest for upland communities in spring and early summer, and late summer rest for riparian communities. Stocking rates and movement between various pastures within the allotments fluctuate yearly based on forage availability and resource conditions. According to BLM, since TOTCO has owned and operated the Ranch, the grazing management in the Bolten Ranch/Pine Grove allotment has been greatly improved; further, BLM has recognized that TOTCO's grazing management plan provides for a well-managed grazing program. *See BLM 2008a*.

In 2014, the BLM Rawlins Field Office once again recognized TOTCO for its environmental stewardship and range management initiatives across three of the BLM grazing allotments that TOTCO manages in Carbon County. Citing TOTCO's significant investments in range and water improvements on the Ranch, BLM found that all three allotments meet all six Rangeland Health Standards, including those that benefit wildlife such as eagles and their prey. According to BLM, TOTCO's planned grazing rotations ensure all pastures receive growing season rest every other year, which has improved vegetation composition, condition and vigor while reducing bare ground. BLM cited improved grazing management as resulting in narrowed stream channels, increased woody plant composition and reduced sedimentation in streams. BLM also recognized TOTCO for its cooperative grazing management of the Grizzly allotment in conjunction with its three allotments, broadening benefits for wildlife habitat "on an even larger landscape level." *See BLM 2014c.*

3.3.2 Physiographic Setting

The Ranch, including the CCSM Project Site, is dominated by three topographic features, Chokecherry Plateau, Miller Hill, and Sage Creek Rim, separated by the Sage Creek Basin. As described above, the CCSM Project Site is divided into two WDAs, Chokecherry to the north and Sierra Madre to the south. Each WDA is further divided into Phase I and Phase II. *See Figure 3.3.*

To the north, Chokecherry Plateau consists of ridges and rolling hills that generally slope northeasterly down toward the North Platte River. Approximately 40 kilometers (25 miles) of the North Platte River flow along the eastern edge of Chokecherry, with the vast majority occurring outside of the Chokecherry WDA. Most of the northern portion of Chokecherry is defined by a small, east/west ridge commonly known as a hogback, which is approximately 16 kilometers (10 miles) long, and the southern portion is defined by a cliff edge commonly referred to as the Bolten Rim, which is approximately 32 kilometers (20 miles) long. In addition, a prominent north/south ridge known as the Interior Chokecherry Rim bisects Chokecherry for approximately 19 kilometers (12 miles), and is cut by three ephemeral drainages, Smith Draw, Hugus Draw, and Iron Springs Draw. Phase I is located entirely west of the Interior Chokecherry Rim.

The southwestern portion of the Ranch is dominated by a steep-sloped mesa commonly known as Miller Hill. This predominant feature slopes gently toward the south and southwest, with relatively level terrain near the edge of the rim and becoming increasingly undulated towards the southwest. Phase I includes Upper Miller Hill and Lower Miller Hill within the Sierra Madre WDA. *See Figure 3.3.*

The southeastern portion of the Ranch includes Sage Creek Rim, which has similar characteristics to Miller Hill, although this feature is not as large or high. Development areas on the Sage Creek Rim are within Phase II of the CCSM Project Site.

The area between the Chokecherry and Sierra Madre WDAs is a high desert basin transected by Sage Creek and several smaller ephemeral tributaries. The majority of this basin is outside the WDAs; however, the Haul Road and internal transmission lines included in Phase I will traverse the Sage Creek Basin and connect the WDAs. Larger waterbodies, which include Kindt, Rasmussen, Sage Creek, and Teton Reservoirs, are interspersed throughout this arid landscape outside of Phase I.

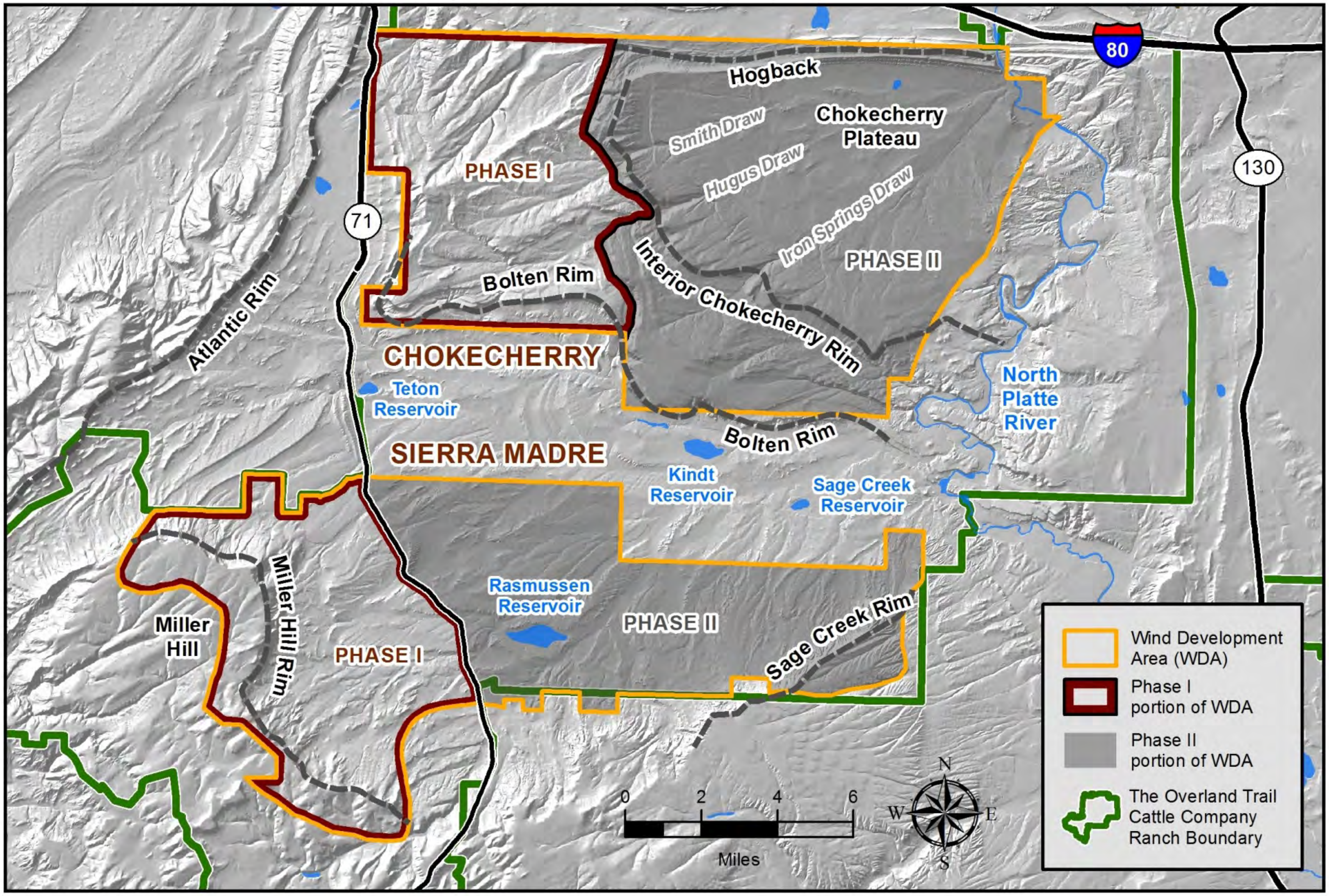

Figure 3.3. CCSM Project Physiographic Features.

3.3.3 Vegetation

Vegetation cover within the CCSM Project Site is typical of Wyoming Basin and Southern Rockies ecoregions, defined by rolling sagebrush steppe, salt desert shrub basins, and foothill shrublands (Chapman *et al.* 2004). Rolling sagebrush steppe communities are dominated by various densities of Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*) and mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*) at higher elevations, with areas of silver sagebrush (*Artemisia cana*) in the lowlands and black sagebrush (*Artemisia nova*) and low sagebrush (*Artemisia arbuscula*) in exposed, rocky soils. *See Figure 3.4 & Figure 3.5.*

Sagebrush steppe communities are interspersed with bunchgrass/rhizomatous grass communities and allied shrubs, and generally have relatively low forb cover. Salt desert shrub basins are characterized by sparse vegetation cover of cushion plant communities with dominant shrub cover of Gardner's saltbush (*Atriplex gardneri*), shadscale (*Atriplex confertifolia*), and black greasewood (*Sarcobatus vermiculatum*). Perennial streams throughout salt desert shrub basins are typically surrounded by basin big sagebrush (*Artemisia tridentata ssp. tridentata*) and riparian communities dominated by willows (*Salix spp*.), sedges (*Carex spp.*), and rushes (*Juncus spp.*). Foothill shrubland communities are dominated by montane deciduous shrubland consisting of mountain big sagebrush, snowberry (*Symphoricarpos spp.*), serviceberry (*Amelanchier spp.*), and mountain mahogany (*Cercocarpus spp.*), surrounded by extended groves of quaking aspen (*Populus tremuloides*), low-growing common juniper (*Juniperus communis*), and patches of limber pine (*Pinus flexilis*).

Table 3.5 summarizes the vegetation community distribution within Phase I surface disturbance and activity areas. Additional detail on vegetation communities within Phase I can be found in the site-specific PODs for Phase I of the CCSM Project. *See PCW 2014b; 2014c; 2014d; 2015b*.

Table 3.5. Phase I Vegetation Communities.

Vegetation Community[1]	Total Acreage within Phase I Development Area	Initial Surface Disturbance (acres)	Long-term Surface Disturbance (acres)	Activity Areas (acres)
Agriculture/Pasture	408	18	4	11
Aspen-Mixed Conifer Woodland	2,564	19	3	2
Barren/Developed	1,052	211	55	7
Lowland Mesic Zone	1,413	42	6	4
Mixed Conifer Woodland	6	0	0	0
Montane Shrubland	2,593	45	5	9
Open Water	37	0	0	0
Sagebrush Steppe	36,888	2,355	403	255
Sagebrush Steppe - Dense	9,133	335	60	41
Salt Desert Shrub	9,681	822	200	52
Sparsely Vegetated	2,653	114	30	11
Upland Grassland	7,638	503	83	48
Total	**74,066**	**4,464**	**849**	**440**

Notes:

1. As defined in the site-specific PODs for Phase I. *See PCW 2014b; 2014c; 2014d; 2015b*.

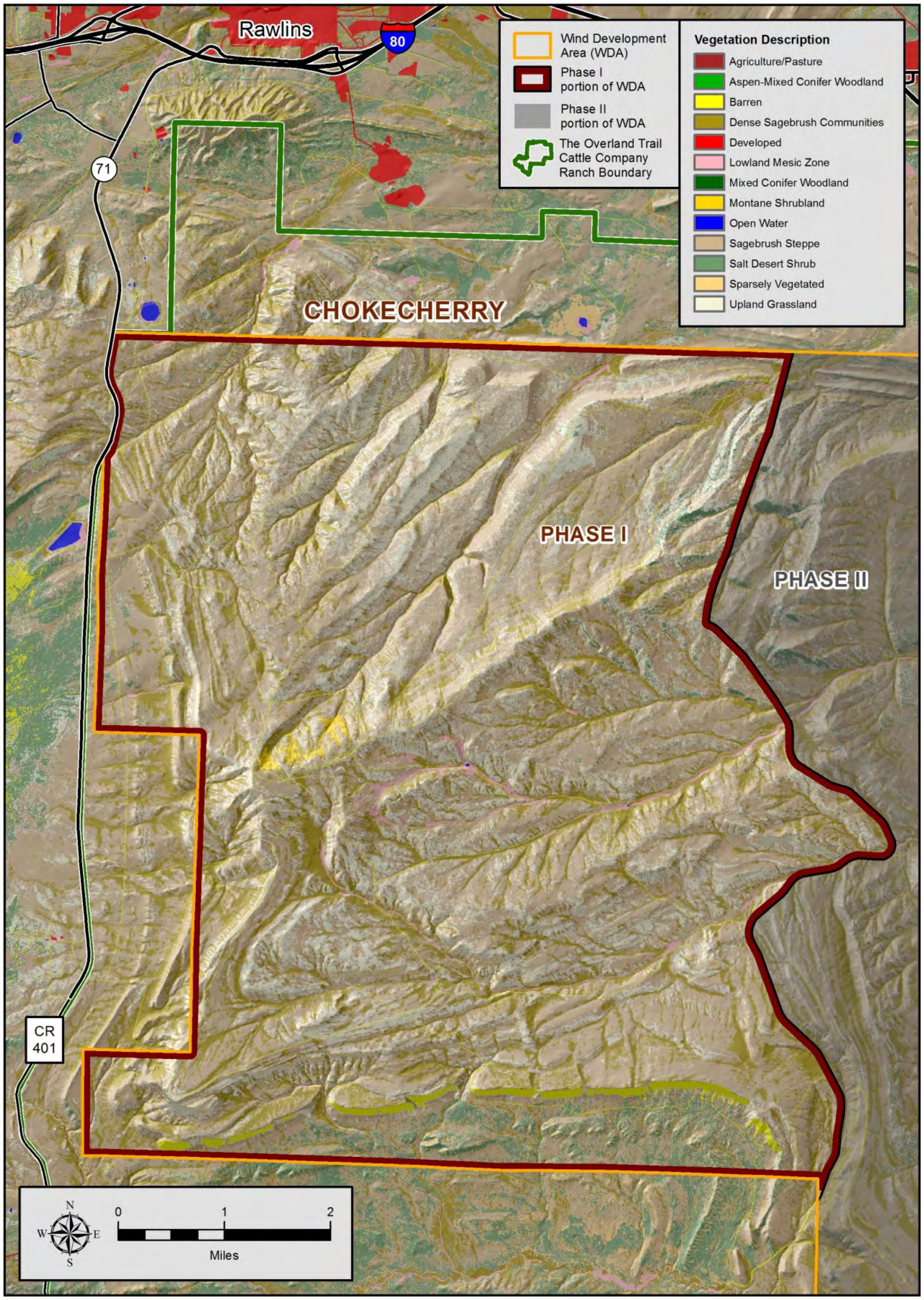

Figure 3.4. Phase I Chokecherry WDA Vegetation Cover.

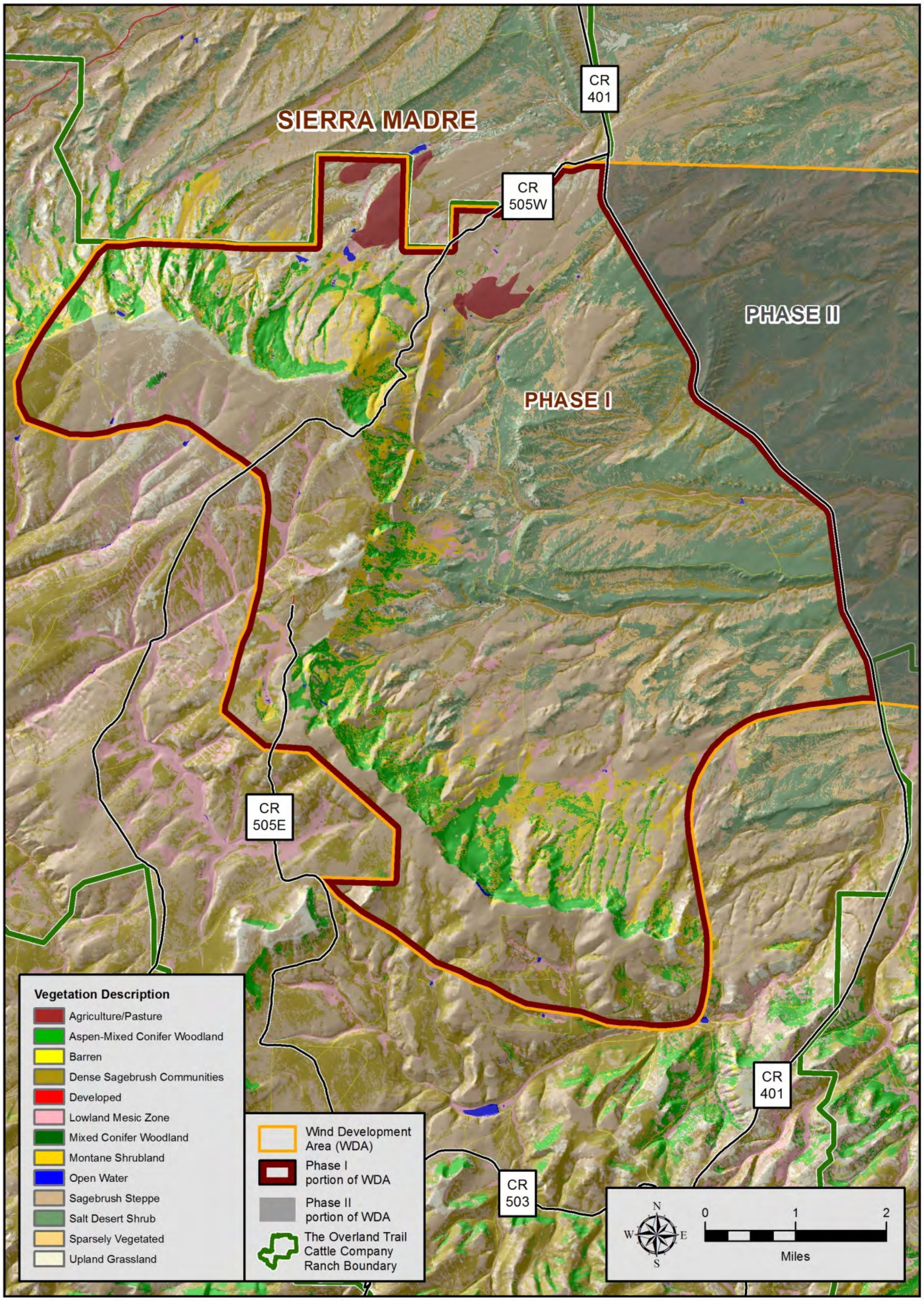

Figure 3.5. Phase I Sierra Madre WDA Vegetation Cover.

3.3.4 Water Resources

The surface water resources on the Ranch include the North Platte River, as well as several streams including Sage Creek, Miller Creek, and Rasmussen Creek in the North Platte River Basin and McKinney Creek, Grove Creek, and Stony Creek in the Yampa-White River Basin. *See Figure 3.6 & Figure 3.7.* In addition, several small ephemeral streams and a few isolated springs are located throughout the Ranch. There are also numerous stock ponds and some larger irrigation reservoirs in the vicinity including Teton, Kindt, Rasmussen, and Sage Creek Reservoirs. During the spring, summer, and fall seasons these irrigation reservoirs support use by waterfowl, primarily ducks and geese, with infrequent use by small groups of shorebirds and pelicans.

Water resources within Phase I include several named and unnamed ephemeral and perennial drainages. Within the Chokecherry WDA, the headwaters of Smith Draw and Hugus Draw flow east toward the North Platte River, and multiple other unnamed drainages cross through the area. In the Upper Miller Hill area, the headwaters of Grove Creek and McKinney Creek trend southwest from the Miller Hill Rim. In Lower Miller Hill, Deadman Creek, Lone Tree Creek, Rasmussen Creek, and several unnamed drainages flow east toward the Sage Creek Basin. No large waterbodies or reservoirs occur within Phase I.

Additional detail on water resources within Phase I can be found in the site-specific plans of development for Phase I of the CCSM Project. *See PCW 2014b; 2014c; 2014d; 2015b*.

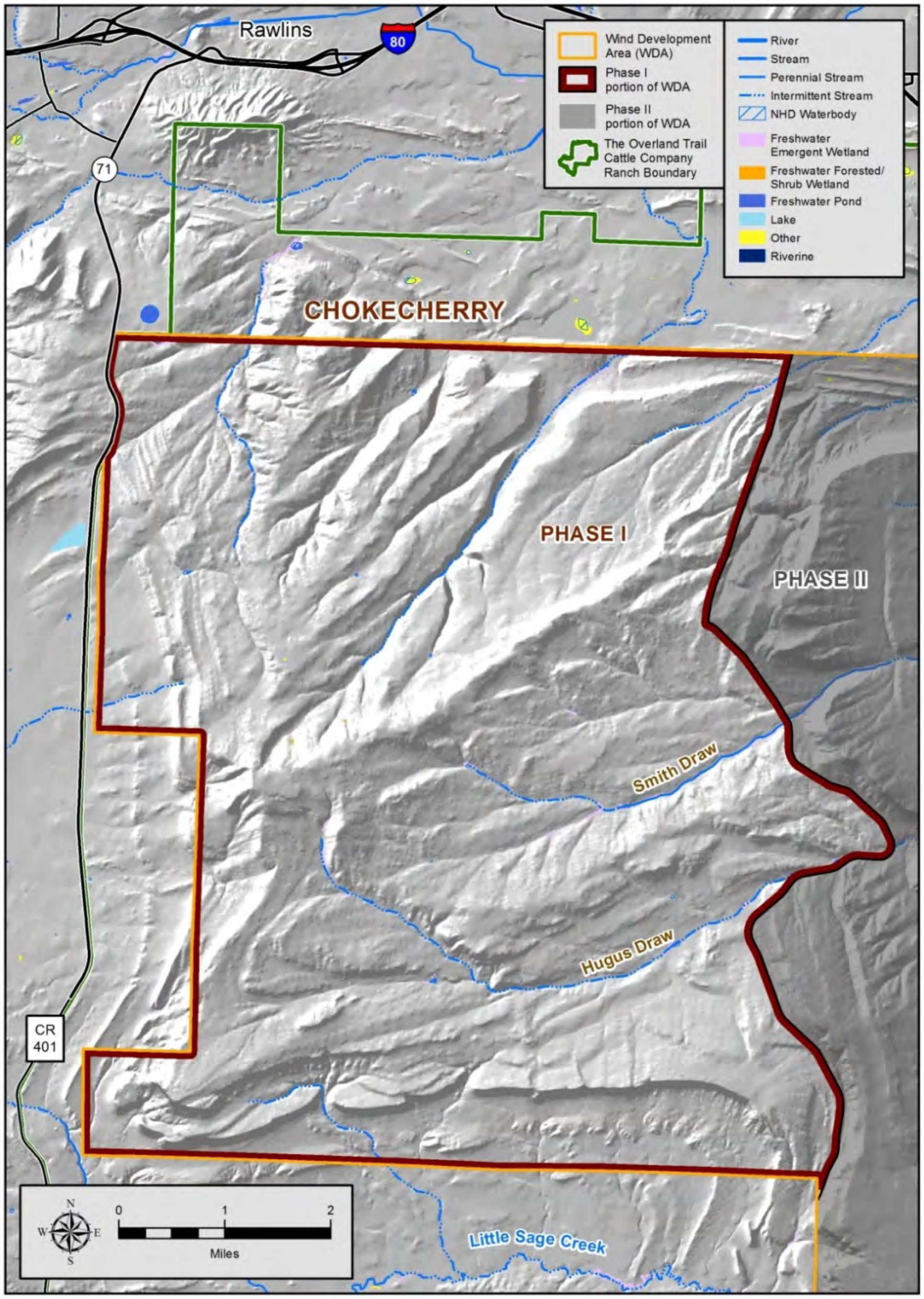

Figure 3.6. Phase I Chokecherry WDA Water Features.[17]

[17] The wetlands indicated on this figure are those mapped by the USFWS National Wetlands Inventory. A wetland delineation was completed by PCW to refine the NWI data that ultimately determined that a number of these areas are not in fact wetlands; however the delineation is limited to Phase I. The NWI data is presented in this figure to provide an overview of the wetlands that may be present within the Phase I Development Area as a whole.

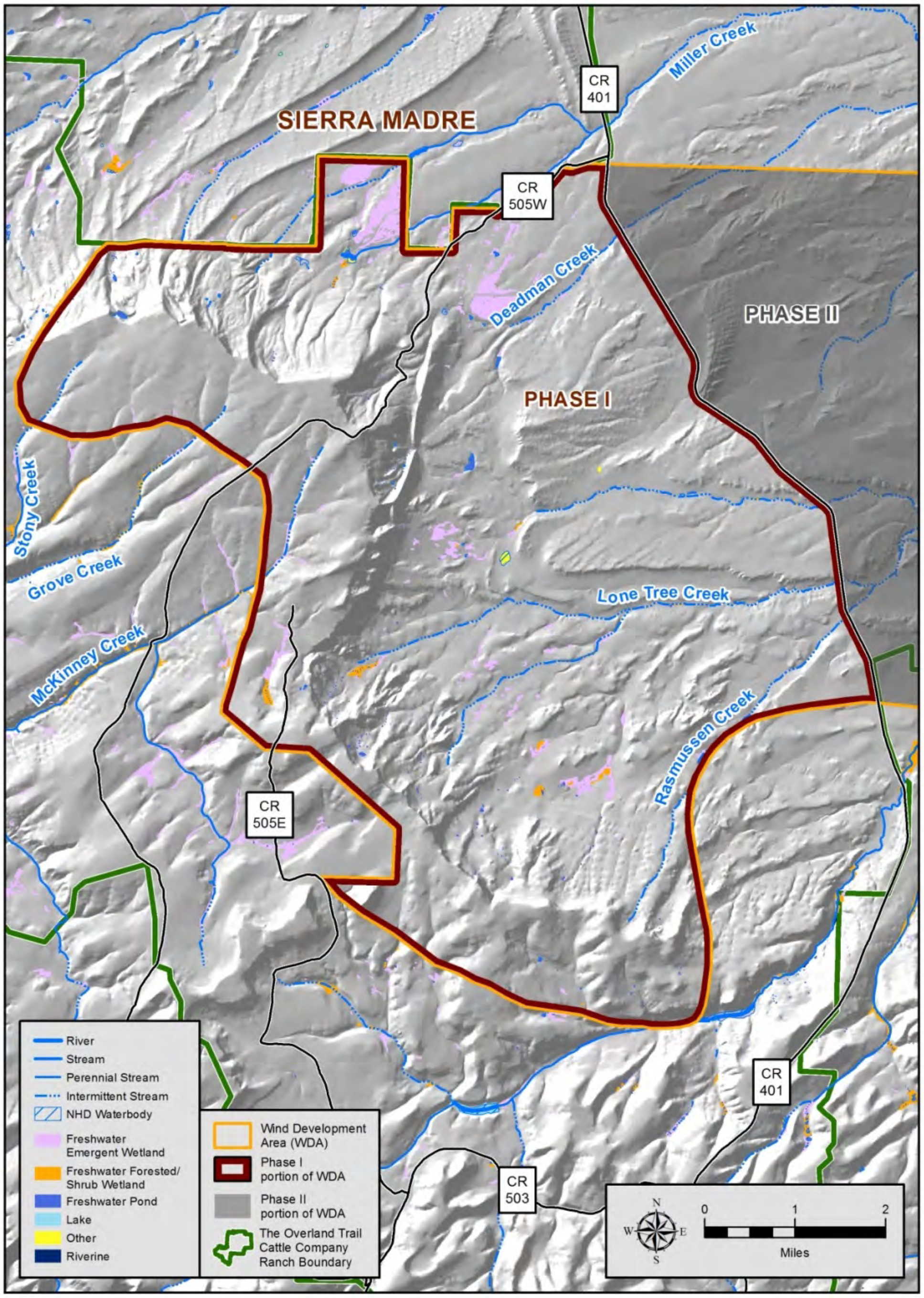

Figure 3.7. Phase I Sierra Madre WDA Water Features.[18]

[18] The wetlands indicated on this figure are those mapped by the USFWS National Wetlands Inventory. A wetland delineation was completed by PCW to refine the NWI data that ultimately determined that a number of these areas are not in fact wetlands; however the delineation is limited to Phase I. The NWI data is presented in this figure to provide an overview of the wetlands that may be present within the Phase I Development Area as a whole.

3.3.5 Prey Base Species

Primary big game species available on the Ranch that may provide foraging opportunities for eagles include mule deer *(Odocoileus hemionus)*, elk *(Cervus canadensis)*, and pronghorn *(Antilocapra americana)*. Primary small game species on the Ranch that may be suitable as prey include white-tailed prairie dogs (*Cynomys leucurus*), greater sage-grouse (*Centrocercus urophasianus*), white-tailed jackrabbit (*Lepus townsendii*) and cottontail rabbit *(Sylvilagus* spp*.).* In addition, near reservoirs, waterfowl and waterbirds such as American coot (*Fulica americana*), American wigeon (*Anas americana*), Scaup (*Aythya* spp.), *Aechmophorus* grebes (i.e., western and Clark's), eared grebe (*Podiceps nigricollis*), redhead (*Aythya americana*), lesser scaup (*Aythya affinis*), and mallard (*Anas platyrhynchos*) may provide seasonal foraging opportunities. *See Chapter 5.0.*

Additional detail on wildlife species, including sensitive species, within Phase I can be found in the site-specific plans of development for Phase I of the CCSM Project. *See PCW 2014b; 2014c; 2014d; 2015b*. Prey base is also discussed in detail in chapter 5.0 of this Phase I ECP.

4.0 Initial Site Assessment (ECP Guidance Stage 1)

In compliance with Stage 1 of the ECP Guidance, PCW has completed the initial site assessment for Phase I and categorized the risk to eagles. Stage 1 of the ECP Guidance combines Tiers 1 and 2 from the Wind Energy Guidelines, and it recommends that project proponents evaluate the broad geographic area to assess the relative importance of various areas to resident breeding and non-breeding eagles, and to migrant and wintering eagles. In Stage 1, the project proponent gathers existing information from publicly available databases and other sources and uses those data to refine potential project siting, balancing suitability for development with potential risk to eagles. Following completion of Stage 1, the project proponent makes an initial site categorization based on mortality risk to eagles.

4.1 Site Assessment

The goal of a Stage 1 initial site assessment is to determine whether a potential wind energy project site is located within areas known or likely to be used by eagles and, if so, to begin to assess the spatiotemporal extent and type of eagle use the site receives or is likely to receive. ECP Guidance Appendix B: Stage 1 – Site Assessment sets out a series of questions to be considered to help place the project site or alternate sites into an appropriate risk category. PCW selected the original site for wind energy development in 2006, approximately seven years prior to the April 2013 release of the ECP Guidance. While the ECP Guidance was not available at the time of site selection, had it been in place, PCW's response to each of the questions in Appendix B of the ECP Guidance for the CCSM Project, including Phase I, would have been as follows:

1. Does existing or historical information indicate that eagles or eagle habitat (including breeding, migration, dispersal, and wintering habitats) may be present within the geographic region under development consideration?

   At the time of site selection, based on direct observations by PCW and BLM personnel, eagles were known to use the area. In addition, BLM's Rawlins Field Office records on raptor nesting activity showed historical eagle use of the area.

2. Within a prospective project site, are there areas of habitat known to be or potentially valuable to eagles that would be destroyed or degraded due to the project?

   Insufficient information existed to determine whether development of the CCSM Project, including Phase I, would potentially destroy or degrade areas of habitat either known to be or potentially valuable to eagles.

3. Are there important eagle use areas or migration concentration sites documented or thought to occur in the project area?

   In 2006, important eagle use areas documented or thought to occur within the CCSM Project Site, including Phase I, consisted of known eagle nest locations identified by BLM. Best available information in 2006 did not document or indicate eagle migration corridors, communal roost locations, or important foraging areas within the CCSM Project Site, including Phase I. *See BLM 2004*.

4. Does existing or historical information indicate that habitat supporting abundant prey for eagles may be present within the geographic region under development consideration (acknowledging, wherever appropriate, that population levels of some prey species such as black-tailed jackrabbits (*Lepus californicus*) cycle dramatically [Gross *et al.* 1974] such that they are abundant and attract eagles only in certain years [e.g., Craig *et al.* 1984])?

   Existing and historical information indicated that habitat supporting prey species was present in the geographical region under consideration for development. *See BLM 2004*.

5. For a given prospective site, is there potential for significant adverse impacts to eagles based on answers to above questions and considering the design of the proposed project?

   In 2006 insufficient information existed, including information concerning potential impacts to eagles from wind energy development, to determine if there was the potential for significant adverse impacts to eagles based on the design of the proposed project.

In 2006, PCW's potential wind development site included the entire 320,000-acre Ranch owned and operated by PCW's affiliate. PCW did not possess the required property rights to consider or evaluate land located outside of the Ranch boundary for wind energy development. Within the boundaries of the Ranch, however, PCW evaluated a number of different project design layouts using different land and development scenarios. These alternate project designs and development scenarios are detailed in section 6.1.

4.2 Risk Assessment Following Stage 1

The ECP Guidance recommends the project proponent make an initial site categorization upon conclusion of Stage 1 site assessment based upon mortality risk to eagles. The risk categories identified in the ECP Guidance are:

Category 1 – High risk to eagles, potential to avoid or mitigate impacts is low

Category 2 – High or moderate risk to eagles, opportunity to mitigate impacts

Category 3 – Minimal risk to eagles

In 2006, following completion of the Stage 1 site assessment PCW would have classified the CCSM Project Site, including Phase I, as Category 2. In its April 2011 concurrence letter to BLM, USFWS stated "…we have determined that developing an APP is an appropriate option to avoid and minimize the potential take of eagles …" *See Appendix A.* These statements are consistent with a Category 2 classification of high to moderate risk to eagles but with opportunities to mitigate impacts.

5.0 Site-specific Surveys and Assessments (ECP Guidance Stage 2)

Stage 2 of the ECP Guidance aligns with Tier 3 of the Wind Energy Guidelines and addresses site-specific surveys and assessments. During Stage 2, the project developer collects quantitative data through scientifically rigorous surveys designed to assess the potential risk of the proposed project to eagles. Consistent with the ECP Guidance, PCW initiated discussions with USFWS regarding potential impacts to bald and golden eagles early in the development of the CCSM Project and conducted site-specific, scientifically rigorous surveys designed to assess the potential risk of the proposed project to eagles.

5.1 Surveys and Methodology

This section describes the site-specific surveys and assessments that were conducted, including general methodologies. Subsequent sections present the results of the surveys.

To assess the potential risk of the proposed project to eagles, since 2008, PCW has conducted numerous surveys. *See Table 5.1*. These surveys include:

1. Eagle use surveys designed to characterize eagle use and identify important eagle use areas including those related to nesting activity, migration, foraging, and roosting;
2. Eagle nest surveys designed to characterize the local area nesting population; and
3. Prey base surveys to identify significant prey resources and potential foraging areas.

In addition, PCW conducted migratory bird surveys, breeding bird surveys, and deployed an avian radar system to further characterize how avian species use the CCSM Project Site, including Phase I.

To understand the potential impacts of the CCSM Project, including Phase I, on eagles, PCW and BLM collected eagle and other wildlife survey data from June 2008 to June 2009 to characterize species composition and relative abundance and to provide information concerning nesting, migration and home ranges within the WDAs. After collecting this data, in 2010, PCW initiated discussions with USFWS, BLM, and WGFD in order to begin developing an ECP for the CCSM Project. During this collaborative process, USFWS and BLM reviewed the existing data and determined that additional data would be useful for more detailed risk assessments, fatality predictions, and siting efforts (Stages 3 and 4 of the ECP Guidance). Therefore, USFWS and BLM recommended that PCW conduct additional surveys to identify high avian use areas, particularly for eagles, and requested that PCW develop survey protocols to assess site-specific risk within the WDAs. USFWS emphasized the importance of identifying high eagle use areas within the WDAs that might be avoided during development of final wind turbine layouts and micrositing of facilities. Specifically, USFWS and BLM identified avian radar technology in combination with long-watch raptor surveys and standard point counts as a desired method to map areas of high avian use.

Table 5.1. CCSM Project Eagle-related Surveys.

Survey	Date
Eagle Use Surveys	
Fixed-point Bird Use Surveys	June 2008 - June 2009 April 2011 - April 2012
Long-watch Raptor Use and Migration Surveys	April 2011 - July 2012
800-meter Raptor Count Surveys	August 2012 - August 2013
Avian Radar Surveys	March 2011 - March 2013
Communal Roost Location Surveys	November 2011- March 2012 November - December 2012 February 2013
Eagle Nest Surveys	
Raptor Nest Surveys and Productivity Monitoring	May 2008 May - July 2011 April - July 2012 April - July 2013 April - July 2014
Prey-base Surveys	
Prey-base Surveys	April 2011 - August 2013
White-tailed Prairie Dog Surveys	August 2012 May - August 2013
Waterbird/Waterfowl Surveys	April, August, October 2011
Greater Sage-grouse Lek Counts	April of 2010, 2011, 2012, 2013, 2014 and 2015
Greater Sage-grouse Telemetry Monitoring	2010 - present
Other Prey Species	2008, 2012 - 2014
Other	
Breeding Bird Density[1]	June 2011
Migratory Bird[1]	April 2011 - July 2012

Notes:

1. Breeding bird density and migratory bird surveys and their results are described in detail in the BBCS. *See PCW 2015a.* No additional information regarding these surveys in included in this Phase I ECP, as the survey results do not provide information that is relevant to eagle use or assessing eagle risk.

In December 2010, PCW circulated draft survey protocols to USFWS, BLM and WGFD for review and comment. PCW incorporated USFWS, BLM and WGFD recommendations and comments into the final survey protocols in March 2011. *See Appendix B*. PCW provided the March 2011 survey protocols to USFWS and received USFWS's concurrence with and endorsement of the protocols.[19] PCW implemented the March 2011 protocols and completed a full year of surveys from April 2011 to March 2012. These surveys included long-watch raptor surveys, avian radar studies, raptor nest surveys, migratory bird surveys, breeding bird surveys, waterbird/waterfowl surveys, and other prey-base surveys.

In April 2012, working with USFWS, PCW identified an additional long-watch raptor survey protocol and new locations to refine important eagle use areas, identify additional eagle use areas, and inform the implementation of appropriate avoidance and minimization approaches to reduce risks to eagles. *See Appendix B.* Surveys were conducted under the additional protocol between April 2012 and July 2012. During this period, PCW also completed eagle nest surveys and monitoring, conducted additional eagle prey base assessments, and continued avian radar surveys. The 2011 and 2012 protocols were implemented to provide site-specific data to identify important eagle use areas including those related to nesting activity, migration, foraging, and roosting as well as to provide the data necessary to complete the Stage 2 risk assessment of the CCSM Project Site. The data collected from these comprehensive surveys were used to substantially redesign the CCSM Project and identify the final wind turbine layout for Phase I. *See Chapter 6.0*.

During implementation of the 2011 and 2012 protocols, PCW worked closely with USFWS to identify additional data collection and surveys necessary to complete fatality estimates using USFWS's fatality model as part of Stage 3 of the ECP Guidance. During a meeting on July 24, 2012, USFWS recommended that raptor survey protocols for the CCSM Project be revised from long-watch raptor surveys to focus on 800-meter radius surveys to collect data that would be compatible with USFWS's predictive eagle fatality model. PCW revised its survey protocols according to USFWS guidance, and on August 20, 2012, 800-meter raptor count surveys began at 40 locations across the CCSM Project Site. After further coordination with USFWS, the 800-meter raptor count surveys were expanded again on November 12, 2012, to cover 60 locations within the CCSM Project Site to aid in the further refinement of important eagle use areas and inform avoidance and minimization measures. *See Appendix B*. Surveys continued at the 60 point locations through the end of August 2013.

[19] In a March 3, 2011 email, Mr. Sanderson, a USFWS employee, stated "[a]s we have stated all along, we are 100% behind the monitoring protocols . . . ." On May 5, 2011, Mr. Sanderson reiterated USFWS's approval of the monitoring protocols and APP/ECP development approach in an email stating "[a]s discussed previously, the Service is entirely on-board with the proposed monitoring protocols . . . ."

5.1.1 Eagle Use Surveys

In compliance with Stage 2 of the ECP Guidance, PCW has conducted extensive eagle use surveys across the CCSM Project Site, including Phase I. Eagle use surveys are designed to identify important eagle use areas and to inform Phase I avoidance and minimization measures. USFWS defines important eagle use areas as an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost site that are essential for the continued viability of the site for breeding, feeding, or sheltering eagles. Because migration corridors and migration stopover sites provide important foraging areas for eagles during migration, USFWS includes these areas within the definition of important eagle use areas in the ECP Guidance.

Site Characterization

PCW completed baseline wildlife surveys, including for raptors and other avian species in 2008 and 2009 for the purpose of estimating impacts of the CCSM Project on wildlife and to assist with siting wind turbines to minimize impacts to wildlife resources. *See Appendix C*. The 2008-2009 survey area was based upon the CCSM Project as originally proposed in PCW's POD submitted to BLM in 2008. *See Chapter 6.0.*

These pre-construction surveys were initiated in June 2008 and concluded in June 2009. Nineteen points were selected in representative habitats and topography for fixed-point bird use surveys. *See Figure 5.1*. BLM decided that the 19 survey points were representative of the habitats and topography of the original CCSM Project configuration. *See BLM 2011b; 2012.* The fixed-point bird surveys (variable circular plots) were conducted using methods described by Reynolds *et al.* (1980). Surveys at each 800-meter radius plot consisted of a 20-minute point count conducted approximately bi-weekly during the summer and winter (June 15 to August 31 and November 16 to December 31, respectively) and weekly during the fall and spring (September 1 to October 15 and March 16 to May 31, respectively). Sampling intensity was designed to document bird use and behavior by vegetation community and season.

The 2008-2009 year-long avian use survey data characterize seasonal, spatial, and temporal eagle use within the boundaries of the Original Proposed Action (also referred to as the Study Area), which included portions of Phase I. *See Figure 5.1. See Section 6.1.2*. These data help inform site characterization completed as part of Stage 2 of the ECP Guidance.

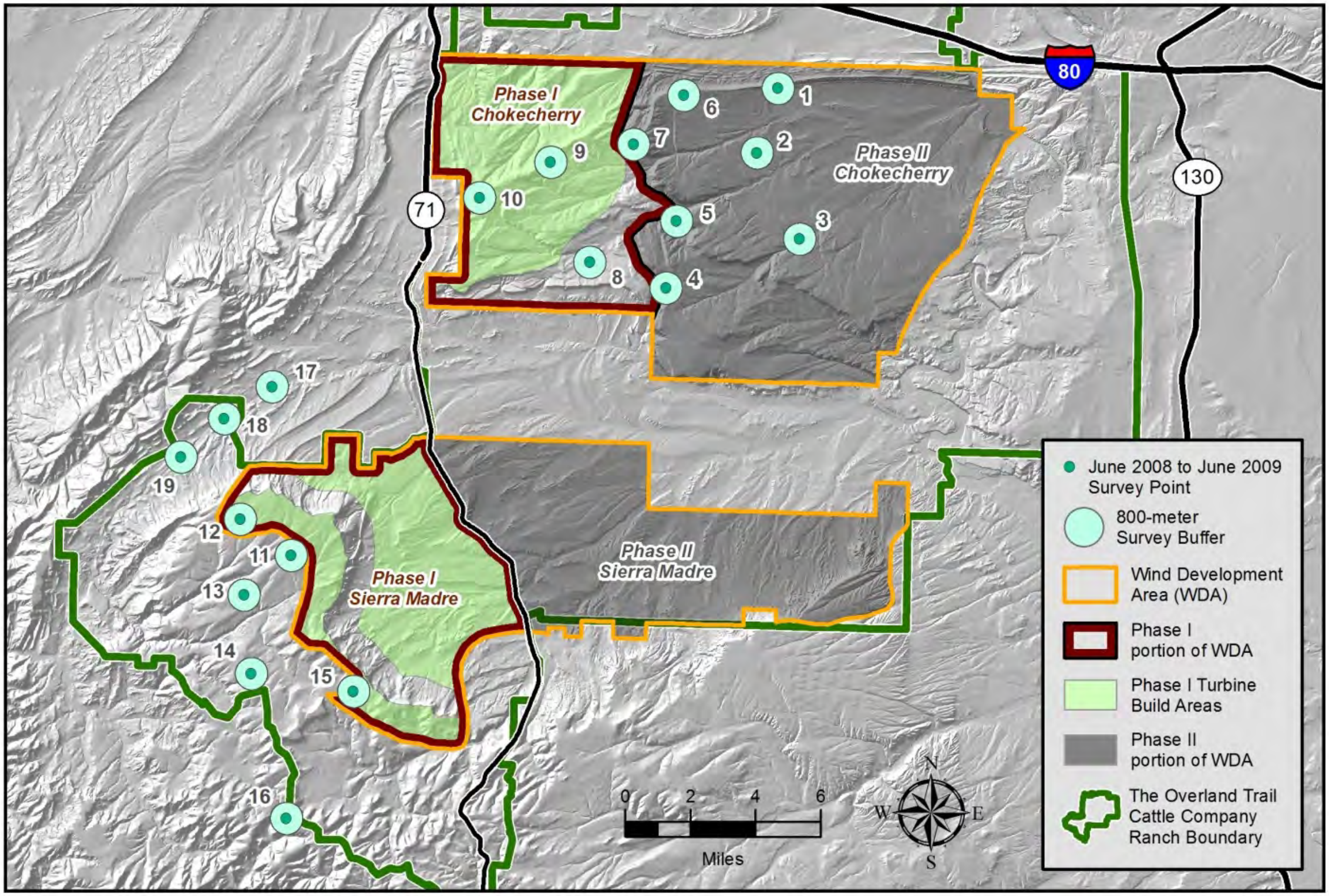

Figure 5.1. Avian Use Survey Locations, June 2008 to June 2009.

Long-Watch Raptor Surveys

Between April 4, 2011, and July 24, 2012, biweekly long-watch raptor surveys were completed throughout the CCSM Project Site. From April 2011 through March 2012, surveys were completed at 15 locations. From April 2012 through July 2012, surveys were completed at 14 locations. *See Figure 5.2. See Appendix B & C*. The duration and frequency of long-watch raptor surveys varied by season in accordance with the recommendations of the federal and state agencies; however, survey minutes were evenly distributed across all daylight hours and between sites within each season.

Long-watch raptor surveys were conducted for 4–8 hours at each site, with summer and winter surveys having the shortest duration, based on agency recommendations. Data collected for each raptor detected included species, number of individuals, age, sex, distance from observer, bearing to the bird, heading of the bird, height, and flight behavior. Flight paths were also recorded on aerial maps for each raptor detected. Long-watch raptor surveys were conducted in 4,000-meter radius plots strategically distributed across the two WDAs to maximize coverage for the purposes of identifying high use areas and potential migratory pathways and other eagle use areas while maintaining observer confidence in species identification.

From April 2011 through July 2012, 430 surveys were conducted for a total of 146,876 minutes (2,447.9 hours) or more than 40% of the daylight minutes during this period. The entirety (100%) of the Phase I wind turbine layout was covered during the long-watch raptor surveys between April 2011 and July 2012. The eagle observations that were made within 800 meters of the long-watch raptor survey locations were used to inform the prior distribution used in the USFWS Eagle Fatality model. *See Chapter 7.0.* In addition, the data collected through the long-watch raptor surveys was used to develop a utilization distribution for the CCSM Project Site to identify areas of high eagle use for the purposes of micrositing wind turbines and other CCSM Project facilities in order to avoid and minimize impacts to eagles to the extent practicable. Further, the results associated with the long-watch raptor surveys were used to identify Turbine No-Build Areas in which wind turbines would not be constructed to avoid impacts to eagles. *See Chapter 6.0*. A summary of the data from these surveys is provided in section 5.2.1.

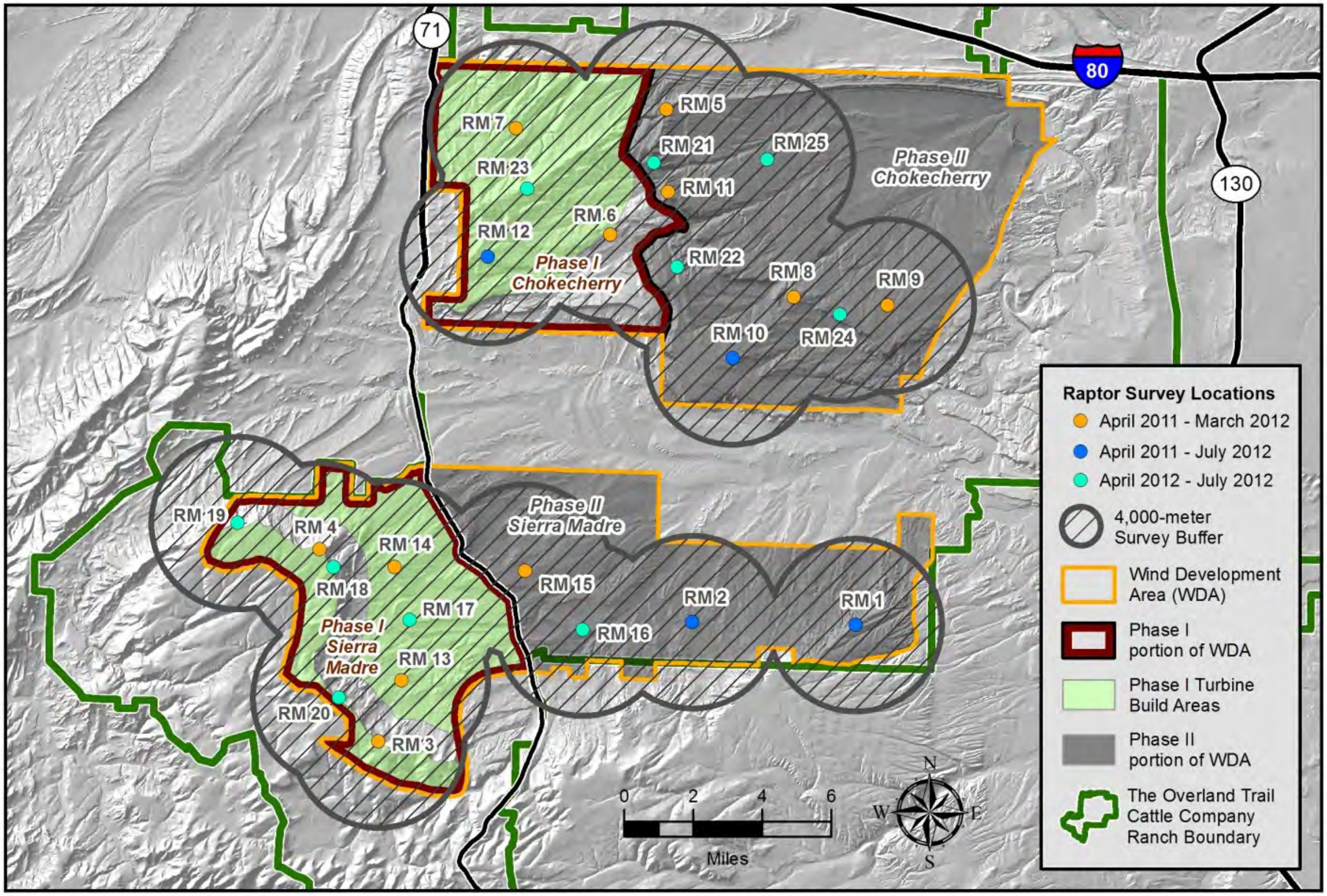

Figure 5.2. Long-watch Raptor Survey Locations, April 2011 to July 2012.

800-meter Raptor Count Surveys

Between August 20, 2012, and November 9, 2012, 1,382 biweekly 800-meter raptor count surveys were conducted at 40 locations within the CCSM Project Site. *See Figure 5.3*. Following discussion with USFWS, the biweekly 800-meter raptor count surveys were increased to 60 sites between November 12, 2012, and August 30, 2013, to achieve additional coverage. *See Figure 5.4. See Appendix B & C.* In compliance with USFWS recommendations, PCW's 800-meter raptor count surveys provide more than 30% coverage of the Phase I wind turbine layout.

To obtain the desired coverage, minimum convex polygons (MCPs) were placed around potential wind turbine construction areas in the WDAs and were evaluated for differences in habitat characteristics, forage potential, and topography. Using the Geostatistical Analyst tools in ArcGIS, spatially balanced 800-meter raptor count survey locations were sequentially selected to capture the variability in habitat conditions, terrain features, and wind turbine numbers and densities in a manner that is consistent with the recommendations made by USFWS, while ensuring that no overlap occurred between survey locations. The total number of sampling locations per MCP was based on the relative surface area, number of wind turbines, and wind turbine densities in each MCP.

The 800-meter raptor count surveys were generally conducted for 1 hour at each site (on rare occasions weather conditions and visibility truncated the 1 hour survey time), and data collected for each raptor detected on these surveys included species, number of individuals, age, sex, distance from observer, bearing to the bird, heading of the bird, height, flight behavior, and number of flight minutes. Flight paths were also recorded on aerial maps for each raptor detected. As recommended in the ECP Guidance, these surveys were conducted within 800-meter radius plots in order to maintain high confidence in detection and identification of raptors, and in the recording of their flight paths.

August 2012 to August 2013 800-meter raptor count surveys were conducted across the CCSM Project Site for a total of 97,573 minutes (1,626 hours), or 35.5% of the total daylight minutes during this period. Of these surveys, 51,964 minutes (866 hours) of survey were conducted within the Phase I Development Area. Data from the 800-meter raptor count surveys were used to further identify high eagle use areas for the purpose of micrositing Phase I to avoid and minimize impacts to eagles and other raptors to the extent practicable. A summary of the data from the Phase I 800-meter raptor count surveys is provided in section 5.2.1. In addition, eagle flight minute data collected during the August 2012 to August 2013, 800-meter raptor count surveys for Phase I was used as input for USFWS's eagle fatality model in order to generate fatality estimates as required in Stage 3 of the ECP Guidance. *See Chapter 7.0.*

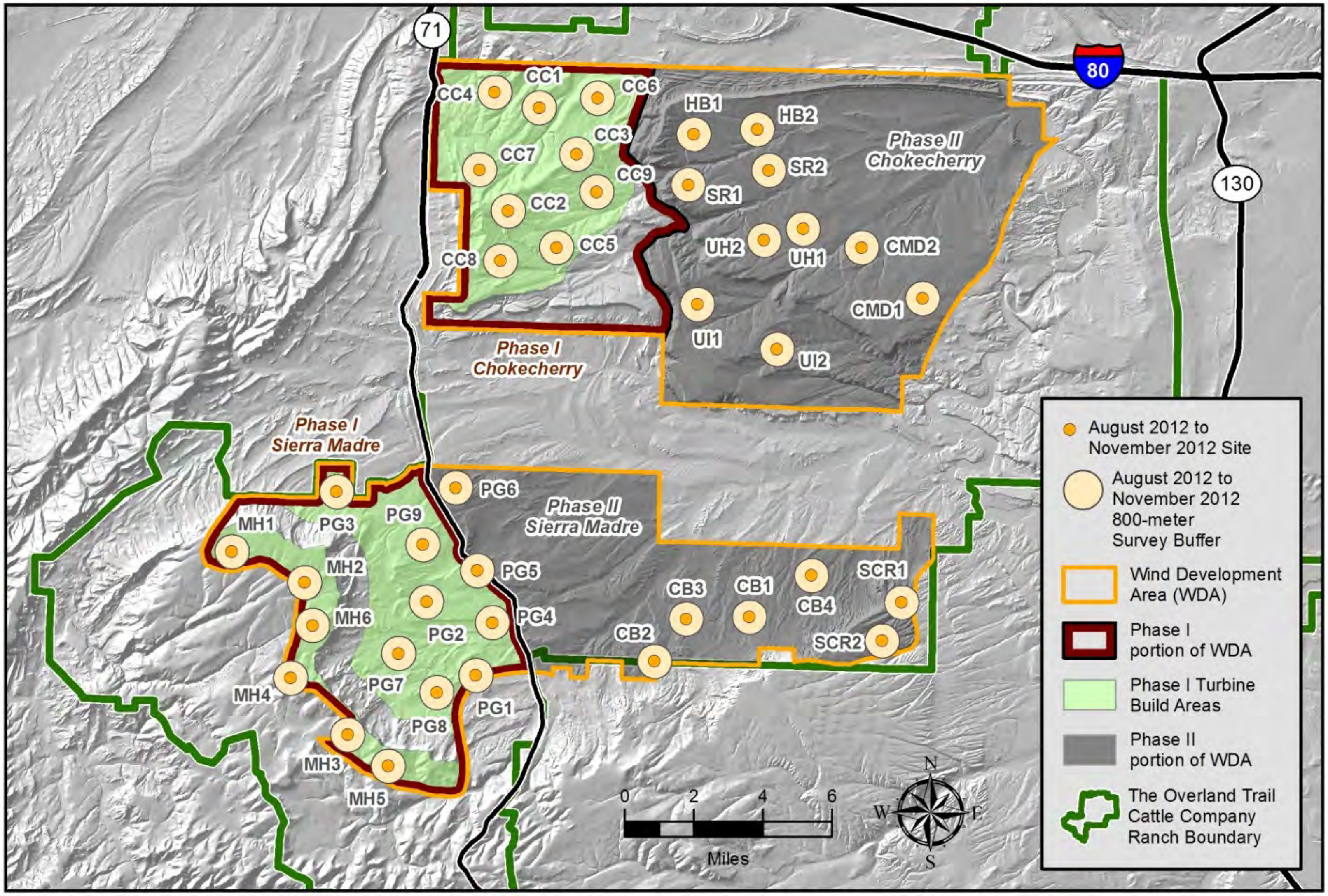

Figure 5.3. 800-meter Raptor Count Locations, August 2012 to November 2012.

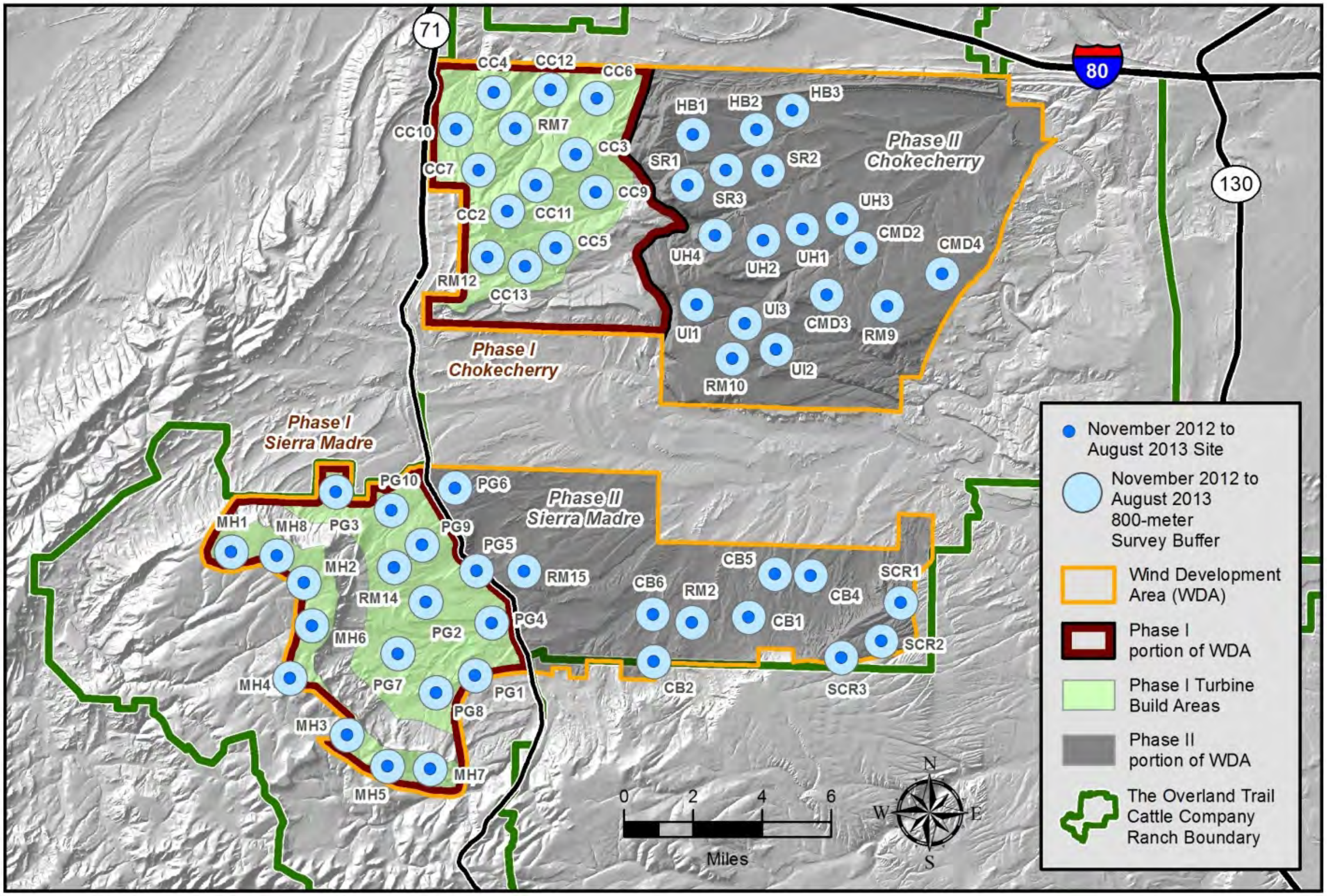

Figure 5.4. 800-meter Raptor Count Locations, November 2012 to August 2013.

Avian Radar Surveys

A DeTect Merlin avian radar system was used to map avian use across the CCSM Project Site to identify eagle flight paths and use areas. The radar was installed in March 2011 and operated through the end of March 2013 at nine different locations across the CCSM Project Site covering 100% of the Phase I wind turbine locations. *See Figure 5.5.* The radar is a trailer-mounted system with a 200-watt horizontal solid-state S-band radar and a 10-kilowatt (kW) vertically operating X-band open array radar. The horizontal scanning radar (HSR) has a range of up to 7.4 kilometers (4.6 miles) for raptors and other large targets in a 360-degree pattern around the unit. The HSR is able to record how targets use topographic features within the CCSM Project Site by collecting accurate location data for each target as it moves through the radar scanning area. The vertical scanning radar (VSR) has a 24-degree beam width and detects flight paths up to 3 kilometers (2 miles) or more for raptors and other large targets above the unit. The HSR does not collect altitudinal data for biological targets; however, the elevation of targets may be collected if they pass through the footprint of the VSR. These data are critical for determining the relative percentage of targets passing through the rotor swept zone (RSZ) versus those flying above and below the RSZ. The radar ran continuously, collecting data for movements of birds throughout the day and night. The relative numbers of birds passing through the scanning area, as well as the relative size of each target, can be derived from the radar data. The results of the avian radar system surveys are discussed in section 5.2.1.

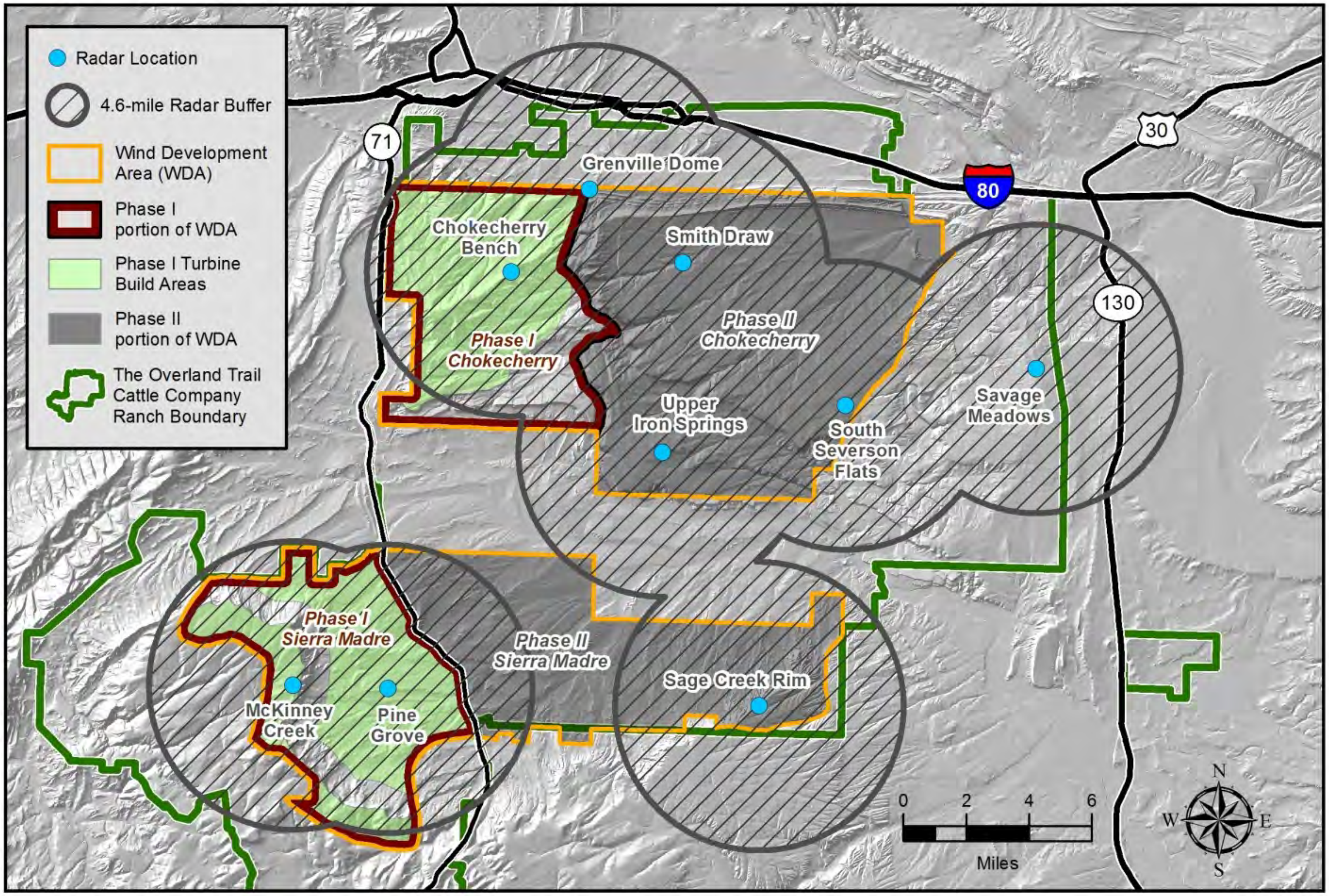

Figure 5.5. Avian Radar Locations, March 2011 to March 2013.

5.1.2 Eagle Nest Surveys

Understanding use of eagle nests and identifying appropriate measures to avoid and minimize impacts to those nests requires an evaluation of the occupancy of the nest as well as the type of activity that is occurring at the nest location. *See Chapter 6.0.* For purposes of evaluating nest status, this Phase I ECP uses the following definitions from the ECP Guidance:

- **Occupied Nest.** An occupied nest is "a nest used for breeding in the current year by a pair of eagles. Presence of an adult, eggs, or young, freshly molted feathers or plucked down, or current year's mutes (whitewash) suggest site occupancy. In years when food resources are scarce, it is not uncommon for a pair of eagles to occupy a nest yet never lay eggs; such nests are considered occupied." *See USFWS 2013a*.
- **Unoccupied Nest.** Unoccupied nests are "those nests not selected by raptors for use in the current nesting season." *See USFWS 2013a*.

BLM has collected information on nests within the Rawlins Field Office (RFO), including the CCSM Project Site and Phase I, since 1980 (a 33-year period). Prior to 1996, BLM mapped raptor nest locations opportunistically. Since 1996, both aerial and ground-based surveys have been conducted to map raptor nests within the RFO. BLM's records have been supplemented with raptor nests located as part of the permitting process for other development activities such as pipelines and oil and gas development. *See BLM 2012b*. Helicopter-based aerial nest surveys have been completed by PCW within the CCSM Project Site, including Phase I, for five years (2008, 2011, 2012, 2013 and 2014). *See Appendix D*. In May of 2008, PCW completed the aerial nest surveys specific to the CCSM Project to identify raptor nests within a 1600-meter (1-mile) buffer of the Original Proposed Action, surveying a total of approximately 270 square miles. *See Johnson, et al. 2008*. These surveys were conducted by helicopter between May 14 and 30, 2008. Surveys were conducted by flying over suitable nesting habitat (e.g., cliff bands, rocky areas, and stands of trees) and recording a geospatial location and noting the status for all known or potential raptor nests. The 2008 surveys also documented nests located incidental to other surveys and project activities.

In April and May of 2011, 2012, 2013 and 2014, additional aerial nest surveys were completed across the CCSM Project Site and a 8-kilometer (5-mile) buffer surrounding the CCSM Project (approximately 700 square miles), which includes all of Phase I. *See Figure 5.6. See Appendix D.* An 8-kilometer-wide (5-mile-wide) buffer was determined to be appropriate for the CCSM Project in coordination with USFWS and BLM using the ECP Guidance and calculated inter-nest distances in the CCSM Project vicinity. *See Appendix D.*

Location, nesting substrate, condition, and nesting status were recorded for each observed nest. For nests that were determined to be occupied, species, adult activity, and nestling activity were also recorded. Unoccupied nests were marked as unknown stick nests as it is not possible to determine what species may have built the nest, or what species may use the nest in the future. The quality of unoccupied nests was also assessed and placed into categories of good, fair, poor, or non-functional.

Good nests were those that could support nesting activity with minimal rebuild or maintenance. Fair nests were those that would require substantial rebuild or maintenance. Poor nests were those that had evidence of nest structure but would require an entire rebuild of the nest. Non-functional nests were those that had only marginal evidence of past nesting (a few sticks on a ledge), had been destroyed, or had completely fallen from the nest substrate.

Ground surveys were conducted to monitor the status of occupied nests located during the aerial nest surveys, and to search areas that were inaccessible during aerial surveys due to high winds or other weather conditions. For all occupied nests, ground surveys were conducted once every three weeks until a nest was determined to have fledged or failed at which time the nest was reclassified as unoccupied. During each visit, nests were surveyed for four hours or until current status was determined. Data collected included date and time of visit, condition of the nest, number of adults/eggs/nestlings present at the nest, behavior of the birds present, and any other notes pertinent to the current activity or status of the nest. Results of the 2011, 2012, 2013 and 2014 aerial nest surveys are discussed in section 5.2.2.

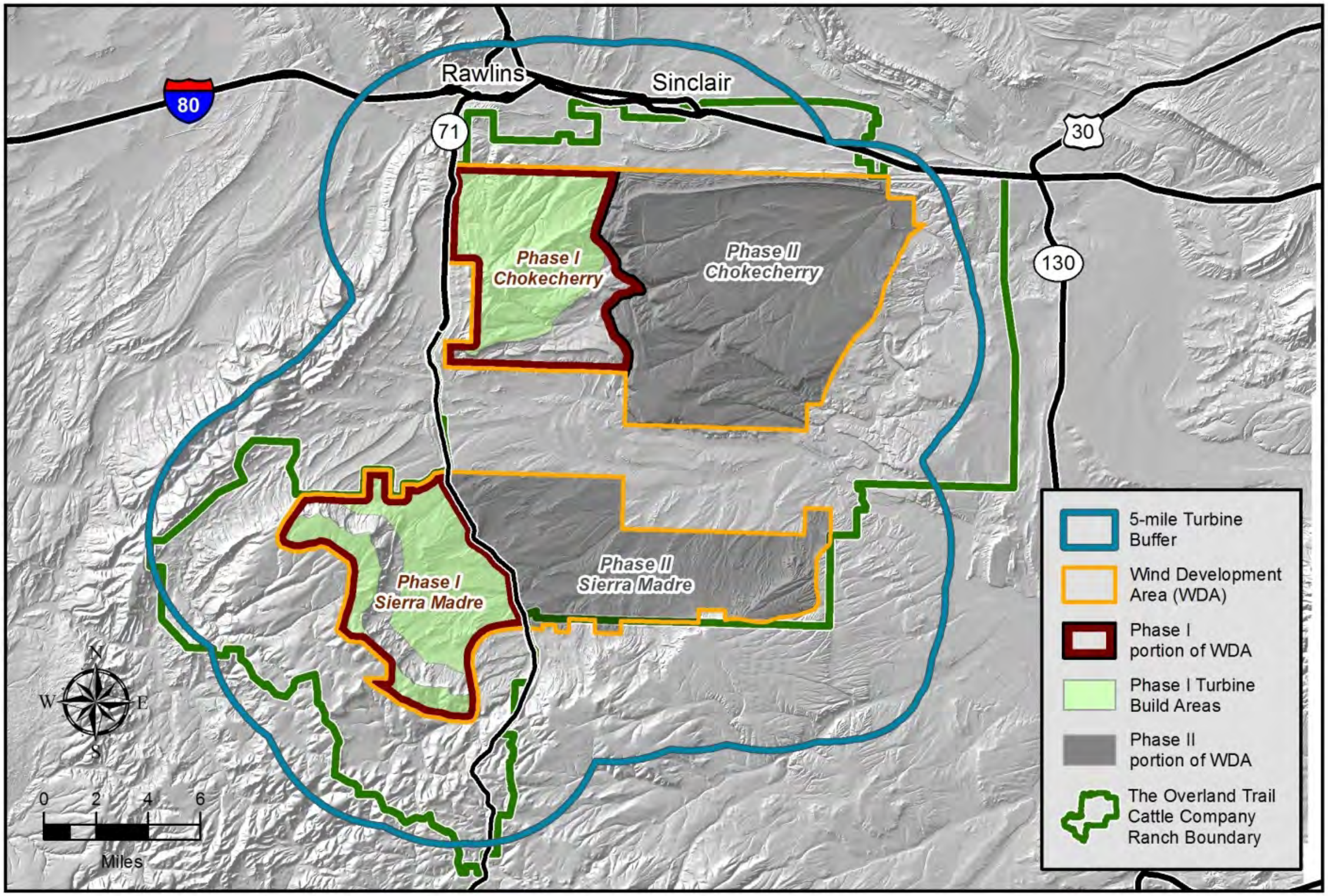

Figure 5.6. Aerial Nest Survey Area, 2011 through 2014.

5.1.3 Communal Roost Location Surveys

Surveys to identify potential eagle communal roost locations were completed between November 2011 and March 2012, and November 2012 and March 2013 as part of winter eagle and avian use surveys. In addition, two aerial surveys were completed in February 2013 to survey areas most likely to have communal roost habitats including cottonwood riparian habitats along the North Platte River, forested habitats with trees of sufficient size to provide roost opportunities adjacent to Miller Hill, and cliff faces and rock outcrops throughout the CCSM Project Site. *See Appendix E*.

5.1.4 Prey Base Surveys

Prey base surveys and evaluations were conducted throughout the Ranch from April 2011 to April 2014. *See Appendix F*. These evaluations were conducted to identify areas containing prey densities sufficient for eagle and large raptor foraging activities. Areas evaluated included prairie dog colonies, areas with high rabbit or ground squirrel activity, greater sage-grouse use areas, waterbird/waterfowl use of reservoirs, and livestock and ungulate calving grounds and winter range. Section 5.2.4 describes the results of these surveys.

White-tailed Prairie Dog (WTPD)

In August 2012, PCW conducted reconnaissance level surveys at 27 sites within polygons identified in a 2010 WTPD study to update the data and assess the accuracy of the study. *See Smith 2010.* Reconnaissance level surveys consisted of locating burrows, determining current or historical use (recent diggings, old or recent scat), recording presence of any small mammals in the area, and measuring burrow entrance diameters to aid in species identification. A total of 74, 1,000-meter long and 6-meter wide transects were surveyed for small mammal burrows in August 2012 within the polygons established in the 2010 study using the methods described in McDonald *et al.* (2011) and Biggins *et al.* (1993). All burrows encountered during the surveys were recorded and categorized according to condition, activity level, and species. *See Appendix F.*

Based on the results of the 2012 reconnaissance surveys, PCW completed full-scale WTPD surveys within Phase I between May and August 2013. Survey protocols for the 2013 Phase I WTPD survey were consistent with those for the 2012 reconnaissance surveys. Activity was determined by WTPD presence, fresh burrowing activity, or other signs of recent activity (fresh droppings, fresh scraping, reduced vegetative cover, etc.). For inactive sites, species were identified using burrow characteristics and entrance size. *See Appendix F.*

Waterbird/Waterfowl

Waterbird/waterfowl surveys were conducted in 2011 during spring (April 26–May 4), summer (August 23–24), and fall (October 20–21) at each of the four major reservoirs (Kindt, Rasmussen, Sage Creek, and Teton) near the CCSM Project Site. *See Appendix G.* Three seasonal surveys (spring, summer, and fall) were completed at each reservoir to create a baseline of potential prey species and assess their spatiotemporal abundance at these locations and the potential to attract and/or concentrate eagles.

Surveys were conducted using spotting scopes to maximize coverage from an optimal number of viewing locations, as well as to facilitate species identification. In addition, care was taken not to double-count individuals if the survey was conducted at more than one location at a given reservoir. Along with standard survey information (e.g., date, location, observer, time, weather conditions), species-specific data collected included species, age, sex, and number of individuals. Section 5.2.4 provides a summary and discussion of the data collected during the waterbird/waterfowl surveys and how this information was used to evaluate and identify important eagle use areas.

Greater Sage-grouse

Understanding seasonal greater sage-grouse movements and patterns provides valuable information on the availability of greater sage-grouse as potential prey item for eagles. PCW has developed a Sage-grouse Conservation Plan with goals and objectives to implement science-based conservation measures for greater sage-grouse and other select species. *See BLM 2012a, App. B at App. N.* As a part of the Sage-grouse Conservation Plan, annual lek counts are conducted through ground surveys to monitor greater sage-grouse populations within the area surrounding the CCSM Project. The objectives of these surveys are to determine lek activity and occupancy, in addition to documenting the attendance of greater sage-grouse observed on a particular lek for each year (lek counts). *See BLM 2012a, App. B at App. N.*

Telemetry monitoring of sage-grouse was initiated in 2010 to refine greater sage-grouse associations with various sagebrush habitat components in order to validate the success of proposed and future conservation projects over time. *See BLM 2012a, App. B at App. N.* Individual sage-grouse have been captured and fitted with global positioning system (GPS) Platform Terminal Transmitters (PTT) to gain a better understanding of the distribution, range and movement patterns of greater sage-grouse within the CCSM Project Site. These units record approximate location, altitude, heading, and speed to allow for identification of migratory pathways and overall use of the landscape. All of these data are useful in determining demographic trends, habitat use, and seasonal use areas. Lek counts and telemetry will continue through construction and post-construction for the CCSM Project. *See BLM 2012a, App. B at App. N.* Section 5.2.4 describes the results of these surveys in relation to eagles.

Other Potential Prey Species

In 2008, baseline wildlife surveys were completed for the CCSM Project. During these surveys potential eagle prey species including WTPD, Wyoming ground squirrel, leporids, and big game species were observed. The results of the 2008 wildlife surveys are reported in the BLM FEIS. *See BLM 2012b.* Further, in 2012, PCW completed general reconnaissance surveys across the CCSM Project Site and completed 74 survey transects to assess fossorial mammal activity. *See Appendix F.* Survey protocols followed USFWS recommendations (McDonald *et al.* 2011) for WTPD surveys and were adapted from Biggins *et al.* 1993. *See Appendix F.* Surveys consisted of locating burrows, determining current or historical use (recent diggings, old or recent scat), recording presence of any small mammals in the area, and measuring burrow entrance diameters to aid in species identification. These surveys provided information to better understand the distribution and densities of small mammals including Wyoming ground squirrel and leporids.

In addition, beginning in 2009, incidental observations of potential eagle prey species were collected as part of ongoing greater sage-grouse, avian, and other wildlife species monitoring. Incidental observations of certain wildlife species including leporids and Wyoming pocket gopher were also made during pedestrian surveys of Phase I completed from 2012 through 2014. *See PCW 2014b; 2014c; 2014d; 2015b*. Incidental observations provided additional information related to the general distribution of eagle prey species such as Wyoming ground squirrel and leporids across the CCSM Project Site, including Phase I.

5.2 Survey Results and Analysis

Following completion of the scientifically rigorous surveys on eagle use, eagle nests, communal roost locations, and potential prey base, PCW compiled the data for use in assessing the risk to eagles from the CCSM Project. The survey data and analysis are presented in detail in Appendices C through G and are summarized below.

5.2.1 Eagle Use Analysis

Identification of eagle use areas, patterns of use, and seasonal use is essential to prioritize the location and timing for implementing avoidance and risk reduction measures to ensure that Phase I meets Category 2 requirements by avoiding the highest eagle use areas. *See USFWS 2011a; 2011b.* Eagle use for Phase I was evaluated using the results of the site characterization, long-watch raptor, 800-meter raptor count, and avian radar surveys. The results of these surveys and analysis of the data are summarized below.

Site Characterization

Surveys completed from June 2008 to June 2009 documented the presence of 12 species of raptors, including bald and golden eagles, within the Study Area. Raptor use was highest in the fall, followed by summer, spring and winter. *See Appendix C*. Only three raptors were observed in the winter (two golden eagles and one ferruginous hawk). The 2008 surveys covered 9,435 acres, of which only a portion occurred within the Phase I Development Area (1,984 acres or approximately 21%) due to PCW's subsequent substantial redesign of the CCSM Project to avoid and minimize risks. *See Chapter 6.0. See Appendix C.* This redesign is consistent with the avoidance and minimization process set forth in the ECP Guidance and the purpose of the 2008 surveys, which was to inform the wind turbine siting process to minimize impacts to wildlife resources. *See Chapter 6.0*.

Long-watch Raptor Survey Analysis

Between April 4, 2011, and July 24, 2012, 430 long-watch raptor surveys were conducted within the CCSM Project Site. In total, 146,876 minutes (2,447.9 hours) of survey were conducted, with 73,984 minutes (1,233.1 hours) of survey completed within the Phase I Development Area. *See Appendix C.* During the 73,984 minutes of long-watch raptor surveys within the Phase I Development Area, 164 minutes of golden eagle flight (0.002 minutes of flight per minute of survey) and 32 minutes of bald eagle flight (0.0004 minutes of flight per minute of survey) recorded. *See Table 5.2 & Table 5.3.*

The long-watch raptor surveys are intended to detect raptors at all distances for the purposes of identifying high-use areas and potential migration corridors. As a result, the eagle flight path utilization distribution analysis described below includes all survey locations within the CCSM Project Site and has not been parsed to Phase I. Including all long-watch raptor survey locations in a utilization distribution analysis creates a higher resolution dataset for identifying eagle use areas and potential migration corridors within the CCSM Project Site.

To identify spatial and seasonal patterns of eagle use and eagle use areas, eagle flight paths recorded during long-watch raptor surveys were digitized and used to complete a utilization distribution analysis to identify areas with the highest probability for eagle and other raptor use. All eagle flight paths recorded from April 2011 through July 2012 were used to generate the utilization distribution. As stated earlier in this document, 100% of the Phase I wind turbine layout was covered by long-watch raptor surveys. This survey coverage enables a detailed assessment of patterns of spatial and seasonal use across the entire CCSM Project Site, including Phase I.

Observed eagle flight paths recorded from April 2011 through July 2012 were used to generate an eagle flight density grid across the CCSM Project Site with 100-meter resolution. Values in each grid cell represent the relative density of eagle use. Results indicate that eagle use within the CCSM Project Site is concentrated immediately adjacent to the Interior Chokecherry Rim; immediately east of the Miller Hill Rim in the Lower Miller Hill area; directly above Rasmussen Reservoir in the south central area of the Sierra Madre WDA; and immediately north of the Sage Creek Rim in the southeastern corner of the Sierra Madre WDA. *See Figure 5.7 & Figure 5.8.*

Table 5.2. Survey Minutes and Golden Eagle Use within 800 meters of Long-watch Raptor Survey Locations, April 2011 through July 2012.

Phase I	Survey Location	Survey Minutes	Golden Eagle Use Minutes Within 0-150 Meter Altitude					
			April to June 2011	July to August 2011	September to November 2011	November 2011 to April 2012	April to June 2012	July 2012
Chokecherry WDA	RM6	9,041	24	0	0	0	0	0
	RM7	7,790	0	0	0	0	0	0
	RM12	9,050	6	0	7	0	0	0
	RM23	1,044	0	0	0	0	0	0
Sierra Madre WDA	RM3	7,173	0	1	0	0	0	0
	RM4	8,171	11	2	0	0	0	0
	RM13	10,563	11	0	3	6	0	0
	RM14	8,264	14	13	7	16	0	0
	RM15	8,558	6	0	13	5	0	0
	RM17	1,082	0	0	0	0	1	4
	RM18	1,088	0	0	0	0	3	0
	RM19	1,080	0	0	0	0	0	9
	RM20	1,080	0	0	0	0	2	0
Total		**73,984**	**72**	**16**	**30**	**27**	**6**	**13**

Table 5.3. Survey Minutes and Bald Eagle Use within 800 meters of Long-watch Raptor Survey Locations, April 2011 through July 2012.

Phase I	Survey Location	Survey Minutes	Bald Eagle Use Minutes Within 0-150 Meter Altitude					
			April to June 2011	July to August 2011	September to November 2011	November 2011 to April 2012	April to June 2012	July 2012
Chokecherry WDA	RM6	9,041	5	0	0	0	0	0
	RM7	7,790	0	0	3	2	0	0
	RM12	9,050	0	0	0	0	0	0
	RM23	1,044	0	0	0	0	0	0
Sierra Madre WDA	RM3	7,173	0	0	1	0	0	0
	RM4	8,171	0	0	0	0	0	0
	RM13	10,563	0	0	4	0	0	0
	RM14	8,264	0	0	17	0	0	0
	RM15	8,558	0	0	0	0	0	0
	RM17	1,082	0	0	0	0	0	0
	RM18	1,088	0	0	0	0	0	0
	RM19	1,080	0	0	0	0	0	0
	RM20	1,080	0	0	0	0	0	0
Total		**73,984**	**5**	**0**	**25**	**2**	**0**	**0**

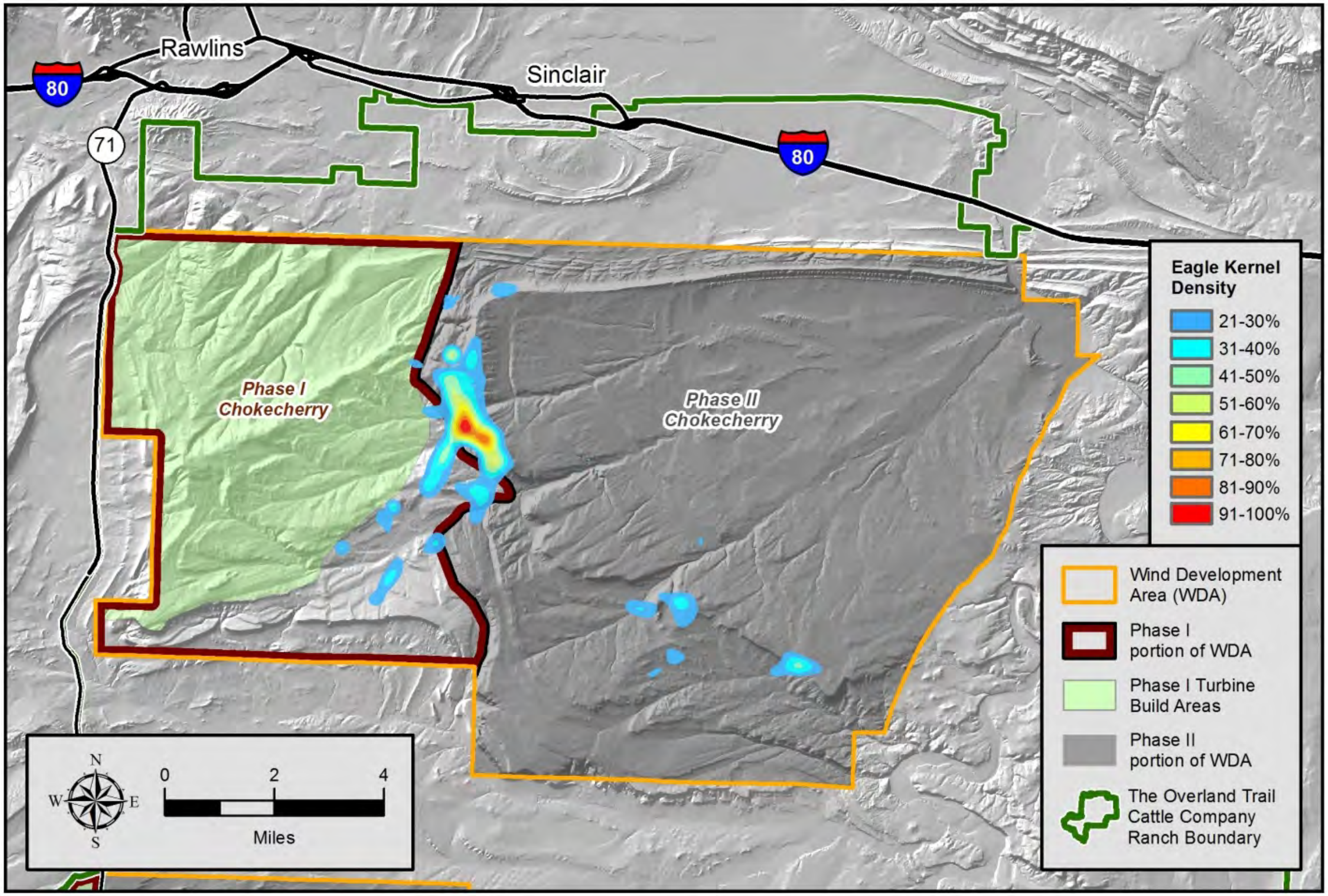

Figure 5.7. Chokecherry WDA Eagle Flight Path Utilization Distribution.

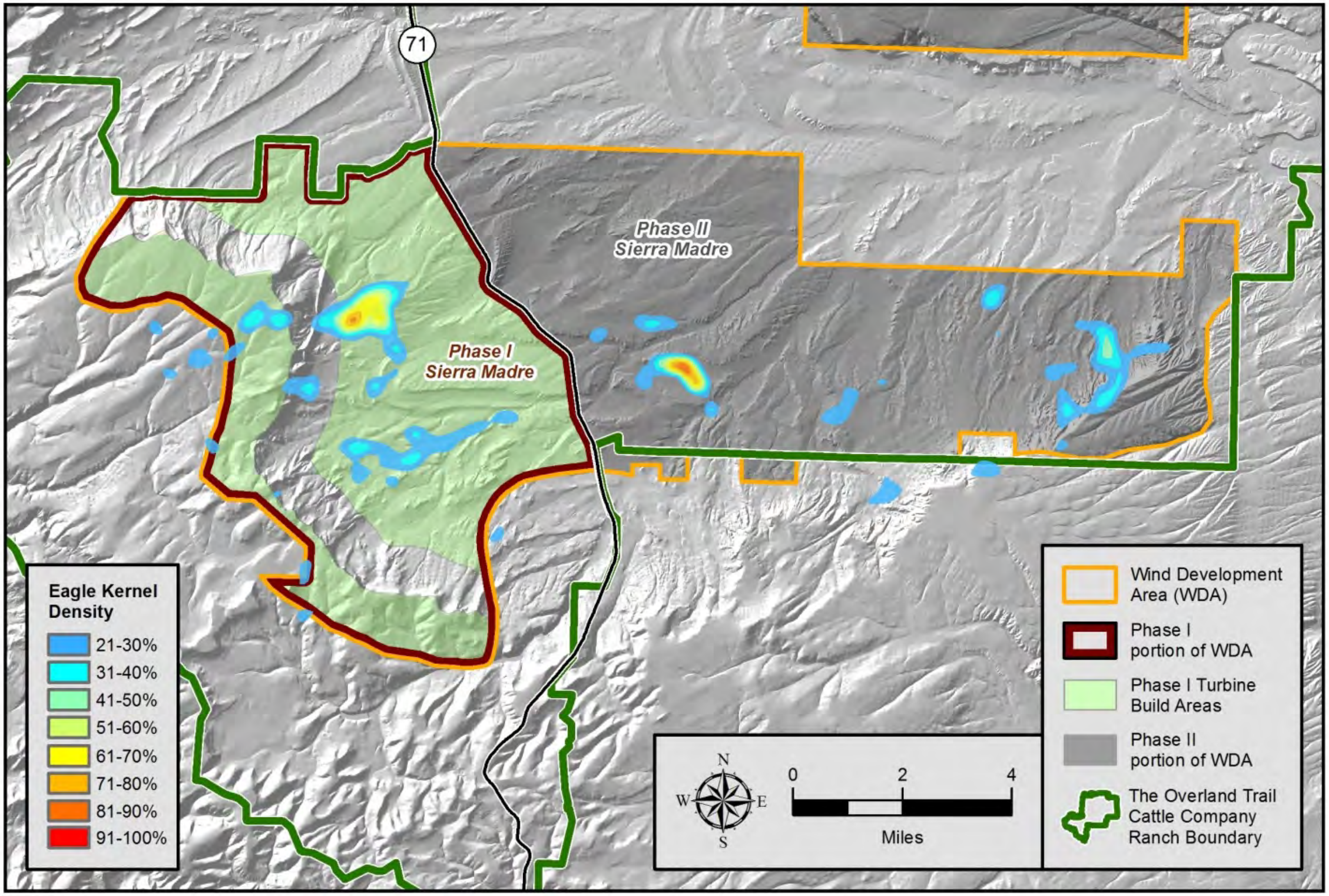

Figure 5.8. Sierra Madre WDA Eagle Flight Path Utilization Distribution.

800-meter Raptor Count Survey Analysis

Data collected using the August 2012 to August 2013 800-meter raptor count protocols for the CCSM Project were shared with USFWS in four quarterly reports. *See Appendix C*. These data serve as the input eagle use data for USFWS's eagle fatality model. As such, while data was collected for the entire CCSM Project, the data discussed below pertain only to Phase I. Separate discussions are provided by seasonal time periods to provide information on changing eagle use patterns throughout the year. For purposes of the analysis below, eagle flight minutes were calculated by subtracting the initial observation time from the final observation time, except when the initial and final observations occurred within the same minute, in which case the flight time was rounded to one full minute. Phase I survey locations for the August 2012 to August 2013 surveys are displayed in Figure 5.3 and Figure 5.4.

In summary, during 800-meter raptor count surveys, 103 minutes of golden eagle flight and 5 minutes of bald eagle flight were recorded during 51,964 minutes (866 hours) of survey time for Phase I, or 0.002 minutes of golden eagle flight per minute of survey and 0.0001 minutes of bald eagle flight per minute of survey. This observed use for golden eagles in Phase I is nearly identical to the use observed during long-watch raptor surveys, and the observed bald eagle use was less than that observed during long-watch raptor surveys. *See "Long-watch Raptor Survey Analysis."*

<u>August 2012 to November 2012</u>

During the August 20 to November 9, 2012, survey period, a total of 51 golden eagle flight minutes were recorded during 16,894 minutes (281.57 hours) of survey or 0.0030 flight minutes per minute of survey for all survey locations within Phase I. *See Table 5.4.* Of the recorded golden eagle flight minutes, 74.51% were outside the rotor swept zone (RSZ). By altitudinal classification, 19.61% of the golden eagle flight minutes were below the RSZ (0 to 30 meters above the ground), 25.5% of the golden eagle flight minutes were within the RSZ (30 to 150 meters), and 54.9% of the golden eagle flight minutes were above the RSZ (above 150 meters). The data collected for Phase I during this survey period is summarized below; the full reports are attached in Appendix C.

With respect to bald eagles, 2 minutes of use were recorded during 16,894 survey minutes or 0.0001 flight minutes per minute of survey. Both of these flight minutes (100%) were recorded between 0 and 30 meters and, therefore, were below the RSZ.

Breaking down the above totals, surveys for the Phase I portion of the Chokecherry WDA were conducted at 9 locations for a total of 6,514 minutes (108.57 hours) during the August 20 to November 9, 2012, survey period. During this survey period, golden eagles were observed in flight for 18 minutes or 0.0028 flight minutes per minute of survey. In total, 54 survey sessions were conducted during which seven golden eagle observations were recorded during six of the sessions. Individual observation times ranged between 2 minutes and 4 minutes, rounded up to the nearest whole minute. Of the recorded use within the Phase I portion of the Chokecherry WDA, 77.78% occurred outside the RSZ. No bald eagles were recorded within the Phase I portion of the Chokecherry WDA.

Surveys for the Phase I portion of the Sierra Madre WDA were conducted at 14 locations for a total of 10,380 minutes (173 hours) during the August 20 to November 9, 2012, survey period. During this survey period, golden eagles were observed in flight for 33 minutes or 0.0032 flight minutes per minute of survey. In total, 85 survey sessions were conducted during which nine golden eagles were observed during eight of the sessions. Individual observation times ranged between 2 minutes and 4 minutes, rounded up to the nearest whole minute. Of the recorded use within the Phase I portion of the Sierra Madre WDA, 72.72% occurred outside the RSZ. One bald eagle was observed during one survey session for 2 minutes or 0.0002 flight minutes per minute of survey.

Table 5.4. Survey Minutes and Golden Eagle Use for Phase I, August to November 2012.

Phase I	Survey Location	Survey Minutes	Number of Individual Golden Eagles Observed	Golden Eagle Flight Minutes	Golden Eagle Use Minutes within 0-30m Altitude	Golden Eagle Use Minutes within 30-150m (RSZ) Altitude	Golden Eagle Use Minutes above 150m Altitude
Chokecherry WDA	CC1	720	0	0	0	0	0
	CC2	720	0	0	0	0	0
	CC3	698	1	2	1	1	0
	CC4	720	2	4	2	2	0
	CC5	720	0	0	0	0	0
	CC6	716	2	4	1	1	2
	CC7	780	0	0	0	0	0
	CC8	720	2	8	0	0	8
	CC9	720	0	0	0	0	0
Sierra Madre WDA	MH1	720	2	7	1	4	2
	MH2	720	0	0	0	0	0
	MH3	780	0	0	0	0	0
	MH4	720	0	0	0	0	0
	MH5	780	0	0	0	0	0
	MH6	720	1	4	2	2	0
	PG1	720	1	2	2	0	0
	PG2	720	2	8	1	1	6
	PG3	720	1	4	0	0	4

Phase I	Survey Location	Survey Minutes	Number of Individual Golden Eagles Observed	Golden Eagle Flight Minutes	Golden Eagle Use Minutes within 0-30m Altitude	Golden Eagle Use Minutes within 30-150m (RSZ) Altitude	Golden Eagle Use Minutes above 150m Altitude
	PG4	840	0	0	0	0	0
	PG5	780	2	8	0	2	6
	PG7	720	0	0	0	0	0
	PG8	840	0	0	0	0	0
	PG9	600	0	0	0	0	0
Total		**16,894**	**16**	**51**	**10**	**13**	**28**

<u>November 2012 to March 2013</u>

During the November 12, 2012, to March 29, 2013, survey period, a total of 45 golden eagle flight minutes were recorded during 15,450 minutes (257.5 hours) of survey or 0.0029 flight minutes per minute of survey for all survey locations within Phase I. *See Table 5.5.* Of the recorded golden eagle flight minutes, 53.33% were outside the RSZ. By altitudinal classification, 15.55% of the golden eagle flight minutes were below the RSZ (0 to 30 meters above the ground), 46.67% of the golden eagle flight minutes were within the RSZ (30 to 150 meters), and 37.78% of the golden eagle flight minutes were above the RSZ (above 150 meters). No bald eagles were observed during this survey period. The data collected for Phase I during this survey period is summarized below; the full reports are attached in Appendix C.

Breaking down the above totals, surveys for the Phase I portion of the Chokecherry WDA were conducted at 13 locations for a total of 6,690 minutes (111.5 hours) during the November 12, 2012, to March 29, 2013, survey period. During this survey period, golden eagles were observed in flight for 18 minutes or 0.0027 flight minutes per minute of survey. In total, 112 survey sessions were conducted during which five golden eagle observations were recorded during three of the sessions. Individual observation times ranged between 2 minutes and 5 minutes, rounded up to the nearest whole minute. Of the recorded use within the Phase I portion of the Chokecherry WDA, 61.11% occurred outside the RSZ.

Surveys for the Phase I portion of the Sierra Madre WDA were conducted at 18 locations for a total of 8,760 minutes (146 hours) during the August 20 to November 9, 2012, survey period. During this survey period, golden eagles were observed in flight for 27 minutes or 0.0031 flight minutes per minute of survey. In total, 146 survey sessions were conducted during which six golden eagles were observed during four of the sessions. Individual observation times ranged between 2 minutes and 8 minutes, rounded up to the nearest whole minute. Of the recorded use within the Phase I portion of the Sierra Madre WDA, 48.15% occurred outside the RSZ.

Table 5.5. Survey Minutes and Golden Eagle Use for Phase I, November 2012 to March 2013.

Phase I	Survey Location	Survey Minutes	Number of Individual Golden Eagles Observed	Golden Eagle Flight Minutes	Golden Eagle Use Minutes within 0-30m Altitude	Golden Eagle Use Minutes within 30-150m (RSZ) Altitude	Golden Eagle Use Minutes above 150m Altitude
Chokecherry WDA	CC2	540	1	2	0	0	2
	CC3	510	0	0	0	0	0
	CC4	540	0	0	0	0	0
	CC5	420	0	0	0	0	0
	CC6	480	0	0	0	0	0
	CC7	480	2	6	1	1	4
	CC9	480	0	0	0	0	0
	CC10	540	0	0	0	0	0
	CC11	540	0	0	0	0	0
	CC12	540	0	0	0	0	0
	CC13	540	2	10	2	6	2
	RM7	540	0	0	0	0	0
	RM12	540	0	0	0	0	0
Sierra Madre WDA	MH1	300	0	0	0	0	0
	MH2	480	0	0	0	0	0
	MH3	480	0	0	0	0	0
	MH4	300	0	0	0	0	0
	MH5	480	0	0	0	0	0

Phase I	Survey Location	Survey Minutes	Number of Individual Golden Eagles Observed	Golden Eagle Flight Minutes	Golden Eagle Use Minutes within 0-30m Altitude	Golden Eagle Use Minutes within 30-150m (RSZ) Altitude	Golden Eagle Use Minutes above 150m Altitude
	MH6	540	0	0	0	0	0
	MH7	480	0	0	0	0	0
	MH8	540	1	2	1	1	0
	PG1	540	0	0	0	0	0
	PG2	540	0	0	0	0	0
	PG3	540	2	10	0	4	6
	PG4	540	2	7	0	4	3
	PG5	540	0	0	0	0	0
	PG7	480	0	0	0	0	0
	PG8	480	0	0	0	0	0
	PG9	480	0	0	0	0	0
	PG10	540	0	0	0	0	0
	RM14	480	1	8	3	5	0
Total		**15,450**	**11**	**45**	**7**	**21**	**17**

<u>April 2013 to June 2013</u>

During the April 1 to June 21, 2013, survey period, a total of 2 golden eagle flight minutes were recorded during 10,320 minutes (172 hours) of survey or 0.0002 flight minutes per minute of survey for all survey locations within Phase I. *See Table 5.6*. Of the recorded golden eagle flight minutes, 50% were outside the RSZ. By altitudinal classification, 50% of the golden eagle flight minutes were below the RSZ (0 to 30 meters above the ground), 50% of the golden eagle flight minutes were within the RSZ (30 to 150 meters), and no golden eagle flight minutes were above the RSZ (above 150 meters). No bald eagles were observed during this survey period. The data collected for Phase I during this survey period is summarized below; the full reports are attached in Appendix C.

Breaking down the above totals, surveys for the Phase I portion of the Chokecherry WDA were conducted at 13 locations for a total of 4,260 minutes (71 hours) during the April 1 to June 21, 2013 survey period. During this survey period, a golden eagle was observed in flight for 1 minute or 0.0002 flight minutes per minute of survey. In total, 71 survey sessions were conducted during which one golden eagle observation was recorded during one of the sessions. The observation time for this individual was 1 minute, which occurred within the RSZ. No flight minutes occurred outside the RSZ for the Phase I portion of the Chokecherry WDA during this survey session.

Surveys for the Phase I portion of the Sierra Madre WDA were conducted at 18 locations for a total of 6,060 minutes (101 hours) during the April 1 to June 21, 2013 survey period. During this survey period, a golden eagle was observed in flight for 1 minute or 0.0002 flight minutes per minute of survey. In total, 101 survey sessions were conducted during which one golden eagle was observed during one of the sessions. The observation time for this individual was 1 minute, which occurred in the 0 to 30 meter altitude category. No flight minutes occurred within the RSZ for the Phase I portion of the Sierra Madre WDA during this survey session.

Table 5.6. Survey Minutes and Golden Eagle Use for Phase I, April to June 2013.

Phase I	Survey Location	Survey Minutes	Number of Individual Golden Eagles Observed	Golden Eagle Flight Minutes	Golden Eagle Use Minutes within 0-30m Altitude	Golden Eagle Use Minutes within 30-150m (RSZ) Altitude	Golden Eagle Use Minutes above 150m Altitude
Chokecherry WDA	CC2	360	0	0	0	0	0
	CC3	360	1	1	0	1	0
	CC4	300	0	0	0	0	0
	CC5	300	0	0	0	0	0
	CC6	300	0	0	0	0	0
	CC7	360	0	0	0	0	0
	CC9	360	0	0	0	0	0
	CC10	360	0	0	0	0	0
	CC11	360	0	0	0	0	0
	CC12	300	0	0	0	0	0
	CC13	300	0	0	0	0	0
	RM7	300	0	0	0	0	0
	RM12	300	0	0	0	0	0

Phase I	Survey Location	Survey Minutes	Number of Individual Golden Eagles Observed	Golden Eagle Flight Minutes	Golden Eagle Use Minutes within 0-30m Altitude	Golden Eagle Use Minutes within 30-150m (RSZ) Altitude	Golden Eagle Use Minutes above 150m Altitude
Sierra Madre WDA	MH1	360	0	0	0	0	0
	MH2	360	0	0	0	0	0
	MH3	360	0	0	0	0	0
	MH4	300	0	0	0	0	0
	MH5	300	0	0	0	0	0
	MH6	360	0	0	0	0	0
	MH7	360	0	0	0	0	0
	MH8	300	0	0	0	0	0
	PG1	360	0	0	0	0	0
	PG2	300	0	0	0	0	0
	PG3	360	0	0	0	0	0
	PG4	360	0	0	0	0	0
	PG5	360	0	0	0	0	0
	PG7	360	0	0	0	0	0
	PG8	300	0	0	0	0	0
	PG9	300	0	0	0	0	0
	PG10	300	0	0	0	0	0
	RM14	360	1	1	1	0	0
Total		**10,320**	**2**	**2**	**1**	**1**	**0**

June 2013 to August 2013

During the June 24 to August 30, 2013, survey period, a total of 5 golden eagle flight minutes were recorded during 9,300 minutes (155 hours) of survey or 0.0005 flight minutes per minute of survey for all survey locations within Phase I. *See Table 5.7.* Of the recorded golden eagle flight minutes, 60% were outside the RSZ. By altitudinal classification, 60% of the golden eagle flight minutes were below the RSZ (0 to 30 meters above the ground), 40% of the golden eagle flight minutes were within the RSZ (30 to 150 meters), and no golden eagle flight minutes were above the RSZ (above 150 meters). No bald eagles were observed during this survey period. The data collected for Phase I during this survey period is summarized below; the full reports are attached in Appendix C.

Breaking down the above totals, surveys for the Phase I portion of the Chokecherry WDA were conducted at 13 locations for a total of 3,900 minutes (65 hours) during the June 24 to August 30, 2013, survey period. During this survey period, golden eagles were observed in flight for 4 minutes or 0.0010 flight minutes per minute of survey. In total, 65 survey sessions were conducted during which three golden eagle observations were recorded during three of the sessions. Individual observation times ranged between 1 minute and 2 minutes, rounded up to the nearest whole minute. Of the recorded use within the Phase I portion of the Chokecherry WDA, 75% occurred outside the RSZ.

Surveys for the Phase I portion of the Sierra Madre WDA were conducted at 18 locations for a total of 5,400 minutes (90 hours) during the June 24 to August 30, 2013, survey period. During this survey period, a golden eagle was observed in flight for 1 minute or 0.0002 flight minutes per minute of survey. In total, 90 survey sessions were conducted during which one golden eagle was observed during one of the sessions. The observation time for this individual was 1 minute, which occurred within the RSZ. No flight minutes occurred outside the RSZ for the Phase I portion of the Sierra Madre WDA during this survey session.

Table 5.7. Survey Minutes and Golden Eagle Use for Phase I, June to August 2013.

Phase I	Survey Location	Survey Minutes	Number of Individual Golden Eagles Observed	Golden Eagle Flight Minutes	Golden Eagle Use Minutes within 0-30m Altitude	Golden Eagle Use Minutes within 30-150m (RSZ) Altitude	Golden Eagle Use Minutes above 150m Altitude
Chokecherry WDA	CC2	300	0	0	0	0	0
	CC3	300	1	1	1	0	0
	CC4	300	0	0	0	0	0
	CC5	300	1	1	0	1	0
	CC6	300	0	0	0	0	0
	CC7	300	0	0	0	0	0
	CC9	300	0	0	0	0	0
	CC10	300	0	0	0	0	0
	CC11	300	0	0	0	0	0
	CC12	300	0	0	0	0	0
	CC13	300	1	2	2	0	0
	RM7	300	0	0	0	0	0
	RM12	300	0	0	0	0	0
Sierra Madre WDA	MH1	300	0	0	0	0	0
	MH2	300	0	0	0	0	0
	MH3	300	0	0	0	0	0
	MH4	300	0	0	0	0	0
	MH5	300	0	0	0	0	0
	MH6	300	0	0	0	0	0
	MH7	300	0	0	0	0	0
	MH8	300	0	0	0	0	0
	PG1	300	0	0	0	0	0

Phase I	Survey Location	Survey Minutes	Number of Individual Golden Eagles Observed	Golden Eagle Flight Minutes	Golden Eagle Use Minutes within 0-30m Altitude	Golden Eagle Use Minutes within 30-150m (RSZ) Altitude	Golden Eagle Use Minutes above 150m Altitude
	PG2	300	0	0	0	0	0
	PG3	300	0	0	0	0	0
	PG4	300	0	0	0	0	0
	PG5	300	0	0	0	0	0
	PG7	300	0	0	0	0	0
	PG8	300	0	0	0	0	0
	PG9	300	0	0	0	0	0
	PG10	300	0	0	0	0	0
	RM14	300	1	1	0	1	0
Total		**9,300**	**4**	**5**	**3**	**2**	**0**

Avian Radar Survey Analysis

As stated in section 5.1.1, the avian radar system ran continuously from March 2011 through March 2013 and was deployed at nine different locations across the CCSM Project Site, including three within the Phase I Development Area that covered 100% of the Phase I wind turbine locations. *See Figure 5.5.* During this time, the radar collected data on all avian and bat species that crossed through the scanning radius of the HSR and VSR, whether they were individual targets, small flocks, or broad front migratory movements.

Two primary factors, however, limit the use of this avian radar data for purposes of identifying patterns of eagle use. First, radar technology cannot detect avian use when it occurs in close proximity to topographic relief that reflects the radar signature. Avian use can only be detected and recorded when there is a minimal amount of backscatter from the radar. For this reason, many of the topographic features commonly associated with eagle use (ridgelines, cliffs, etc.) cannot be mapped using the avian radar system. Second, current avian radar technology is unable to distinguish between different avian and bat species. Data for each target identified by the radar is recorded as a series of more than 60 variables based on different measures of recorded pixel size and shape. These variables can differ greatly within species and even for a single individual; therefore, it is not possible to definitively determine species from the dataset recorded by the radar system. Targets could be grouped based upon their relative size, but this can be problematic as well due to variance in individuals and overlap in variable values between species.

While the radar is not able to identify targets to species level or component group, it is possible to apply species-specific tags to individual birds through radar validation surveys. Therefore, PCW conducted radar validation surveys to enhance the usefulness of the avian radar data. These surveys were conducted in real-time in the field as the radar was operating, and involved communication between a biologist in the field and one at the radar to add the species-specific tags to individual targets being tracked by the radar. Golden eagles that were tagged during radar validation surveys at the Upper Iron Springs radar location in 2011 were very helpful in capturing use around two of the occupied nests along the Bolten Rim. When flight path data from golden eagles tagged near the two occupied nests along the Bolten Rim were analyzed through a utilization distribution analysis similar to the one described in "Long-watch Raptor Survey Analysis," the analysis showed that the vast majority of activity occurred south of the nest locations over the Sage Creek Basin, not north of the nests over the Chokecherry WDA.

At this time, while avian radar data from validated targets is helpful in determining use, raptor count and long-watch raptor surveys are more effective at determining species-level use across a project site. Of note, however, is that the radar dataset was essential in the analysis of broad-front migratory movements across the CCSM Project Site, including Phase I, as described in the Phase I BBCS and associated avian radar reports. *See DeTect, Inc. 2012; DeTect, Inc. 2013; PCW 2015a.*

5.2.2 Eagle Nest Analysis

In five years of conducting nest surveys for the CCSM Project, (2008 and 2011-2014), only two occupied golden eagle nests were located within Phase I Turbine Build Areas. One occupied nest was located along the northern boundary of the Phase I Turbine Build Area of the Chokecherry WDA in 2008, and the other occupied nest was located along the southwestern boundary of the Phase I Turbine Build Area of the Sierra Madre WDA in 2011. No bald eagle nests were located within Phase I Turbine Build Areas in any of the five years of aerial nest surveys. The closest bald eagle nest is located approximately 1600 meters (1 mile) southeast of Phase I near Rasmussen Reservoir and was occupied in 2011, 2012, 2013, and 2014. The results of the CCSM Project nest surveys are summarized below; detailed data on occupied eagle nests located during 2008 and 2011–2014 nest surveys can be found in Appendix D.

As described in section 5.1.2, BLM has collected information on nests within the CCSM Project Site since 1980 (a 33-year period) and helicopter-based aerial nest surveys have been completed for the CCSM Project, including Phase I, for five years (2008, 2011, 2012, 2013 and 2014). There is a large variance in the current condition of historic eagle nests within the CCSM Project Site. Many of the historic nests recorded by BLM are in poor condition as observed and documented during aerial flights conducted by PCW. Nests in poor condition are less likely to be used for nesting because they require an extensive rebuild in order to be used for future nesting activities and because nearby alternate nests in good condition are often available. *See Figure 5.9 & Figure 5.10.*

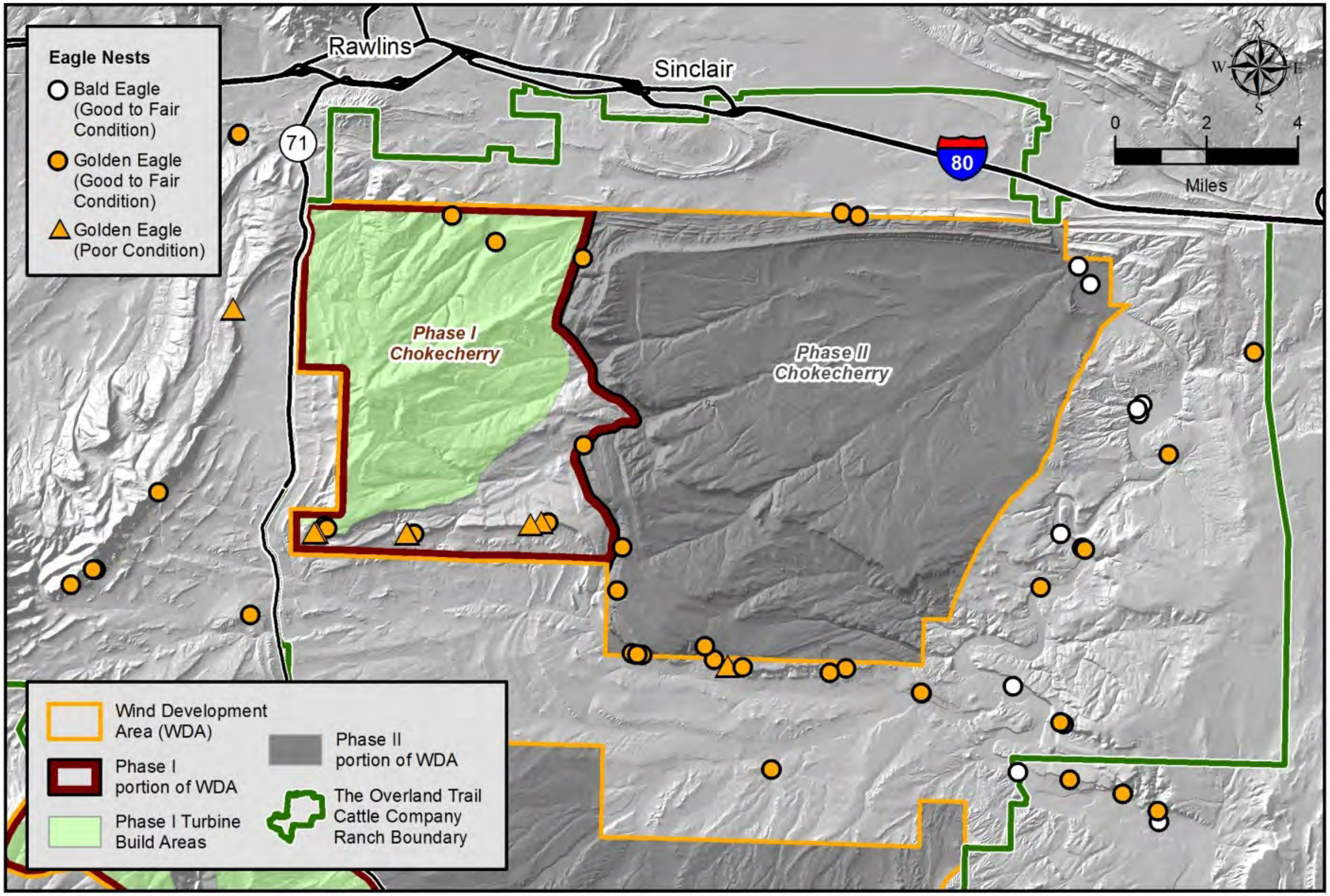

Figure 5.9. Phase I Chokecherry WDA Eagle Nest Locations (1980 to 2014). Condition determined by PCW through aerial surveys.

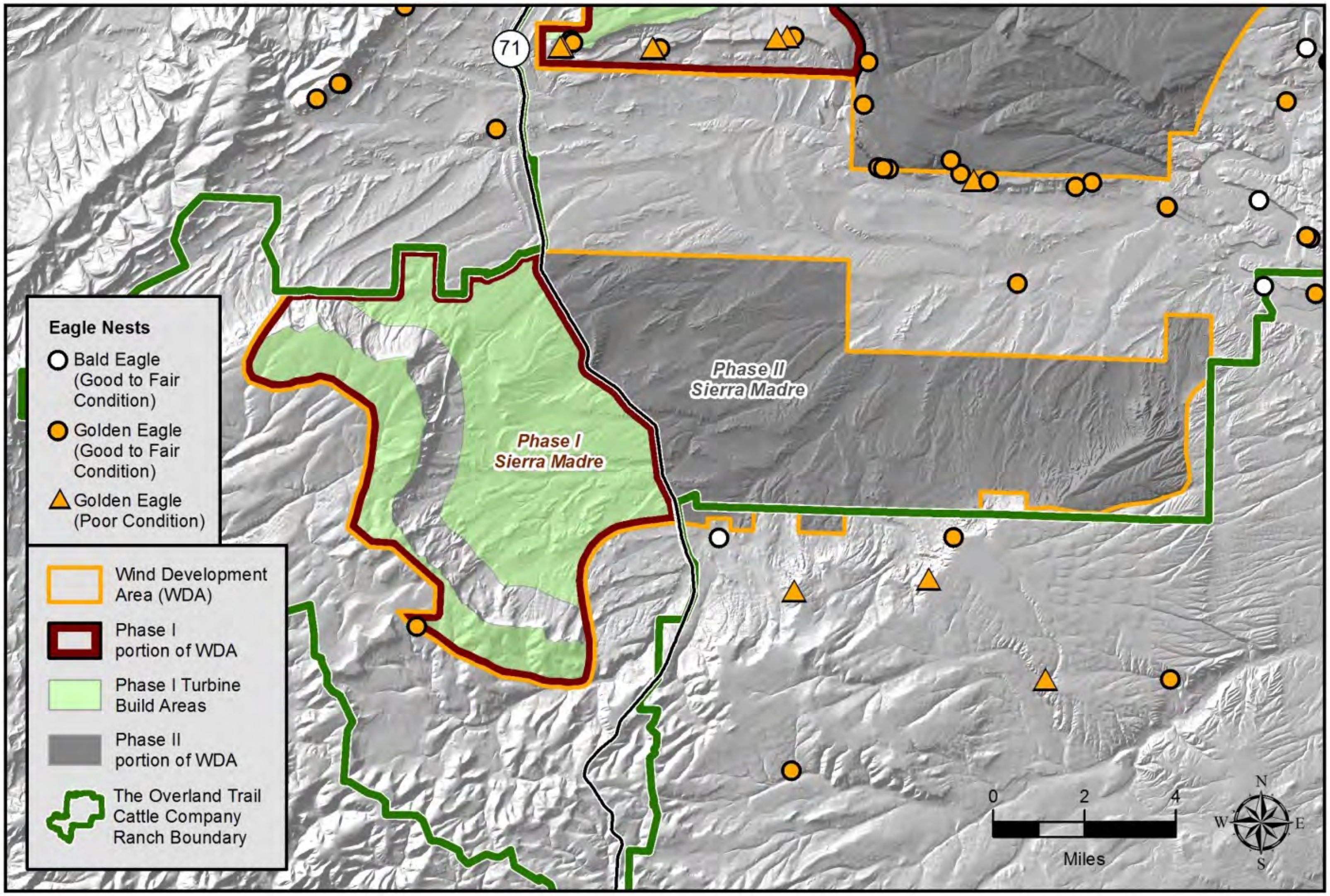

Figure 5.10. Phase I Sierra Madre WDA Eagle Nest Locations (1980 to 2014). Condition determined by PCW through aerial surveys

During the 2008 nest surveys, a total of 24 occupied raptor nests were located, three of which were used by golden eagles. *See Figure 5.11. See Appendix D*. Of the three occupied golden eagle nests, only one was located within the Phase I Turbine Build Areas. The one occupied golden eagle nest was located within the Phase I Turbine Build Area of the Chokecherry WDA on a northwest facing cliff band. The other occupied golden eagle nests were located outside of Phase I, one on the Bolten Rim and the other along the hogback north of the Chokecherry WDA. *See Figure 5.11.* No occupied golden eagle nests were identified in 2008 in the Sierra Madre WDA. Surveys in 2008 did not locate any occupied bald eagle nests, but did not include the North Platte River corridor because it was outside the original Study Area.

During the 2011 nest surveys, only one occupied golden eagle nest was located near the southwestern boundary of Phase I. *See Figure 5.12 & Figure 5.13.* An additional seven occupied golden eagle nests were located within the CCSM Project 8-kilometer (5-mile) wind turbine buffer that was flown during the nest surveys; however none of these were located within the WDAs and all occurred between 10.3 and 26.6 kilometers (6.4 and 16.5 miles) from Phase I. No bald eagle nests were located within Phase I. Four bald eagle nests were located within the Ranch and 8-kilometer (5-mile) buffer, but most were along the North Platte River between 17.7 and 21.2 kilometers (11.0 and 13.2 miles) from Phase I. One of the occupied bald eagle nests was located south of Rasmussen Reservoir, approximately 1600 meters (1 mile) southeast of Phase I. *See Figure 5.13.*

The one occupied golden eagle nest located in 2011 near the southwestern boundary of Phase I was located near the Red Rim-Grizzly WHMA on a small ledge along the southwest face of a small, pyramid-shaped mesa. Eagle flight path data collected during 2011 when the nest was occupied indicates that the majority of the observed eagle activity occurred south and west of the nest location in an area with documented greater sage-grouse use and pronghorn fawning activities. Very little eagle use was observed north and east of this nest within the Phase I Turbine Build Areas. With respect to the occupied bald eagle nest located south of Rasmussen Reservoir, very little bald eagle use was documented in Phase I during the time this nest was occupied. Most of the observed use associated with this nest occurred between the nest and Rasmussen Reservoir, where waterbirds/waterfowl create foraging opportunities for this pair of eagles. The use associated with this nest led to the development of the Rasmussen Reservoir Turbine No-Build Area. *See Section 6.2.7.*

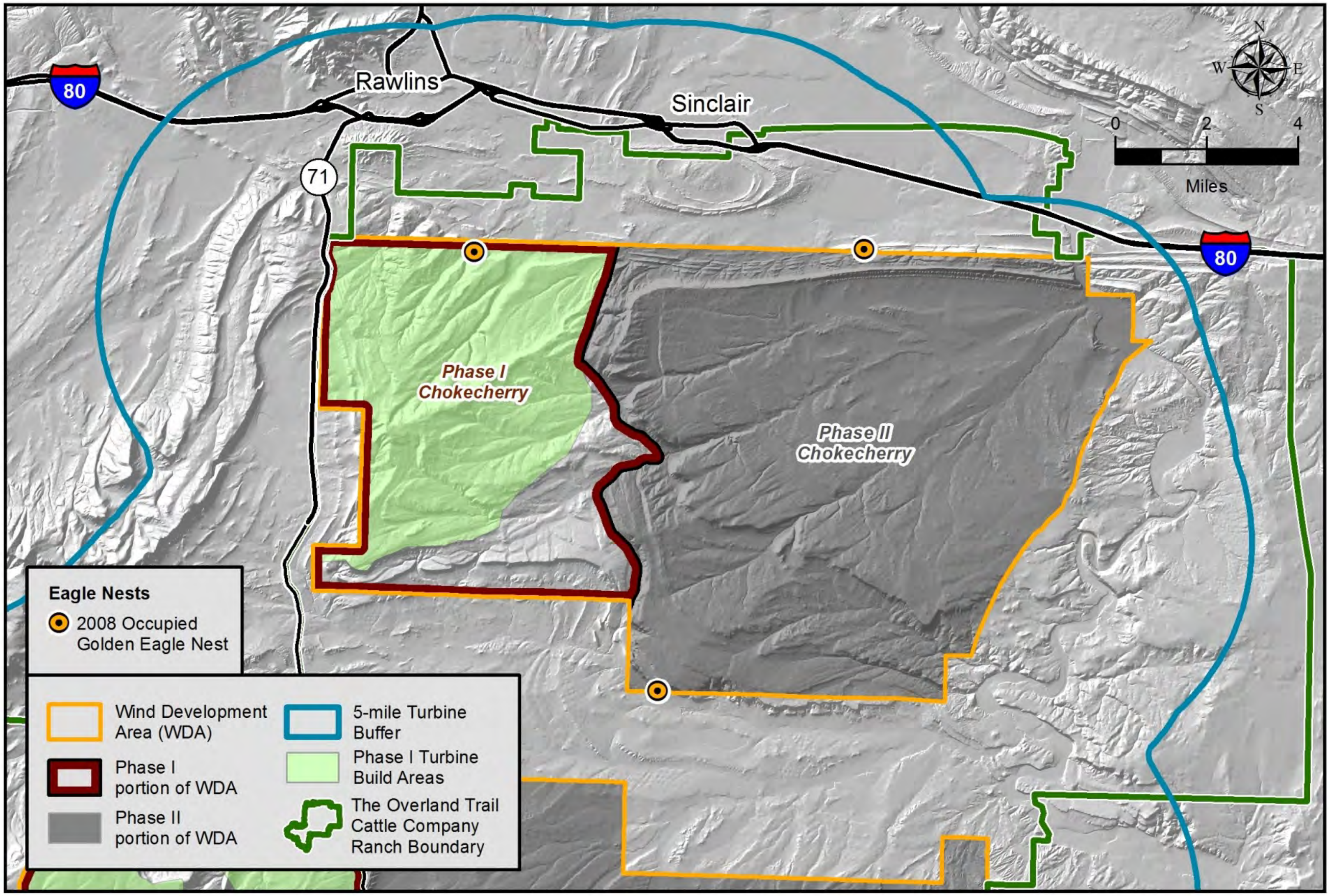

Figure 5.11. Occupied Golden Eagle Nests, 2008.

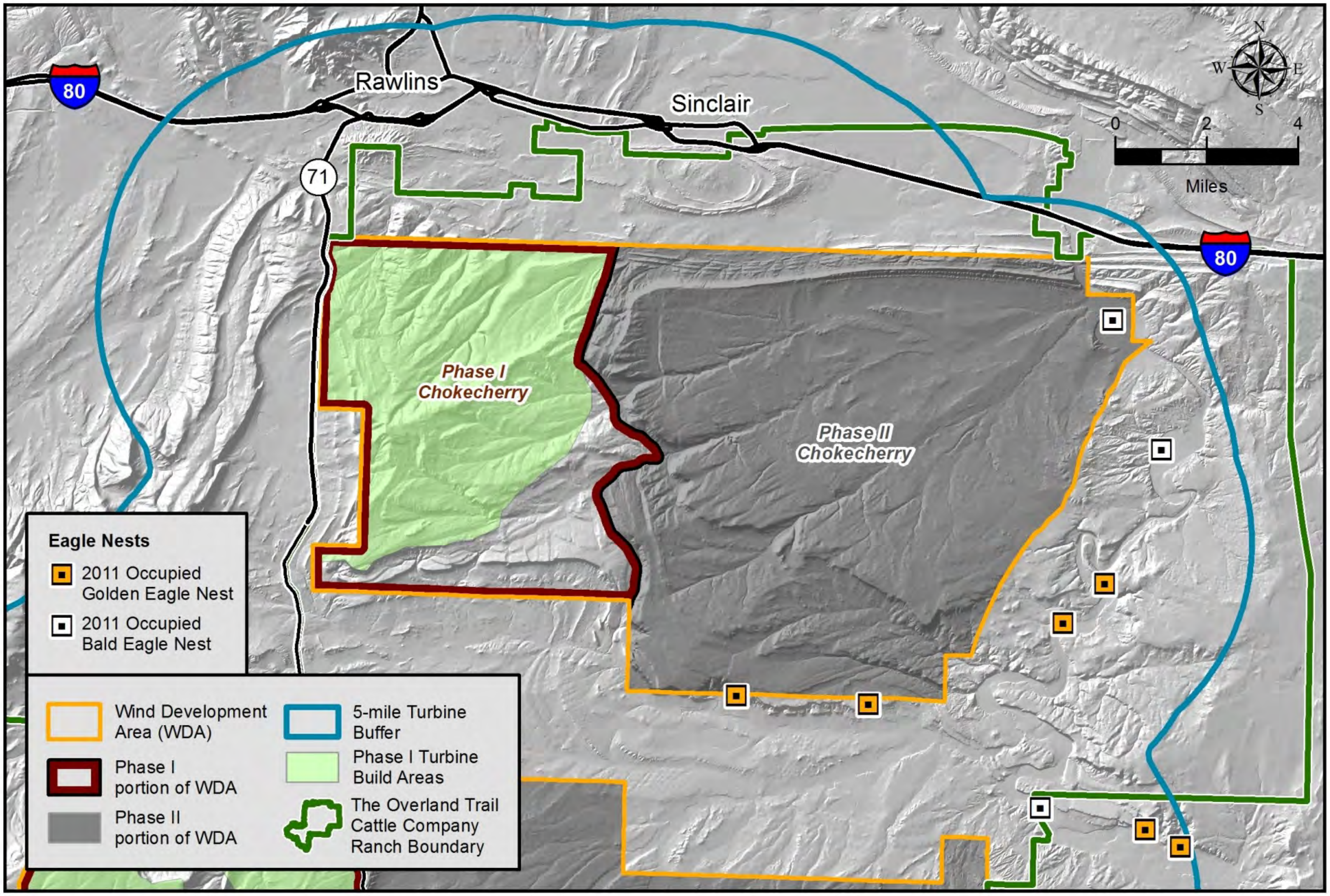

Figure 5.12. Chokecherry WDA Occupied Eagle Nests, 2011.

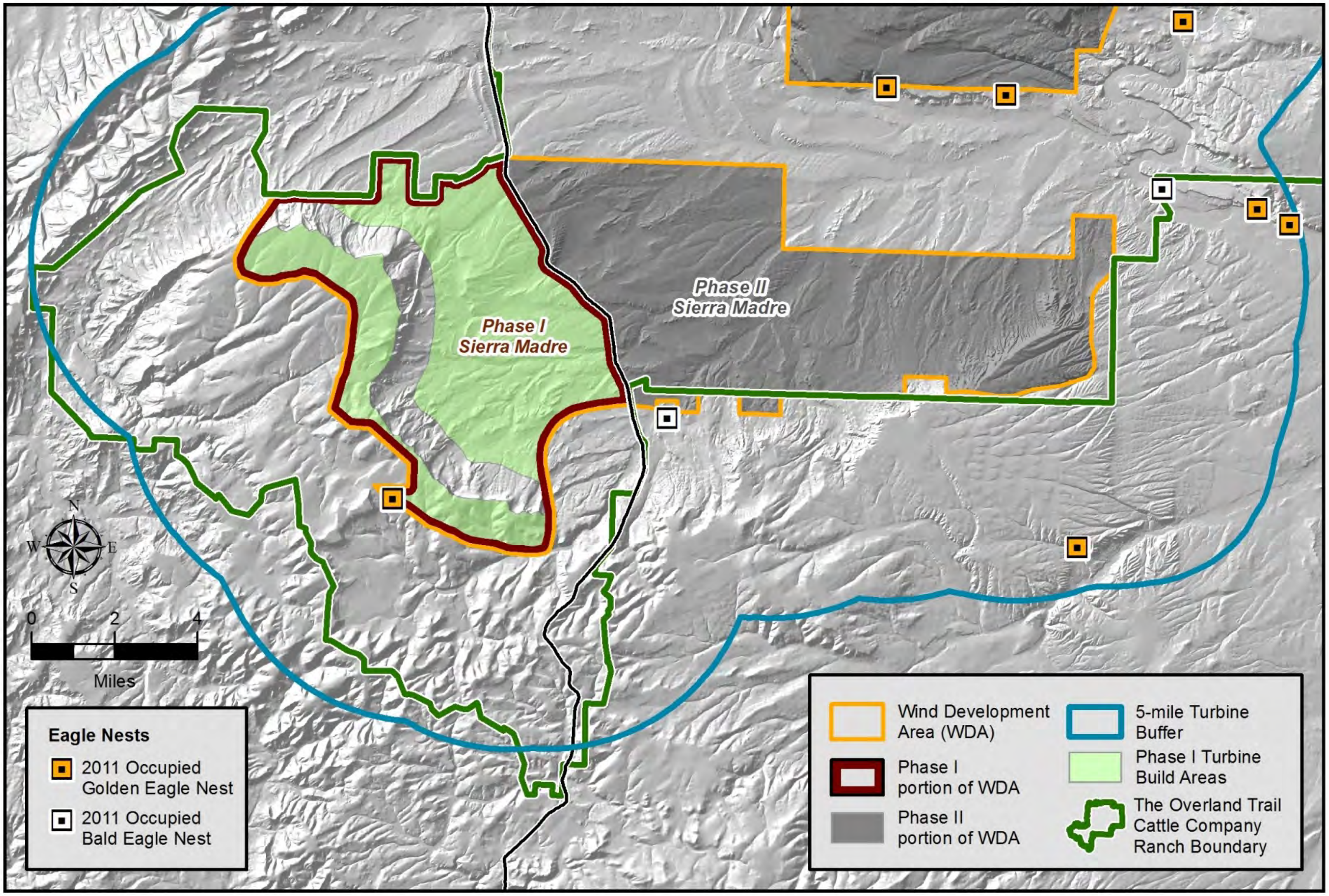

Figure 5.13. Sierra Madre WDA Occupied Eagle Nests, 2011.

During the 2012 nest surveys, no occupied golden eagle or bald eagle nests were located within Phase I. *See Figure 5.14 & Figure 5.15.* A total of seven occupied golden eagle nests (two nests were likely nesting attempts by the same pair) and 6 occupied bald eagle nests were located within the CCSM Project 8-kilometer (5-mile) wind turbine buffer, with most of the occupied eagle nests occurring along the North Platte River. The occupied golden eagle nests ranged between 8.7 and 23.8 kilometers (5.4 and 14.8 miles) from Phase I. Most of the occupied bald eagle nests were located between 17.7 and 21.2 kilometers (11.0 and 13.2 miles) from Phase I; however, the occupied bald eagle nest located south of Rasmussen Reservoir in 2011 and discussed above was recorded as occupied again in 2012.

During the 2013 nest surveys, no occupied golden eagle or bald eagle nests were located within Phase I. *See Figure 5.16 & Figure 5.17.* A total of seven occupied golden eagle nests and seven occupied bald eagle nests were located within the CCSM Project 8-kilometer (5-mile) wind turbine buffer; however, none of these occupied eagle nests occurred within the WDAs and most were located along the North Platte River. An additional active golden eagle territory was identified in northern Sage Creek Basin near Sage Creek Reservoir; however, no nest initiation was detected at this location and it was considered unoccupied. The occupied golden eagle nests ranged between 7.9 and 22.4 kilometers (4.9 and 13.9 miles) from Phase I. Most of the occupied bald eagle nests were located between 17.2 and 25.9 kilometers (10.7 and 16.1 miles) from Phase I. The bald eagle nest located south of Rasmussen Reservoir outside of Phase I that was recorded as occupied in 2011, 2012, was occupied again in 2013.

During the 2014 nest surveys, no occupied golden eagle or bald eagle nests were located within the Phase I Turbine Build Areas. *See Figure 5.18 & Figure 5.19*. A total of sixteen occupied golden eagle nests and seven occupied bald eagle nests were located within the CCSM Project 8-kilometer (5-mile) wind turbine buffer. As in previous years, the highest density of occupied eagle nests, seven bald eagle and six golden eagle, was located along the North Platte River. Six of the occupied golden eagle nests were located along the Bolten Rim; of these, two were on the eastern half of the Bolten Rim and are 8.5 and 14.0 kilometers (5.3 and 8.7 miles) from Phase I Turbine Build Areas and the remaining four were on the western half of the Bolten Rim between 2.9 and 3.5 kilometers (1.8 and 2.2 miles) from the Phase I Turbine Build Areas. One occupied golden eagle nest was located on a small cliff in the Sage Creek Basin between the Chokecherry and Sierra Madre WDAs in a Turbine No-Build Area approximately 14.6 kilometers (9.1 miles) from Phase I. Two occupied golden eagle nests were located along the Atlantic Rim, approximately 6.8 and 8.7 kilometers (4.2 and 5.4 miles) from Phase I. None of the occupied eagle nests were located within the Sierra Madre WDA. However, two occupied golden eagle nests were located south of the Sierra Madre WDA 8.4 and 11.4 kilometers (5.2 and 7.1 miles) from Phase I. The bald eagle nest that was occupied in 2011, 2012 and 2013, located approximately 600 meters (0.4 miles) south of the Sierra Madre WDA and 3.9 kilometers (2.4 miles) from Phase I, was occupied again in 2014. This occupied bald eagle nest is located immediately south of the Turbine No-Build Area surrounding Rasmussen Reservoir that was created to avoids and minimizes impact to foraging and use areas associated with the nest.

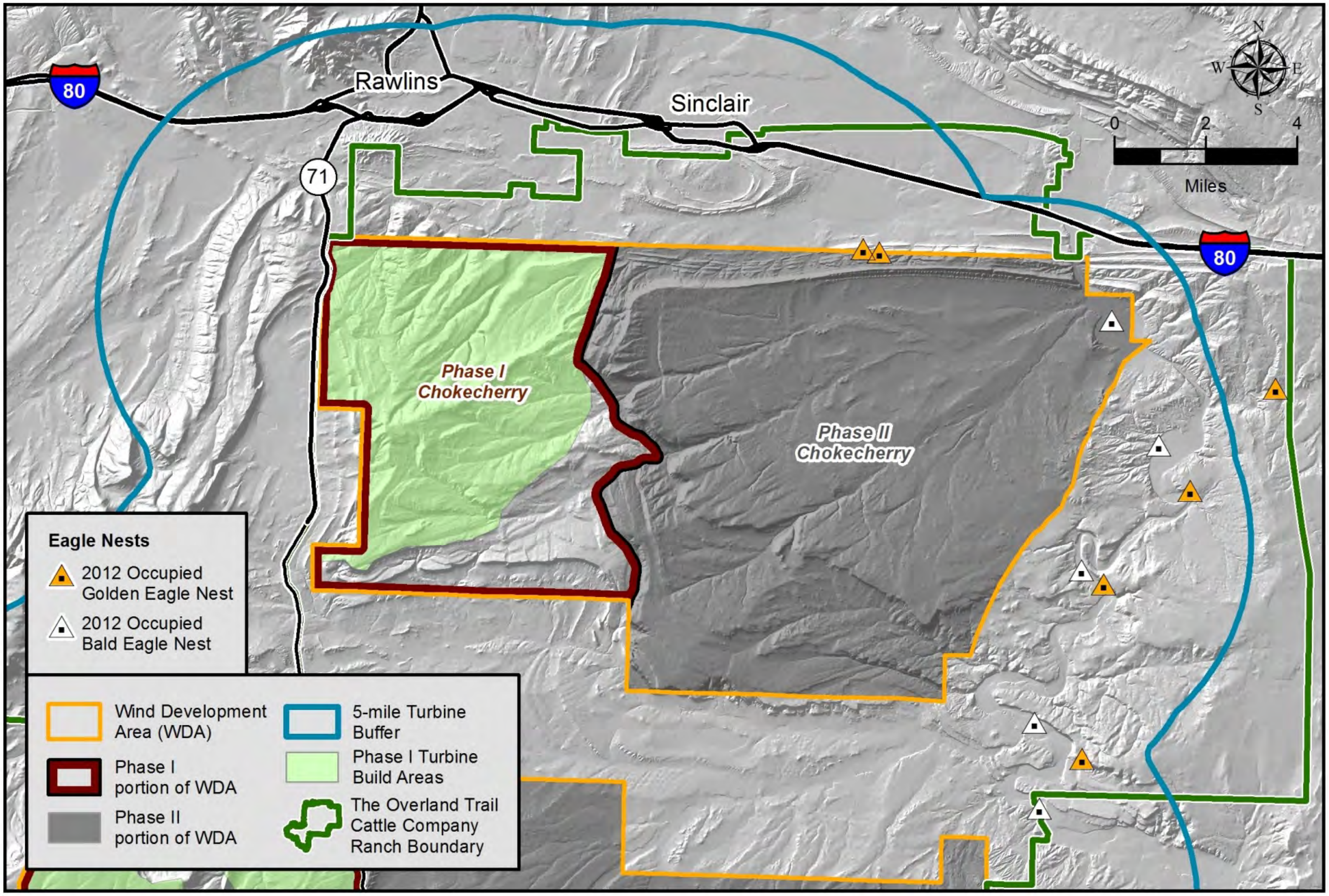

Figure 5.14. Chokecherry WDA Occupied Eagle Nests, 2012.

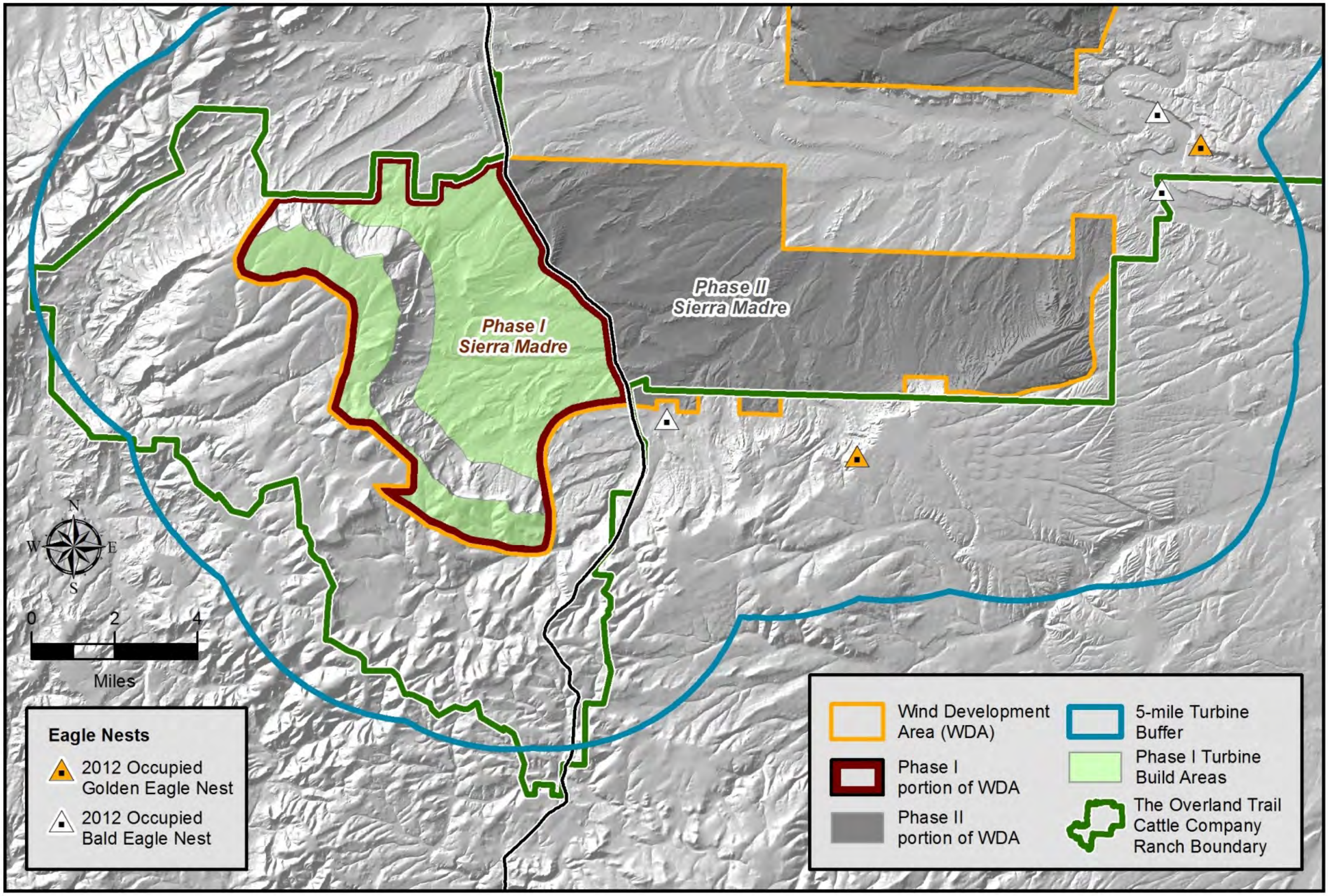

Figure 5.15. Sierra Madre WDA Occupied Eagle Nests, 2012.

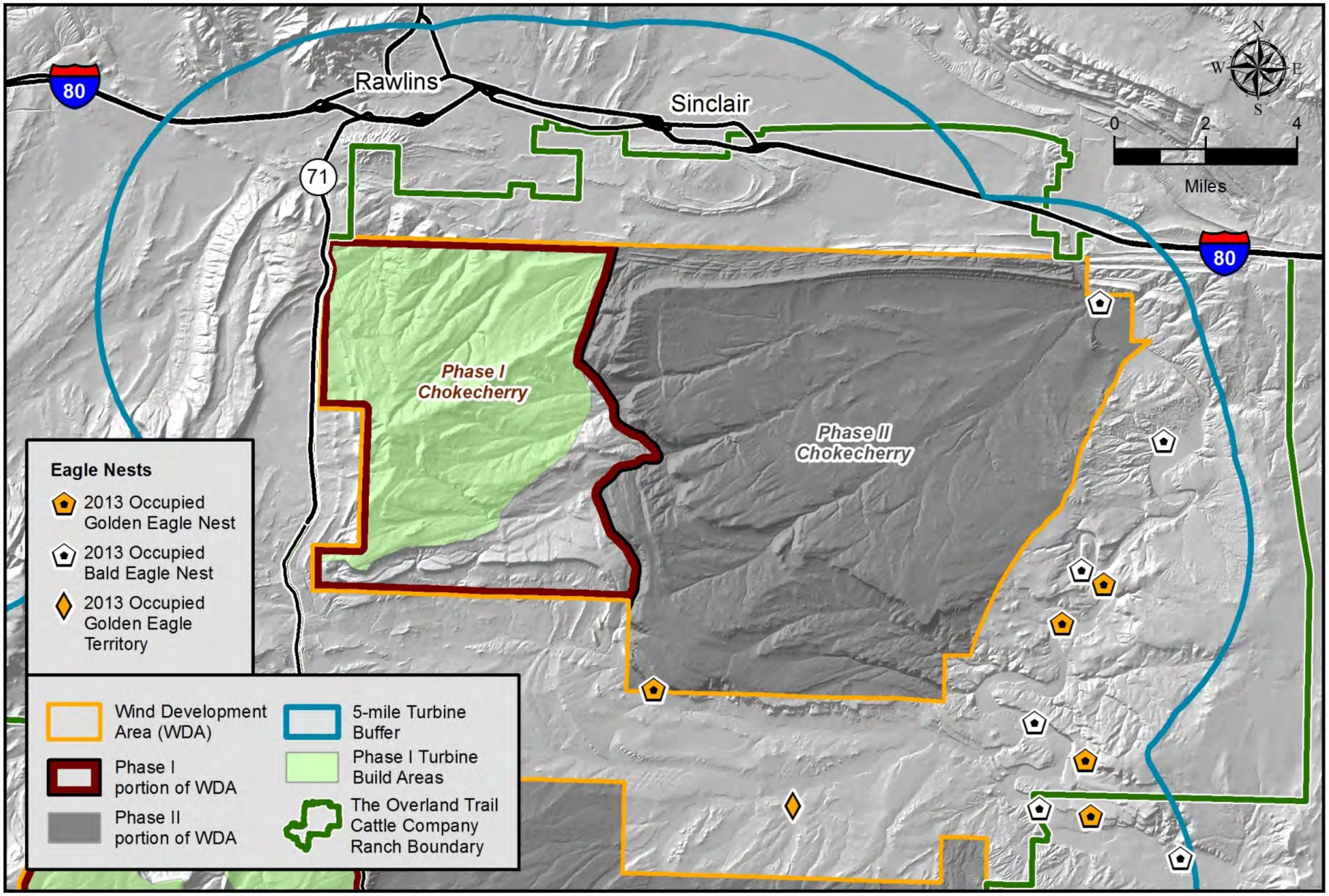

Figure 5.16. Chokecherry WDA Occupied Eagle Nests, 2013.

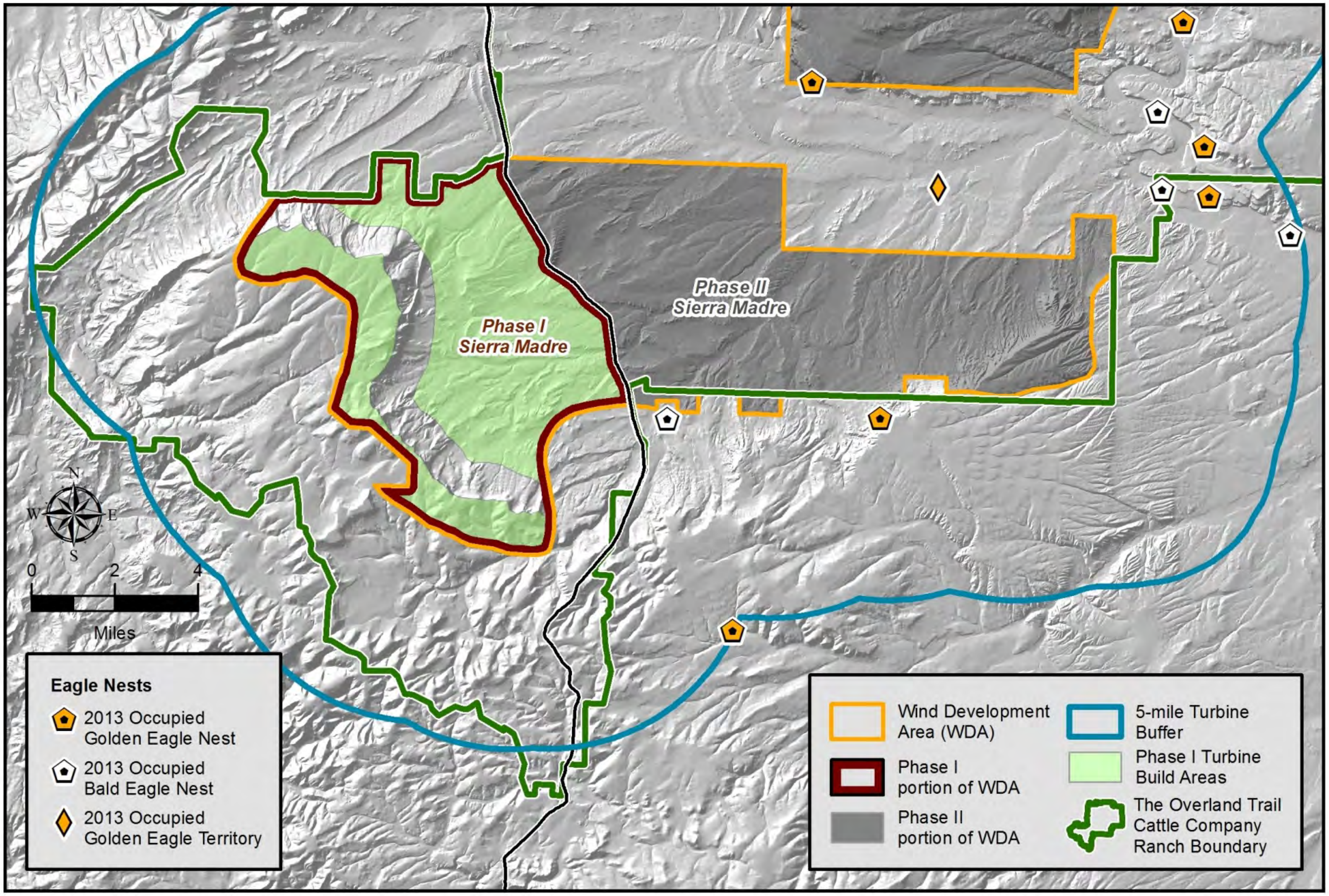

Figure 5.17. Sierra Madre WDA Occupied Eagle Nests, 2013.

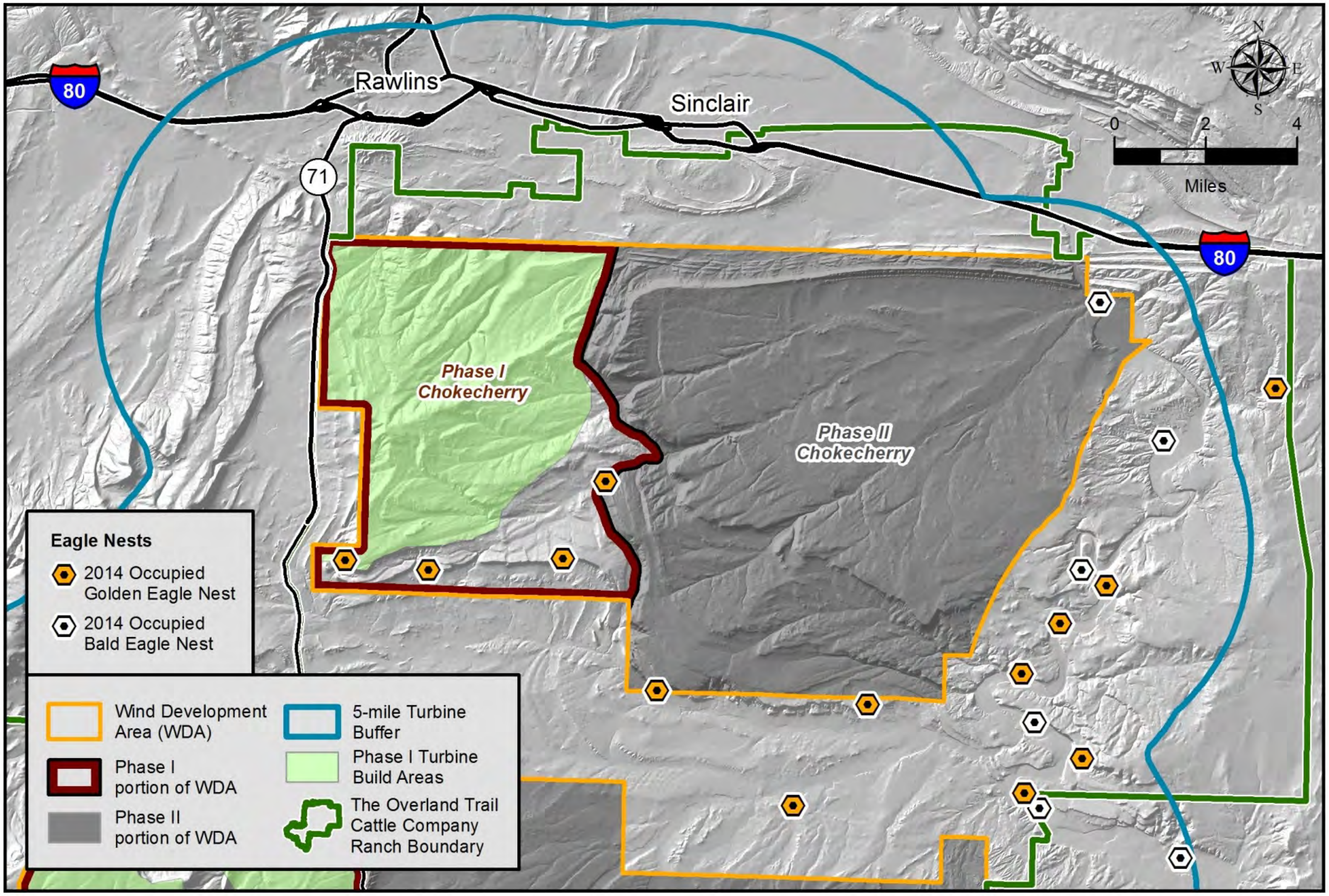

Figure 5.18. Chokecherry WDA Occupied Eagle Nests, 2014.

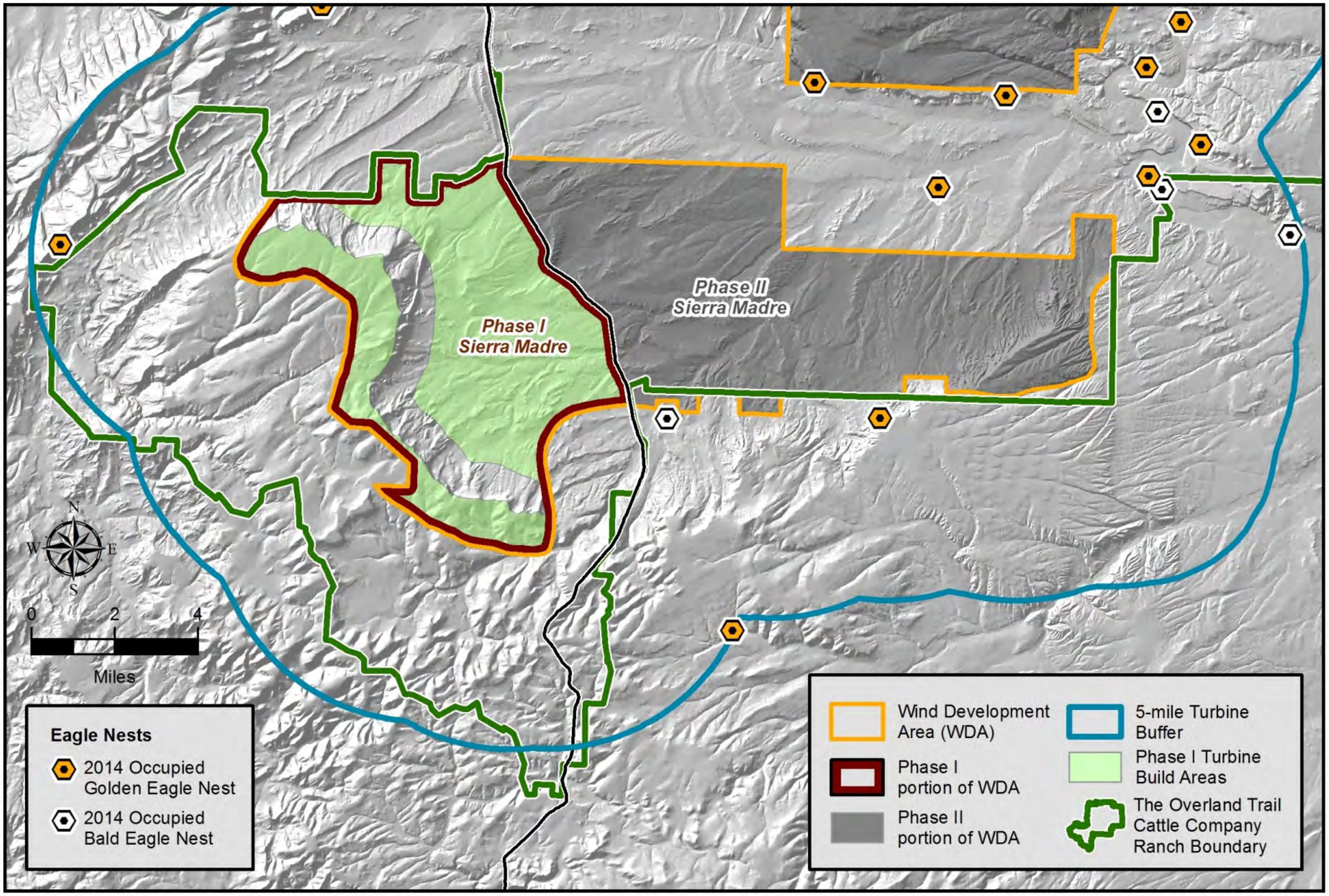

Figure 5.19. Sierra Madre WDA Occupied Eagle Nests, 2014.

5.2.3 Communal Roost Location Analysis

No communal eagle roosts have been identified within Phase I, the CCSM Project Site or the CCSM Project 8-kilometers (5-mile) wind turbine buffer and survey area. *See Appendix E*. No roost locations were identified during ground-based surveys or during aerial reconnaissance flights in winter 2011, 2012, and 2013. Further, no communal eagle roosts were located during the 2013 aerial surveys that focused on the highest probability locations for potential roosts (i.e., North Platte River corridor, along Bolten Rim, etc.).

These communal eagle roost survey results are consistent with the habitat available on and adjacent to the CCSM Project Site as there are very few forested areas or areas with trees large enough to support a communal eagle roost. The North Platte River corridor, located more than 16 kilometers (10 miles) from Phase I, is the only area within the CCSM Project survey area that has any potential to support a communal roost as it has scattered galleries of cottonwood trees, adjacent cliffs that provide some protection from inclement weather conditions, and potential prey during periods when the river is not frozen over. However, during winter aerial surveys of the area, only two individual bald eagles were observed along the North Platte River corridor. Further, during other winter wildlife surveys, only occasional incidental observations of individual bald eagles were made. Outside of the North Platte River corridor, no other areas of the CCSM Project Site have suitable habitat to support a communal eagle roost as the available trees are too small and scattered, there is little protection from inclement weather, and there are few consistent prey sources to support a large number of wintering eagles. *See Appendix E & F*.

The findings of PCW's communal roost surveys are consistent with data that have been collected by BLM across the entire RFO planning area as described by USFWS in the 2007 Biological Opinion for the RFO Resource Management Plan. *See BLM 2008a, App. 14.* The Biological Opinion identified that only two communal winter roosts are known in the RFO, one in the San Pedro Mountains in the northern portion of the RFO and one in the riparian forests along the Little Snake River in the southern portion of the RFO. *See BLM 2008a, App. 14.* These locations are 48 to 64 kilometers (30 to 40 miles) from the CCSM Project Site.

5.2.4 Prey Base Analysis

Prey base assessments were conducted throughout the CCSM Project Site and adjacent land from April 2011 to August 2013. Prey base surveys were conducted to identify areas containing prey densities sufficient for eagle and large raptor foraging activities. A summary of the CCSM Project Site prey base assessments is included below. Complete reports on prey base surveys and assessments are located in Appendix F.

White-tailed Prairie Dogs (WTPD)

WTPD are generally available as prey for eagles only from mid-March through late October and are considered prey resources for eagles during nesting and summer use periods. *See Keinath 2004.* WTPD are unavailable as prey beginning in late July as they enter their burrows. *See Clark and Stromberg 1987.* Peak activity occurs from late May when juveniles emerge from burrows to late July when adult males begin to descend into burrows. Adult females descend two to three weeks later than males in the fall and emerge two to three weeks later in the spring. Juveniles begin to hibernate in late October or early November. *See Keinath 2004*.

The CCSM Project Site, including Phase I, provides small, scattered pockets of prairie dogs that likely provide only low foraging potential for raptors and eagles. Reconnaissance surveys in 2012 identified relatively low densities of active and total WTPD burrows across the CCSM Project Site, including Phase I. *See Appendix F.* Active burrows ranged from zero per acre in the higher elevations of Upper Miller Hill and Sage Creek Rim to 3.3 active burrows per acre in the colonies in northern Sage Creek Basin just below the Bolten Rim. Highest burrow densities were located outside of the WDAs. All burrow densities within Phase I are at the lower end of the range of conditions reported for other WTPD colonies, supporting the conclusion that WTPD are not an important forage source for eagles across much of the CCSM Project Site, including Phase I. *See Menkens et al. 1987; Clark and Stromberg 1987.*

In 2013, full-scale WTPD surveys were conducted throughout Phase I. No WTPD colonies were recorded within the Phase I portion of the Chokecherry WDA; however, eleven colonies were found north of the Chokecherry WDA between Interstate 80 and the hogback, and one colony was located approximately 6.4 kilometers (4.0 miles) east of Phase I. *See Figure 5.20. See Appendix F.* Of the eleven colonies between Interstate 80 and the hogback, ten were clustered in close proximity. *See Figure 5.20.*

Surveys in 2013 on Upper Miller Hill identified eight WTPD colonies, all very small and all within an approximately 2.9-kilometer (1.8-mile) stretch of the northern portion of the Miller Hill rim. *See Figure 5.21. See Appendix F.* WTPDs or signs of recent activity were noted at three of the eight colonies; therefore, these are deemed active colonies. Two of the three active colonies contained only one active burrow and the population size of the other colony was estimated as being between 1 and 5 prairie dogs based on observations of individuals and burrowing activity. The collective acreage for all three active prairie dog colonies was 3.7 acres (average of less than 1 acre per colony). Five colonies, each consisting of a single prairie dog burrow, were determined to be inactive due to the lack of WTPDs or signs of recent activity.

A total of 127 WTPD colonies were identified in the Lower Miller Hill portion of the 2013 survey area. *See Figure 5.21*. *See Appendix F*. Of the 127 colonies identified, 28 colonies were determined to be inactive. The remaining 99 colonies had at least one prairie dog present or a burrow with sign of recent activity. Of the 99 active colonies, 43 colonies were less than 5 acres in size and were located in scattered or loosely associated groups and 14 were identified as having burrow densities of less than five burrows per acre with very few individuals. These 57 active colonies are not considered to be important prey resources for eagles due to their small populations, ephemeral nature, and lack of observed use by eagles. The remaining 42 active colonies in Lower Miller Hill were more than five acres in size and had burrow densities of more than five burrows per acre.

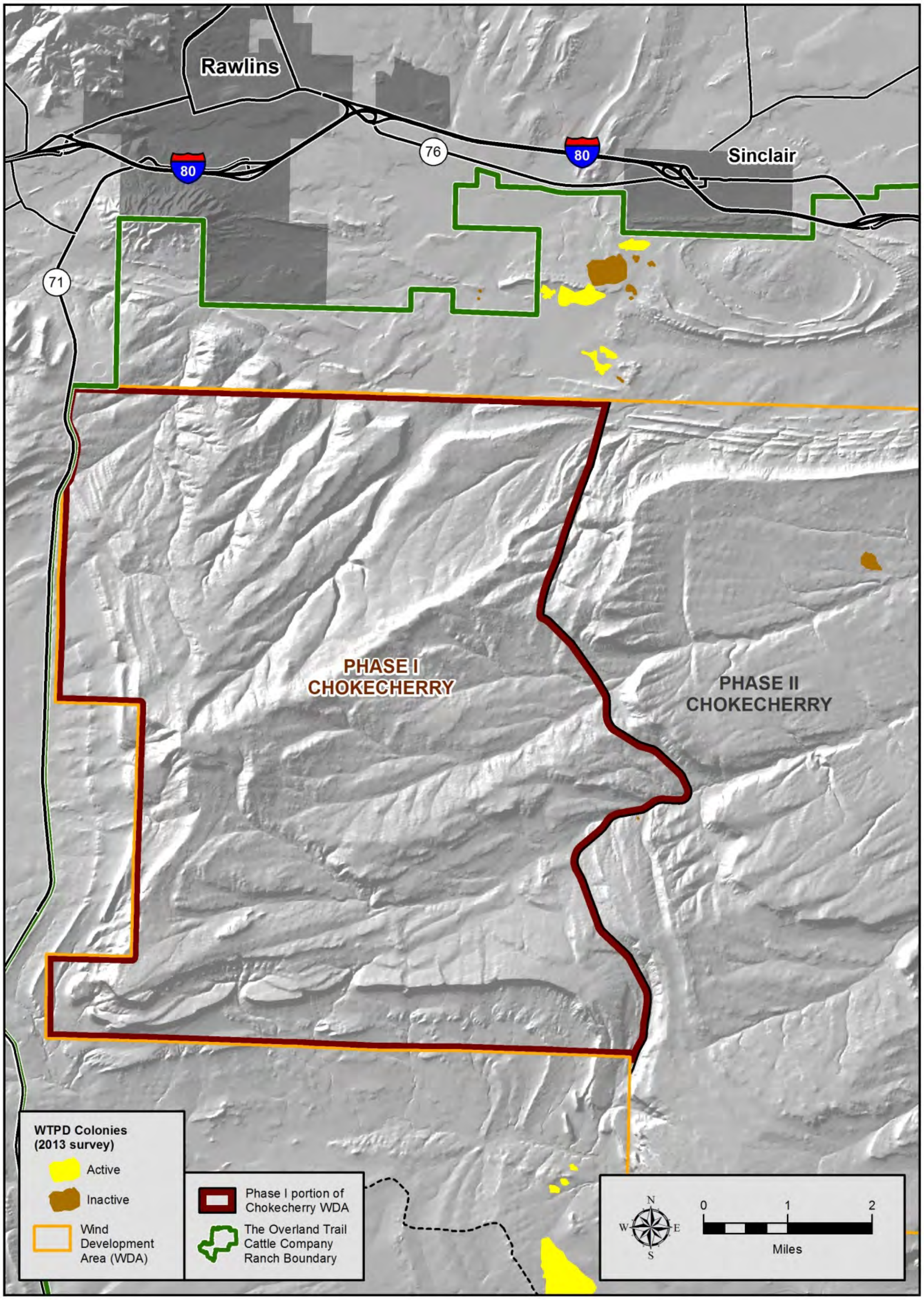

Figure 5.20. Phase I Chokecherry WDA White-tailed Prairie Dog Colonies.

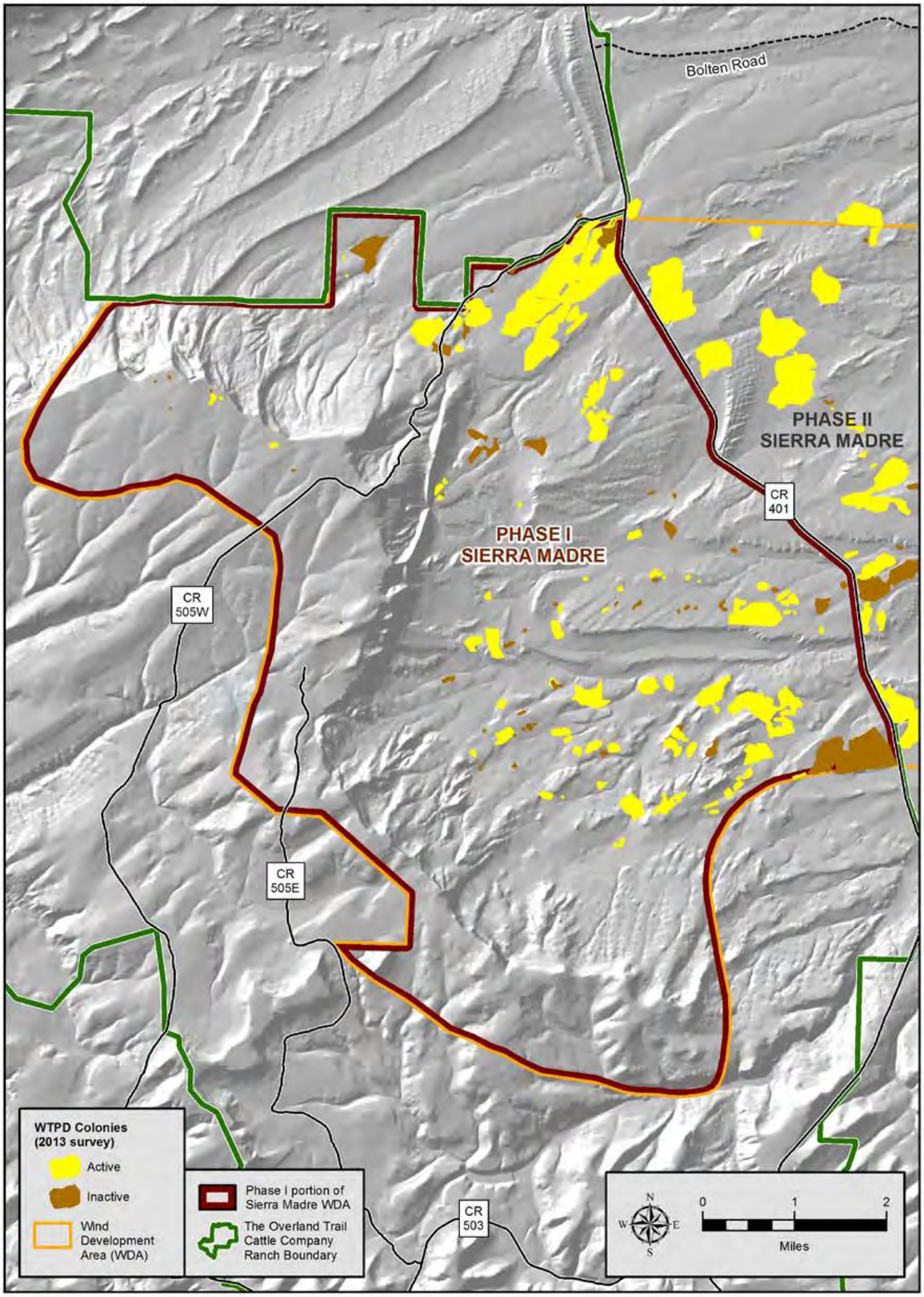

Figure 5.21. Phase I Sierra Madre WDA White-tailed Prairie Dog Colonies.

Waterbirds/Waterfowl

Waterfowl and waterbirds provide seasonal foraging opportunities for bald and golden eagles at the four major reservoirs (Kindt, Rasmussen, Sage Creek, and Teton) located on the Ranch, as well as along the North Platte River corridor. Three of the four reservoirs and the North Platte River are located outside of the WDAs; Rasmussen Reservoir is located within the Phase II portion of the Sierra Madre WDA. Waterfowl /waterbirds are available as a forage source from early spring through late fall during periods when the reservoirs and the river are ice-free; however, the highest concentration of waterbird/waterfowl species occurs during the fall when nesting is completed and adults and juveniles of many species aggregate on the reservoirs to prepare for southerly migration.

Waterbird/waterfowl surveys were conducted in 2011 during spring (April 26–May 4), summer (August 23–24), and fall (October 20–21) at each of the four reservoirs located on the Ranch. *See Appendix G.* Spring waterbird/waterfowl surveys resulted in a total count of 1,415 individuals representing 35 species. American coot (*Fulica americana*) was the most abundant species accounting for 364 individuals (26% of total count). Scaup (*Aythya* sp.), *Aechmophorus* grebes (i.e., western and Clark's), and eared grebe (*Podiceps nigricollis*) were the next most abundant species with 351, 209, and 113 individuals, respectively. Collectively, those four groups accounted for 1,037 individuals or 73% of all birds detected. More species and individuals were counted at Kindt Reservoir (25 species, 808 individuals) than the other three reservoirs. The fewest species and number of individuals (12 species, 165 individuals) were recorded at Sage Creek Reservoir during spring surveys.

In total, 1,708 individuals representing 29 species were recorded on summer waterbird/waterfowl surveys. Redhead (*Aythya americana*) had the highest number of individuals (815) accounting for 48% of all birds detected during summer surveys. Lesser scaup (*Aythya affinis*), mallard (*Anas platyrhynchos*), and American coot were the next most abundant species with 157, 149, and 99 individuals, respectively. Collectively, those four species accounted for 1,221 individuals or 71% of all birds detected. The highest number of individuals (920) was recorded at Rasmussen Reservoir, where 89% (780 individuals) were redheads. Nearly all of the season's redheads (780 of 815) were recorded at Rasmussen Reservoir. Despite the high number of birds recorded at Rasmussen Reservoir, the fewest number of species (12) were recorded at that location.

Waterbird/waterfowl surveys during the fall migration period resulted in 11,473 individuals of 29 species recorded. Similar to spring, in the fall American coot accounted for the majority of individuals (8,024, 70% of all individuals). A total of 1,692 American wigeon (*Anas americana*) were also recorded. Combined, American coot and American wigeon accounted for 9,716 individuals (85% of all individuals). More individuals (8,773) and species (22) were recorded at Kindt Reservoir during fall surveys than at other reservoirs. Of the 8,024 American coots and 1,692 American wigeons recorded at all reservoirs combined, the survey at Kindt Reservoir accounted for 5,810 coots (66%) and 1,690 wigeon (99%).

Observations of bald eagles actively foraging at Rasmussen Reservoir indicate that this location is an important foraging location for a known bald eagle pair nesting immediately south of the Sierra Madre WDA and Rasmussen Reservoir. These observations led to the designation of the Rasmussen Reservoir Turbine No-Build Area. *See Section 6.2.7.* Observational data from 2011 also indicate the potential use of Kindt Reservoir as a foraging location for a golden eagle pair that nested just above the reservoir during that year. Kindt Reservoir is already located outside of the WDAs. Waterbirds/waterfowl using the North Platte River are also an available prey source for eagles nesting along this corridor. Similar to Kindt Reservoir, the North Platte River is located outside of the WDAs. *See Appendix G.*

Greater Sage-grouse

PCW's intensive greater sage-grouse monitoring and research program indicates that greater sage-grouse are prey for eagles. Greater sage-grouse tagged by PCW have been killed by eagles as evidenced by tags located in eagle nests or at perch locations. *J. Kehmeier, personal communication.* Therefore, it is believed that greater sage-grouse could provide a year-round forage base for eagles. In 2011, Wyoming Governor Matt Mead issued Executive Order (EO) 2011-5 establishing the current greater sage-grouse Core Areas, which protect the best greater sage-grouse habitat and largest populations of greater sage-grouse remaining in Wyoming. Greater sage-grouse Core Areas represent important eagle foraging locations within the vicinity of Phase I because of the higher quality sagebrush habitat and associated usage by other potential eagle prey species including leporids, big game species, and fossorial mammals. *See Appendix F.* Results of PCW's greater sage-grouse monitoring program indicate that the majority of greater sage-grouse use during late brood-rearing periods occurs in Core Areas outside the boundaries of the WDAs; late brood-rearing periods are potentially important for eagle foraging because greater sage-grouse populations are generally highest during this period and they concentrate around mesic habitats. *J. Kehmeier, personal communication.* PCW has committed to developing the CCSM Project, including Phase I, entirely outside of designated greater sage-grouse Core Areas. *See BLM 2012a; Wyoming EO 2011-5 at Attachment A, Sage-Grouse Core Breeding Areas Version 3.*

Other Potential Eagle Prey Species

<u>Wyoming Ground Squirrel</u>

Similar to WTPDs, Wyoming ground squirrels are only active from mid-March/early April (depending on late winter conditions) to late July when they begin to hibernate. *See Armstrong et al. 2011; Reid 2006.* By mid-September, almost all ground squirrels have entered hibernation. Males usually emerge from hibernation one to three weeks before the females. Breeding takes place a few days after females emerge from hibernation and one litter of 5 to 7 young is born in late April or May after a three- to four-week gestation period. *See Zegers 1984; Reid 2006*. Juveniles emerge from burrows at 4 to 5 weeks old, therefore highest population densities above ground occur between May and July.

Even during their active season, ground squirrels are typically only above ground during cooler weather in the mornings and evenings, retreating into their burrows during hot weather. *See Clark and Stromberg 1987*. Wyoming ground squirrels spend around 21 hours per day inside their burrows. *See*

Zegers 1984. As discussed in PCW's Prey Base Assessment for the CCSM Project, including Phase I, Wyoming ground squirrel colonies are unlikely to achieve the necessary densities required to consistently attract eagles and to support eagle nesting populations due to the restrictive activity schedule and colony structure of Wyoming ground squirrels. Therefore, Wyoming ground squirrels are at best a secondary prey item. *See Appendix F.*

Leporids

Leporids are known to be an important prey source for eagles. Some scientific studies have shown that fitness and overall nesting success of some breeding populations of golden eagles may depend heavily on the cyclic abundance and deficiencies of leporid populations, especially the white-tailed jackrabbit. *See Bates and Moretti 1994; Preston 2011; Steenhof et al. 1997*. These cycles in leporid populations are caused by an abundance or shortage of available forage, with shortages of forage typically linked to periods of drought.

The leporids commonly found within the CCSM Project Site, including Phase I, are white-tailed jackrabbit, desert cottontail and mountain cottontail (*Sylvilagus nuttallii*). These three species appear to be diffuse and widespread across the CCSM Project Site based on field observations collected since 2009. *See Appendix F.* As described in PCW's Prey Base Assessment, white-tailed jackrabbit typically inhabit the lower-lying Sage Creek Basin of the CCSM Project Site, which is comprised of salt desert scrub and dense sagebrush steppe vegetation, but may also be found in higher areas of the CCSM Project Site. Desert cottontail may also be found in the Sage Creek Basin, the North Platte River corridor, and to a lesser extent on Chokecherry and Upper Miller Hill, while mountain cottontail mainly occur on Upper Miller Hill and to a lesser extent on the higher elevations of Chokecherry. *See Appendix F.* All three species tend to inhabit areas with moderate shrub densities for use as cover from predators.

All three leporid species found within the CCSM Project Site, including Phase I, are crepuscular, feeding predominantly during the early morning and late evening hours; however, white-tailed jackrabbits are known to forage throughout the night as well. Though leporids are able to meet much of their water needs through absorbing moisture from forage, they are attracted to the moist low-lying vegetation along state and county roads surrounding Phase I. *See Appendix F.* This attraction leads to many individuals being killed along roadways and results in increased scavenging opportunities for eagles in the vicinity of the CCSM Project Site on public roads and highways such as Interstate 80 and State Highways 130 and 71.

Leporids differ from many potential eagle prey species in that they do not hibernate and are active during the winter months, which may create some additional foraging opportunities for eagles during this time of year. This winter activity is typically concentrated in lower-lying basin areas with little or no snow cover, or in areas where they are able to forage from underneath shrub cover.

Scientific literature describes the importance of the eagle-leporid predator-prey relationship. Leporids within the CCSM Project Site likely represent a quality food source for eagles. However, due to leporids' mainly crepuscular habits and the diffuse nature of leporid populations across the many habitats within the CCSM Project Site, including Phase I, they are likely taken as prey opportunistically, albeit regularly, by eagles. *See Appendix F.*

<u>Big Game Species</u>

Big game species provide eagle foraging opportunities throughout the year. During spring and summer months, big game parturition (birthing) areas can be important as eagles will prey on young deer (*Odocoileus* spp.), elk (*Cervus elaphus*), and pronghorn (*Antilocapra americana*). No parturition areas have been identified by PCW, WGFD, or BLM in Phase I or the CCSM Project vicinity; however, young pronghorn may be found in the Sage Creek Basin and young mule deer may be found along the North Platte River during the spring and early summer. Observations of two golden eagle and one bald eagle nest during the recovery of greater sage-grouse GPS telemetry tags have shown high concentrations of juvenile pronghorn legs located on and around the base of these nests, indicating that young pronghorn are a viable prey item that may be taken regularly by eagles nesting in the vicinity of the CCSM Project Site. *J. Kehmeier, personal communication.*

During fall and early winter months, carcasses and remains left by hunters could be an important food source for eagles. Eagle scavenging of big game carcasses and other remains during hunting season has been observed in the landscape surrounding Phase I. *J.Kehmeier personal communication*. Hunting in the vicinity of the CCSM Project Site occurs primarily in the Red Rim-Grizzly WHMA, in block federal land south of the Sierra Madre WDA, and in the Medicine Bow National Forest. In the FEIS, BLM identified that in 2010, 1,593 big game animals were harvested within the hunt units overlapping the CCSM Project Site, including Phase I. *See BLM 2012b.* However, the majority of the harvest occurs outside of the CCSM Project Site because the privately-owned and controlled land on the Ranch is either not hunted or hunted very lightly. Therefore, there are not adequate carcasses or remains to support eagle foraging and scavenging within the Phase I Development Area. *See Appendix F.*

WGFD has identified areas of big game winter range in the vicinity of the Phase I. Portions of mule deer winter range overlap with the northern portions of the Chokecherry WDA along the hogback and pronghorn winter range occurs east of the Chokecherry WDA. *See BLM 2012b. See Figure 3.3.* PCW is currently working with WGFD, BLM, and the University of Wyoming to better understand use of the CCSM Project Site, including Phase I, by mule deer and other big game species. These efforts will continue and may be used to inform adaptive management options and future conservation measures.

Livestock and Grazing

Phase I was historically, and is currently, used for raising livestock. The Ranch dates to the early 20th century and was once one of the largest sheep ranches in the state of Wyoming. *See Barclay 2011*. Golden eagle depredation on livestock has been documented in many areas of the western United States. *See Avery and Cummings 2004*. Most depredation involves golden eagles preying on young lambs and goats; depredation of domestic calves occurs only occasionally. *See Avery and Cummings 2004*. A survey conducted from 1997 to 2002 by Wyoming Agriculture and presented in the Wyoming Agriculture Statistics, indicated that eagles, specifically golden eagles, took over 40,000 sheep/lambs during this period. *See Avery and Cummings 2004*. O'Gara (1978) draws a connection between a decline in jackrabbit populations and increased lamb predation by golden eagles, especially juvenile and subadult birds, which have no established territories.

From the turn of the century until the mid-1990s, the Ranch was primarily run as a sheep operation; however, the Ranch has since been converted to a cattle operation. Historically, the widespread availability of sheep/lambs as a prey source within Phase I may have created more forage opportunities for golden eagles serving to potentially support larger populations by stabilizing the prey base during periods of declining leporid populations; however, predation on domestic calves rarely occurs. *See Avery and Cummings 2004; Phillips et al. 1996*. The conversion of the Ranch from a sheep to a cattle operation in the mid-1990's dramatically decreased potential opportunities for eagles to forage upon livestock. For this reason, domestic livestock operations on the Ranch do not create or support significant eagle foraging or use areas. *See Appendix F.*

Roadkill

During fall and winter months, vehicle collision-killed carcasses or roadkill are a forage source for bald and golden eagles. In January 2014, U.S. Forest Service Ranger Melanie Fullman published a column in The Saratoga Sun newspaper citing the recent discovery of another eagle killed on the road and reminding drivers to be cautious in the area. *See Fullman 2014.* During February 2012 avian surveys, 14 individual eagles and one ferruginous hawk concentrated around two pronghorn carcasses were observed during a 15-minute drive along a 16-kilometer (10-mile) stretch of Highway 130 east of the CCSM Project. *J. Kehmeier, personal communication.* At the same time, several other eagles were observed along Interstate 80 north of the CCSM Project. *J. Kehmeier, personal communication.* In contrast, in February of 2012, only seven eagles (all golden eagles) were observed during more than 56 hours of winter raptor count surveys within the CCSM Project Site. *See Appendix C.* This indicates that winter eagle activity is likely higher along roadways where roadkill is present versus areas where prey and scavenging opportunities are infrequent. In the vicinity of the Phase I, winter eagle use is closely tied to the availability of winterkill carcasses along area highways. *See Appendix F.*

5.3 Risk Assessment Following Stage 2

PCW used the information obtained in its Stage 2 surveys and assessments to identify important eagle use areas likely to be affected by the CCSM Project and to assist in applying measures to avoid and minimize impacts to eagles to the extent practical. As discussed in detail in chapter 6.0, PCW substantially redesigned Phase I of the CCSM Project based upon the information and data gathered to address potential environmental risks to species of concern, including eagles. *See Chapter 6.0*. PCW has used iterative implementation of Stage 2 of the ECP Guidance as Phase I has been redesigned to avoid and minimize impacts to eagles. Following completion of Stage 2, PCW characterized the CCSM Project, including Phase I, as a Category 2 project.

According to the ECP Guidance, a project is a Category 2 if, as currently sited and planned, it is (1) reasonably likely to take eagles at a rate greater than is consistent with maintaining stable or increasing populations, but (2) the risk might be reduced to an acceptable level through a combination of conservation measures and reasonable compensatory mitigation, per an effective and verifiable ECP. While Phase I has potential to take golden eagles, the risk will be avoided and minimized to the extent practicable as set forth in this Phase I ECP. In addition, PCW commits to compensatory mitigation as set forth in this Phase I ECP to offset unavoidable take from construction, operation and maintenance of Phase I such that there is no net loss to the golden eagle population. PCW has prepared this Phase I ECP following the ECP Guidance to meet the regulatory requirements for a programmatic ETP.

6.0 Avoidance and Minimization of Risks in Project Siting (ECP Guidance – Stage 4)

Wind energy development can affect bald and golden eagles in a variety of ways, such as causing direct mortality through collision. *See USFWS 2013a citing Hunt 2002, Krone 2003, Chamberlain et al 2006*. According to the ECP Guidance, this is the primary threat to eagles from wind energy facilities, and the monitoring, avoidance, and minimization measures advocated in the ECP Guidance are primarily aimed at this threat. As described in the ECP Guidance, evidence across multiple studies suggests that three main factors contribute to increased risk of collision by eagles: (1) the interaction of topographic features, season, and wind currents to create favorable conditions for slope soaring or kiting (stationary or near-stationary hovering) in the vicinity of wind turbines; (2) behavior that distracts eagles and presumably makes them less vigilant (e.g., active foraging or inter- and intra-specific interactions); and (3) resident status, with resident eagles being less vulnerable and dispersers and migrants (especially sub-adults and floating eagles) being more vulnerable. *See USFWS 2013a.*

USFWS ECP Guidance Stage 4 – Avoidance and Minimization of Risk Using ACPs and Other Conservation Measures, and Compensatory Mitigation instructs the project developer to address conservation measures that might be employed to minimize or, ideally, avoid eagle mortality and disturbance based on information gathered in Stage 2. The USFWS Region 6 Guidance instructs project developers to address avoidance and minimization of risk in project siting prior to prediction of eagle fatalities (Stage 3). *See USFWS 2013b.* The USFWS Region 6 Guidance then instructs project developers to revisit additional avoidance and minimization measures, ACPs, and compensatory mitigation as a separate section of the ECP. In compliance with the USFWS Region 6 Guidance, this chapter focuses only on those avoidance and minimization measures incorporated into the Phase I siting process. Additional avoidance and minimization measures, conservation measures, experimental ACPs, and compensatory mitigation are described in chapter 8.0.

PCW has worked cooperatively with USFWS to avoid and minimize impacts to eagles from Phase I. *See Appendix H*. PCW used the best available scientific data, including the extensive data collected for Phase I, to develop the specific avoidance and minimizations measures that were incorporated into the Phase I wind turbine layout. This chapter outlines the avoidance and minimization measures that PCW implemented during the Phase I siting consistent with the USFWS Region 6 Guidance, including the following:

1. Considering alternative sites for reducing eagle/raptor/migratory bird risk in the Phase I siting and redesign process.
2. Removing and/or relocating wind turbines or potential wind turbine sites from the Phase I design using site-specific eagle and avian use data.
3. Modifying, removing, and/or relocating other infrastructure from the Phase I design using site-specific eagle and avian use data.
4. Adjusting the Phase I design using site-specific eagle and avian use data.

5. Incorporating the USFWS Region 6 Recommendations for Avoidance and Minimization of Impacts to Golden Eagles at Wind Energy Facilities (USFWS Region 6 Recommendations) as well as complying with project-specific recommendations made by USFWS. *See USFWS 2013c*.

The following sections further describe the substantial redesign that PCW has completed since first applying for Type-II Wind Energy Project Area Grants for wind energy site testing and monitoring, submitting a POD for the CCSM Project to BLM, and applying for a Type-III Wind Energy Development Grant. *See Section 1.2.2.*

PCW's iterative design and siting approach resulted in substantial reconfiguration of the CCSM Project including several revisions in the siting of wind turbines for Phase I. These are exactly the type of actions contemplated and recommended by Stages 2-4 of the ECP Guidance and Tier 3 of the Wind Energy Guidelines. The evolution of the CCSM Project and Phase I described below illustrates:

1. PCW's attention to the early determination of potential environmental risks at the landscape scale;
2. PCW's adjustment of the Phase I design based on eagles and their habitat as well as other environmental considerations;
3. PCW's evaluation of potential environmental risks based on site-specific data; and
4. PCW's adjustment/limitation of the areas of potential wind development to avoid and minimize impacts to eagles from Phase I.

6.1 Overview of Phase I Avoidance and Minimization Efforts

This ECP is limited in scope to Phase I of the CCSM Project. Phase II of the CCSM Project will have a separate ECP and will be evaluated by USFWS independently; however, portions of this chapter describe the CCSM Project as a whole to provide context for the project siting effort.

PCW has used the site-specific data collected along with the recommendations from USFWS in re-designing the CCSM Project and developing the final wind turbine layout for Phase I. Phase I avoids and minimizes risks to eagles such that additional take is unavoidable, consistent with the ECP Guidance and Wind Energy Guidelines and the provisions of BGEPA and MBTA. The Phase I wind turbine layout - when combined with the best management practices, conservation measures, experimental ACPs and monitoring and adaptive management described in this Phase I ECP - avoids and minimizes impacts to bald and golden eagles such that additional take is unavoidable.

6.1.1 Wind Energy Site Testing and Monitoring Application Area

PCW has an easement from TOTCO for wind development on the privately owned sections of the Ranch; however, PCW must also obtain the proper authorizations for wind development on the intermingled federal land. *See Chapter 1.0.* In November of 2006, PCW applied to BLM for two ROW grants for wind energy site testing and monitoring on federal land (Type-II Wind Energy Project Area Grants) in two areas of the Ranch. *See BLM 2008b.* The northern area was identified as Chokecherry and the southern area was identified as Sierra Madre. BLM granted the Chokecherry Wind Energy Project Area Grant on June 11, 2007, and the Sierra Madre Wind Energy Project Area Grant on June 15, 2007, covering the Wind Energy Site Testing and Monitoring Application Area (Application Area) in which wind energy development was proposed. The Application Area, located almost entirely within the Ranch, encompassed 169,500 acres. PCW installed its first two meteorological (or “met”) towers for monitoring and measuring wind speed, direction and behavior in June 2007, with additional met tower installations shortly thereafter. The data from these met towers were used to generate a site-specific wind map of the Application Area and inform the wind turbine layout for PCW’s original Proposed Action. *See Figure 6.1.*

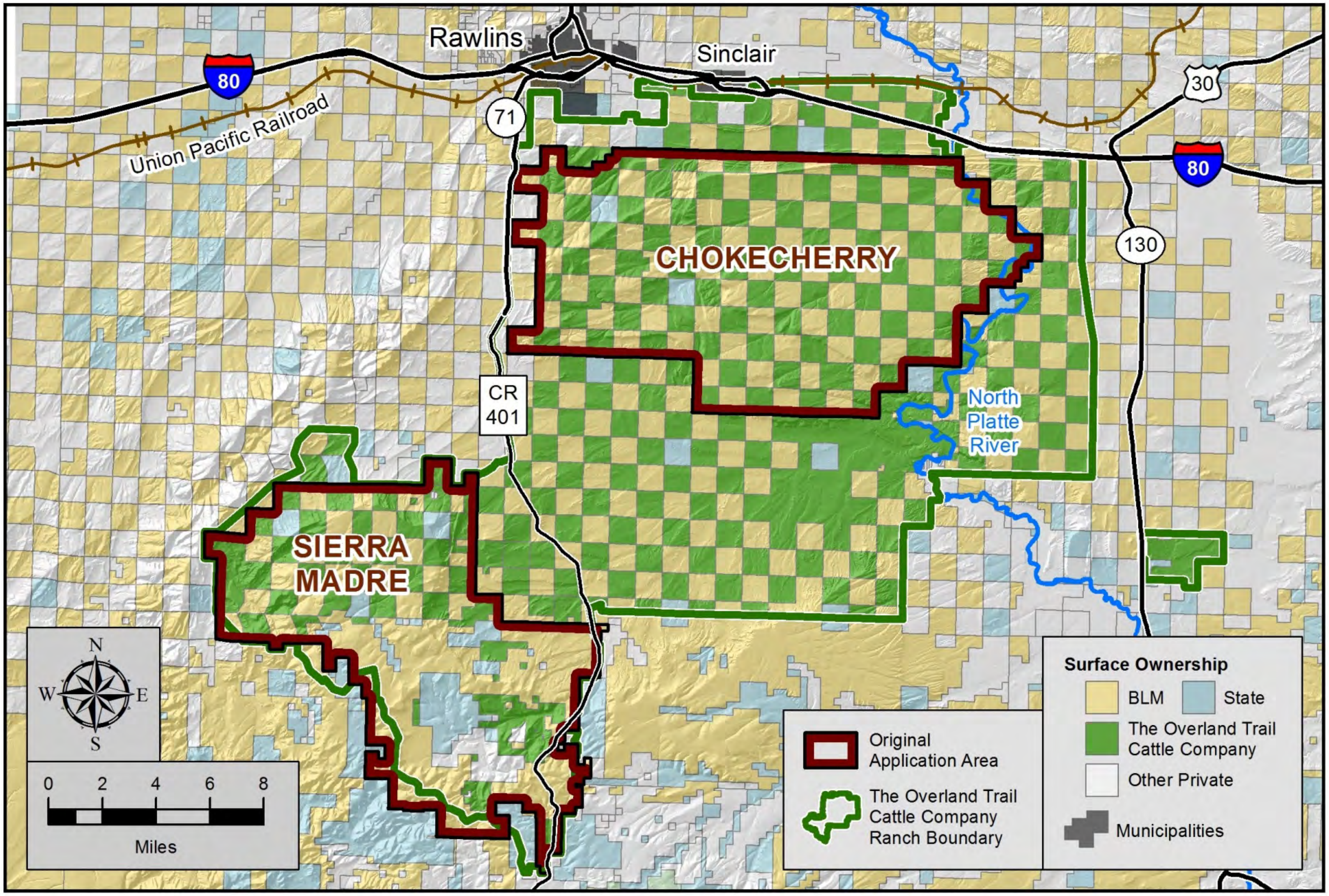

Figure 6.1. Wind Energy Site Testing and Monitoring Application Area – June 2007.

6.1.2 Original Proposed Action

To develop a wind energy generation project on BLM-administered federal land, a Type-III Wind Energy Development Grant is needed from BLM. *See BLM 2008b.* In January 2008, PCW applied for a Type-III Wind Energy Development Grant, which would authorize PCW to construct, operate, maintain and decommission the CCSM Project on BLM-administered land within the checkerboard.

In support of its application for a Type-III Wind Energy Development Grant, PCW submitted a POD to BLM in March 2009, which included a proposed wind turbine layout for the CCSM Project (Original Proposed Action). The Original Proposed Action was based on siting the CCSM Project wind turbines to take advantage of the Ranch's best wind resources as verified from the wind data collected since 2007. The Original Proposed Action had 675 wind turbines in Chokecherry and 325 in Sierra Madre, with no wind turbines on Sage Creek Rim or in Lower Miller Hill or the Sage Creek Basin. Wind turbines were planned throughout the full extent of Upper Miller Hill including within the Red Rim-Grizzly WHMA, and along the hogback feature in the north portion of Chokecherry. *See Figure 3.3 & Figure 6.2.*

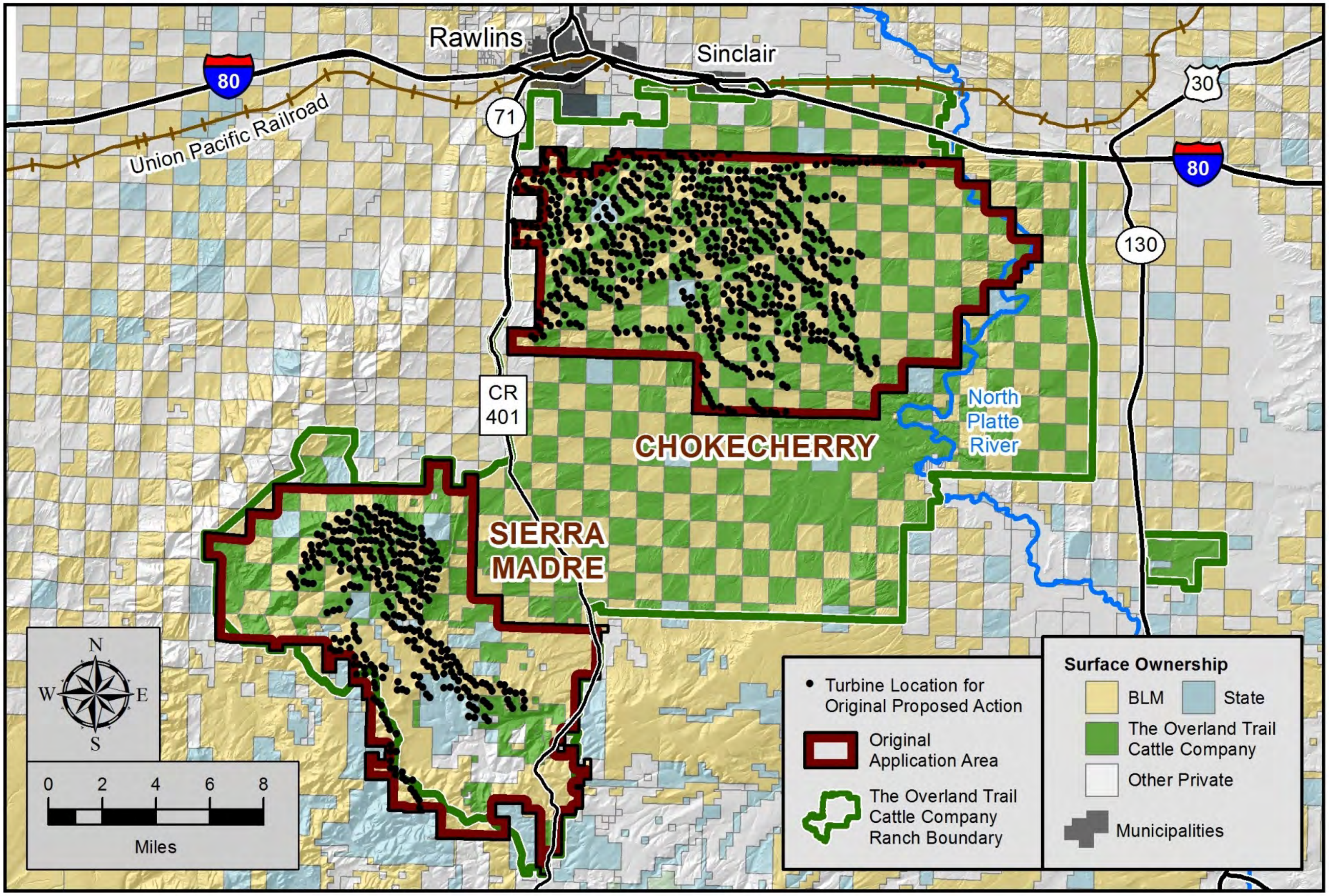

Figure 6.2. Original Proposed Action in Plan of Development – March 2009.

6.1.3 Revision 1, Revised Proposed Action – April 2010

Consistent with Stage 1 of the ECP Guidance and Tiers 1 and 2 of the Wind Energy Guidelines, following the submittal of the Original Proposed Action, PCW conducted a broad, landscape-scale evaluation of the Application Area using the results of the 2008-2009 baseline wildlife surveys. *See Section 5.1.1.* The review included an evaluation of the locations of multiple resources including eagle and non-eagle raptor nest locations, habitat for avian and other wildlife species, greater sage-grouse lek and habitat locations, and other environmental considerations. The review also included identification of preliminary environmental constraints based on the Resource Management Plan (RMP) for the BLM Rawlins Field Office and the best available environmental information and datasets for the Ranch.

As a result of the initial avoidance and minimization efforts associated with PCW's review of the Original Proposed Action, over 30% of the wind turbine locations in the Original Proposed Action (approximately 340 wind turbine locations) were removed from consideration. This included proposed wind turbine locations in the southernmost area of Sierra Madre and the western area of Upper Miller Hill (also in Sierra Madre). Accordingly, PCW amended its Type-II Wind Energy Project Area Grants to add potential development areas in Sierra Madre (Lower Miller Hill, the Sage Creek Basin and Sage Creek Rim). The Application Area along with these expanded areas form the Amended Application Area evaluated by BLM in its FEIS (with a few additional minor adjustments). The Amended Application Area encompasses approximately 216,000 acres, including all of Phase I.

Following amendment of its Type-II Wind Energy Project Area Grants, PCW revised its Original Proposed Action (the Revised Proposed Action). The Revised Proposed Action moved proposed wind turbines from the southernmost area of Sierra Madre and the western area of Upper Miller Hill to areas in Lower Miller Hill, Sage Creek Basin, Sage Creek Rim, and Severson Flats. When compared with the Original Proposed Action, these relocations resulted in decreased impacts to multiple resources, including eagles and other avian species. The Revised Proposed Action was provided to BLM in April 2010. *See Figure 6.3.*

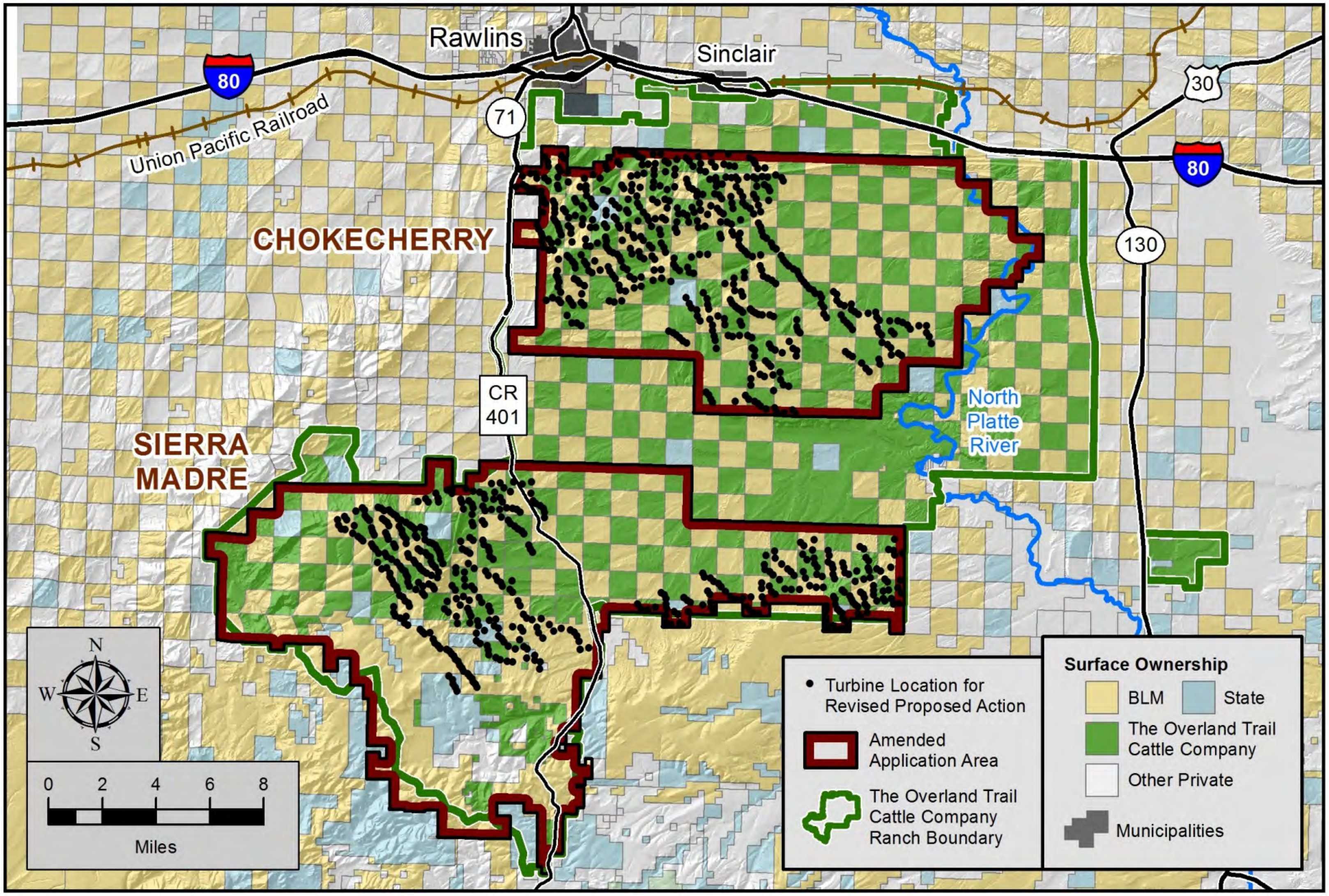

Figure 6.3. Revision 1: Revised Proposed Action – April 2010.

6.1.4 Revision 2, Applicant Proposed Alternative – August 2010

In August 2010, PCW again revised the CCSM Project by removing all wind energy development from greater sage-grouse Core Areas as designated in the Wyoming Governor's Executive Order 2010-4 (and subsequently Executive Order 2011-5). The State of Wyoming Core Area conservation strategy for greater sage-grouse limits development and disturbance in large areas of public, private, and state land across Wyoming. In the vicinity of the CCSM Project, habitats along and east of the North Platte River and habitats south and west of the Sierra Madre WDA are identified as Core Areas for greater sage-grouse conservation. These areas also overlap important eagle nesting habitat and contain much of the high-quality prey base for eagles. Removing wind energy development from greater sage-grouse Core Areas avoids and minimizes impacts to eagles, their prey base, and nesting habitat to aid in the conservation of the local and regional populations.

PCW modified the Revised Proposed Action by relocating 68 wind turbines, primarily from western and southern Upper Miller Hill, where the best wind resources are located, to areas outside of greater sage-grouse Core Areas and the associated eagle prey base and nesting habitat. This is in addition to the over 300 wind turbines that were relocated between the Original Proposed Action and the Revised Proposed Action, most of which were also in what are now designated greater sage-grouse Core Areas and the associated eagle prey base and nesting habitat. Revision 2 to the wind turbine layout was submitted to BLM in August 2010 as the Applicant Proposed Alternative. BLM analyzed the Applicant Proposed Alternative as Alternative 1R in its Draft EIS. *See BLM 2011b*. *See Figure 6.4.*

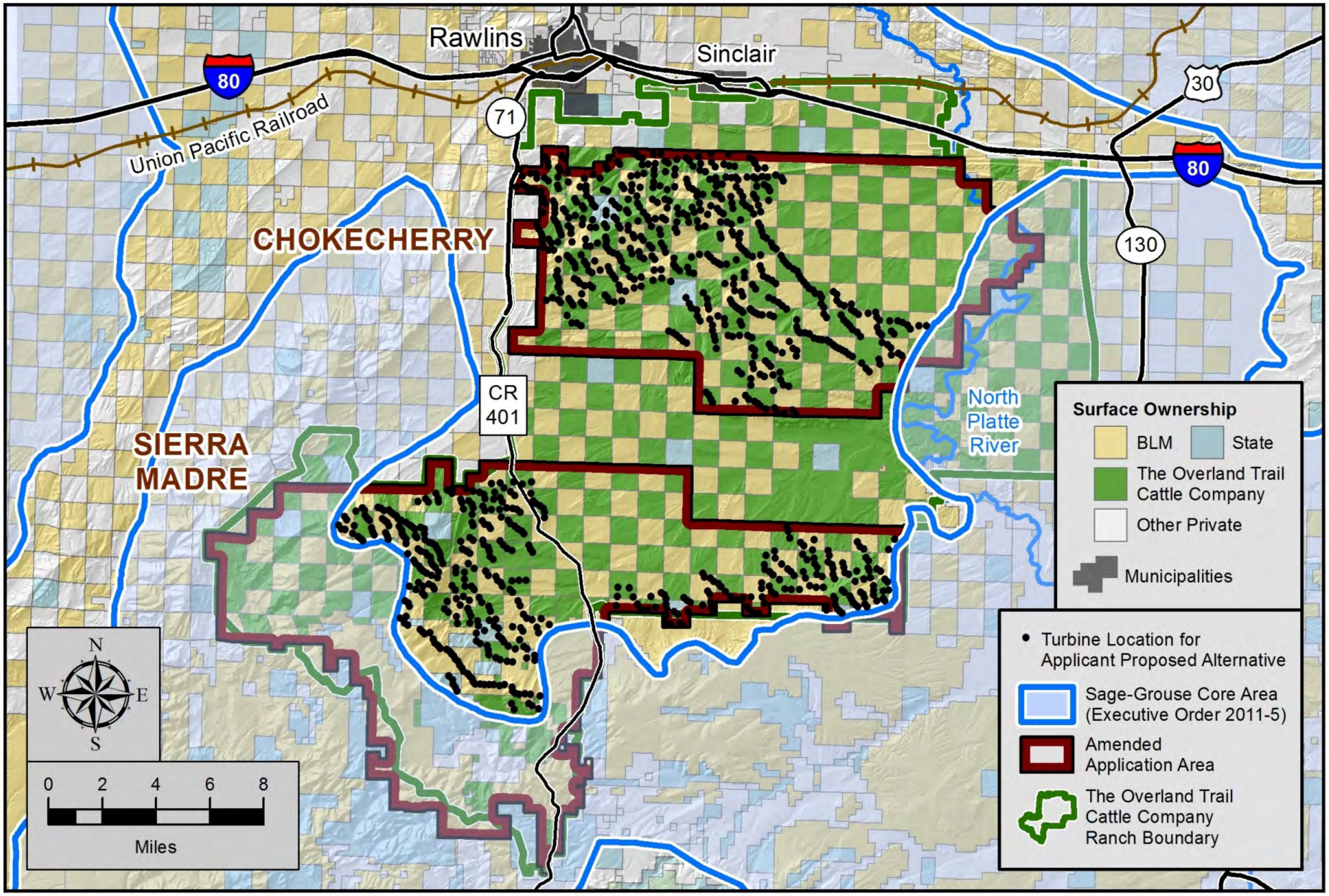

Figure 6.4. Revision 2: Applicant Proposed Alternative – August 2010.

6.1.5 Revision 3, Revised Plan of Development – January 2012

Following the release of BLM's Draft EIS in July 2011, PCW revised the CCSM Project again in its POD dated January 2012. This revision considered the analysis contained in the BLM Draft EIS and incorporated updated ACMs and a revised wind turbine layout. Many of the ACMs are consistent with conservation practices recommended in the ECP Guidance, Wind Energy Guidelines, and other recommendations made by USFWS. Specifically, in the January 2012 POD, PCW worked to further reduce surface disturbance and habitat fragmentation and to provide flight/movement corridors for avian species throughout the CCSM Project by aligning wind turbines into rows consistent with the ECP Guidance. In addition, wind turbines were also removed north of the hogback and south of Rasmussen Reservoir to further reduce potential risks to eagles based on observed eagle use. This revised wind turbine layout formed the basis of BLM's analysis in the FEIS. *See Figure 6.5.*

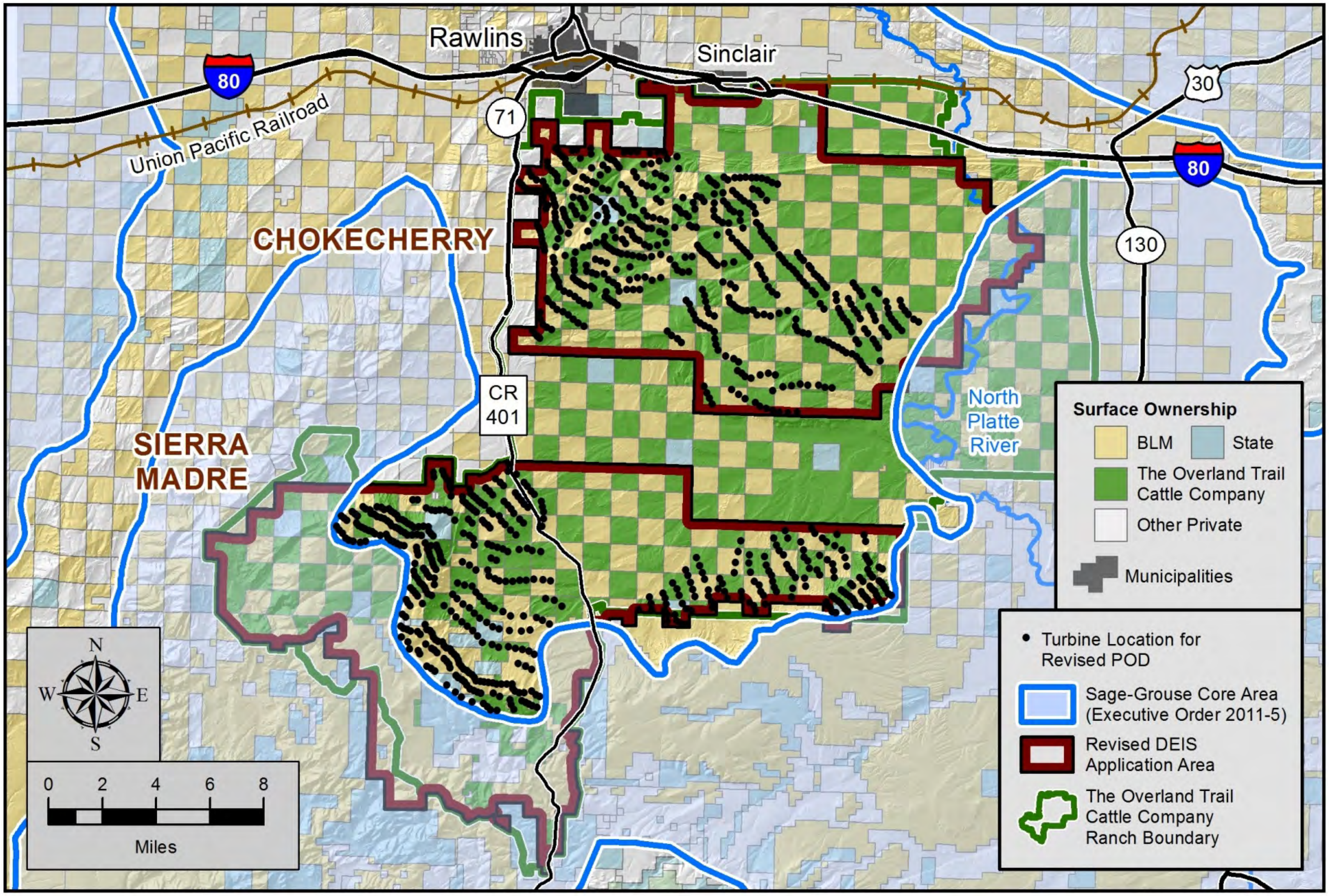

Figure 6.5. Revision 3: Revised Plan of Development – January 2012.

6.1.6 Revision 4, Turbine No-Build Areas – July 2012

Beginning in 2010, PCW coordinated and consulted with USFWS to identify additional surveys necessary to identify and document important eagle use areas and other avian use areas, potential migration areas, nesting use areas, prey base resources for eagles, and other resources associated with eagle and avian use of the CCSM Project Site. The purpose of these surveys was to inform additional avoidance and minimization efforts to reduce risks to eagles by identifying areas of highest eagle use within the CCSM Project Site. These surveys were conducted between April 2011 and July 2012. *See Chapter 5.0.*

Based on the site-specific eagle use data collected through July 2012 and the recommendations made by USFWS, PCW further revised the layout in its January 2012 POD (Revision 4). PCW provided Revision 4, which included Turbine No-Build Areas, to USFWS on July 18, 2012. *See Section 6.2.* Revision 4's Turbine No-Build Areas total over 105,000 acres across the Ranch and were designed to reduce impacts to eagles by avoiding placement of wind turbines in and adjacent to many of the documented avian use areas, flight/movement corridors, and nesting and foraging habitats. The Turbine No-Build Areas were identified through a kernel density analysis of the long-watch raptor survey data, observed eagle flight paths, incidental observations, and consideration of recommendations from USFWS regarding important eagle use areas. Eagle use within the designated Turbine No-Build Areas represents approximately 80% of all eagle use observed during the 2011 and 2012 long-watch raptor surveys. As such, avoidance of these areas substantially reduces the risk to eagles.

In addition to designating Turbine No-Build Areas, Revision 4 removed wind turbines from the Red Rim-Grizzly WHMA located west and south of the Miller Hill portion of the Sierra Madre WDA. Survey data demonstrated that survey points adjacent to and within the Red Rim-Grizzly WHMA had relatively high raptor and eagle use compared to other areas that are currently proposed for the CCSM Project. The Red Rim-Grizzly WHMA is managed to benefit big game and other wildlife species that serve as important forage for eagles. Removal of wind turbines reduces potential impacts to eagles and will ensure that the Red Rim-Grizzly WHMA continues to provide important habitat for eagles and a conservation benefit to local and regional eagle populations.

Approximately 66 wind turbines were moved in Revision 4 such that no wind turbines will be constructed in or overhang the boundaries of the Turbine No-Build Areas. Revision 4 of the wind turbine layout, the Turbine No-Build Areas layout, formed the foundation for the further avoidance and minimization discussions between PCW and USFWS. It was also the basis for PCW's 2012 project-wide draft ECP. *See PCW 2012.* The Turbine No-Build Areas are described in section 6.2. *See Figure 6.6.*

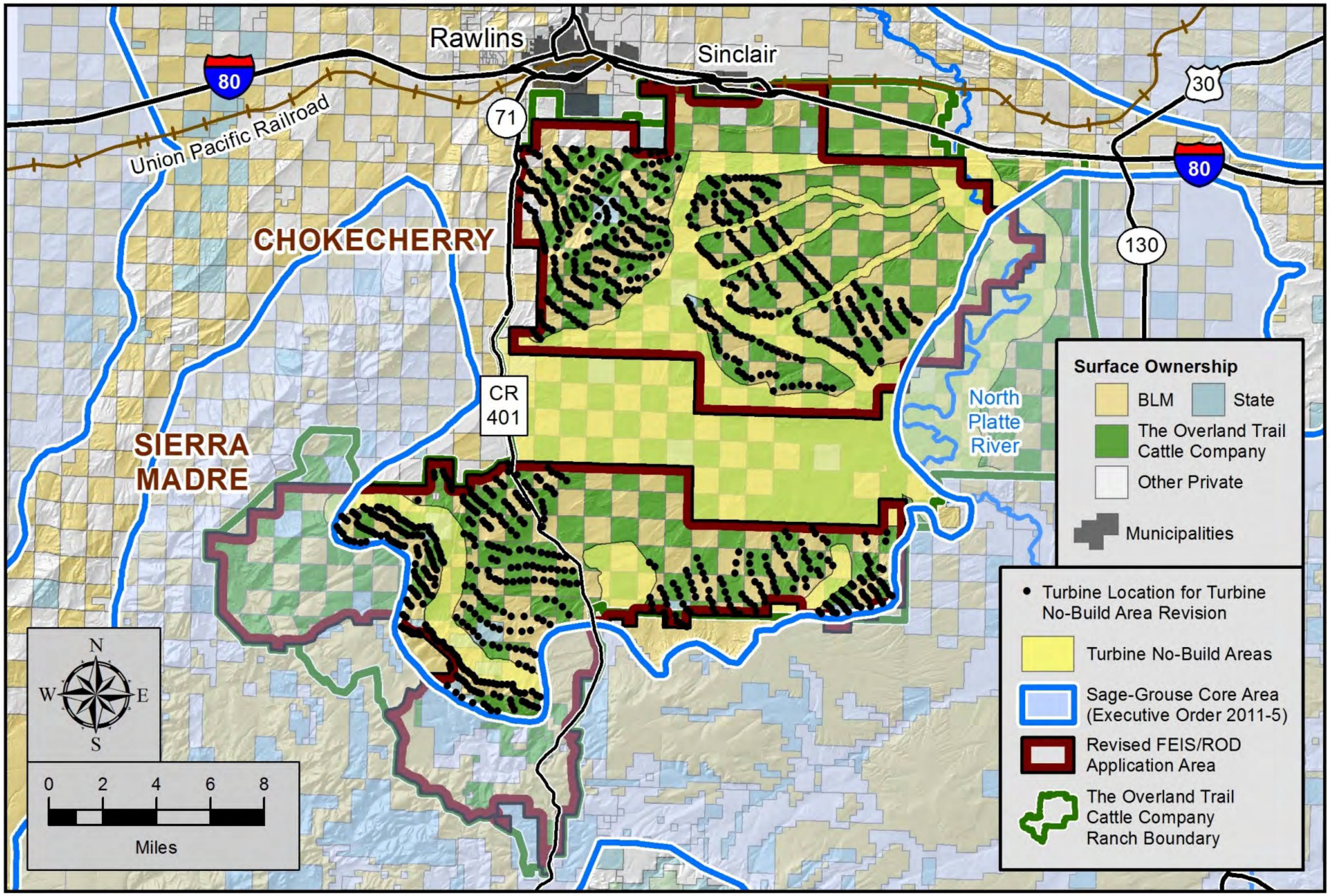

Figure 6.6. Revision 4: Turbine No-Build Areas – July 2012.

6.1.7 Revision 5, Initial Phase I Site-Specific Plan of Development - April 2013

As described in chapter 1.0 of this ECP, BLM's ROD outlined a specific process in which PCW will submit site-specific PODs to BLM for subsequent tiered NEPA analysis. In compliance with this process, PCW divided the CCSM Project into two phases for final design and subsequent analysis. For purposes of developing the site-specific PODs for Phase I, PCW again revised the wind turbine layout for the CCSM Project to create the initial wind turbine layout for Phase I. Revision 5 to the layout incorporated all of the requirements set out in BLM's ROD and also considered all of the most recent environmental data and information for Phase I, including the most recent eagle and raptor count survey data.

Revision 5 to the layout incorporated appropriate eagle and raptor nest buffers, avoidance and minimization measures related to important eagle use areas, the terms and conditions of Carbon County's approved Conditional Use Permit for the CCSM Project, and the USFWS avoidance and minimization recommendations received prior to the revision. *See Figure 6.7.*

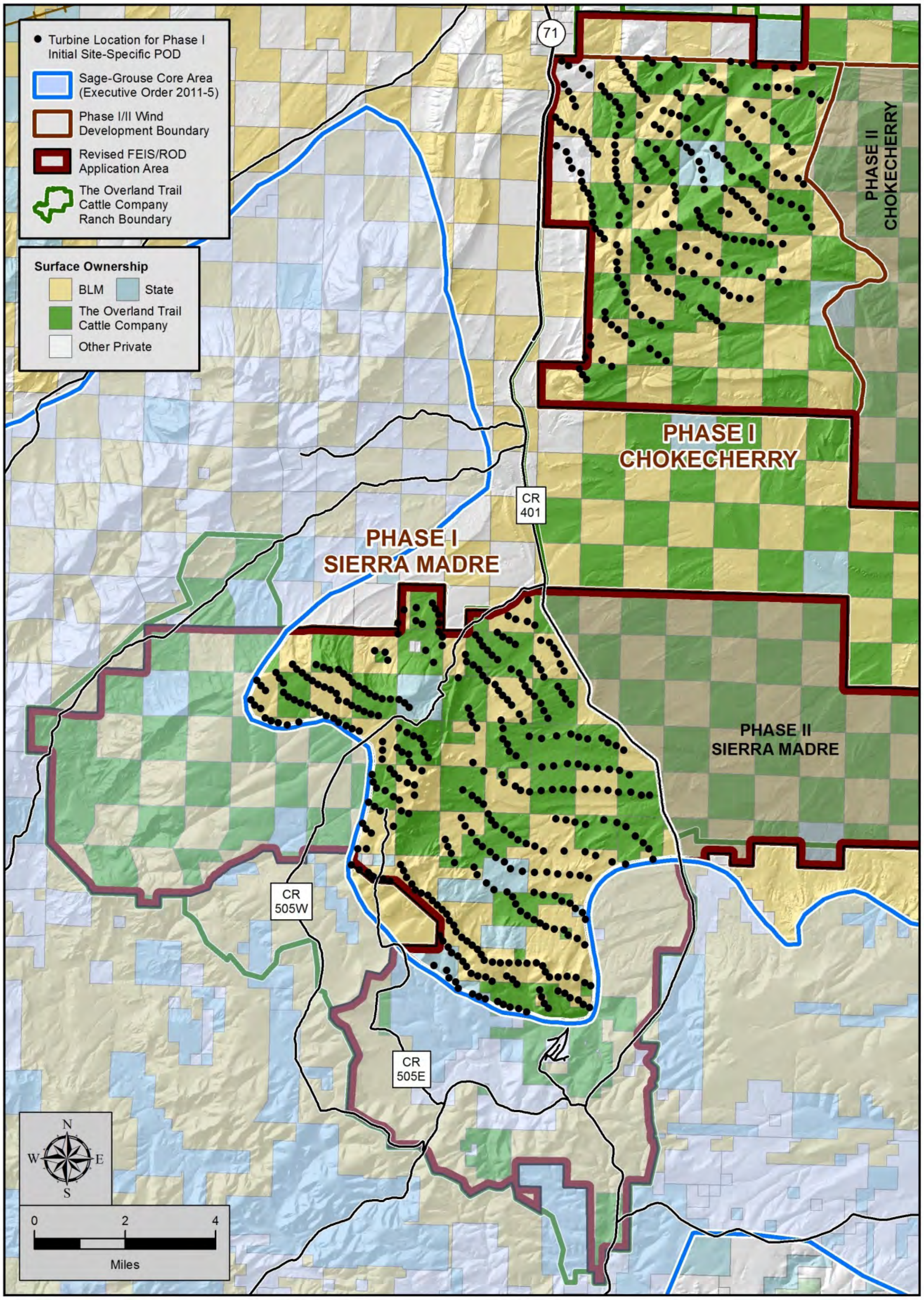

Figure 6.7. Revision 5: Initial Phase I Site-Specific Plan of Development – April 2013.

6.1.8 Revision 6, Final Phase I Site-Specific Plan of Development – January 2014

Revision 5 of the Phase I wind turbine layout was the basis for PCW's micrositing process and pre-construction surveys for Phase I. *See Section 3.1.1.* Beginning in April 2013, PCW conducted engineering field reviews and pre-construction surveys for BLM sensitive species and USFWS threatened and endangered species, Class III cultural resource surveys, and soil, vegetation and aquatic surveys for Phase I, as well as other required pre-construction surveys and inventories. Concurrent with micrositing and pre-construction surveys, PCW continued to work with USFWS and BLM through the remainder of 2013 to refine the Phase I wind turbine layout. In January 2014, PCW revised the Phase I wind turbine layout again. In this revision, PCW incorporated the best available scientific data, including the extensive eagle survey data collected for Phase I, through the application of additional avoidance and minimization measures designed to reduce risk to eagles to the maximum extent practicable. *See Section 6.3*. *See Appendix H.* Over 110 of the 500 Phase I wind turbines were moved to new locations within Phase I to address USFWS and BLM requirements and recommendations. *See Figure 6.8.* The final Phase I wind turbine layout represents the culmination of the extensive data collection and avoidance and minimization effort for Phase I that began in 2008.

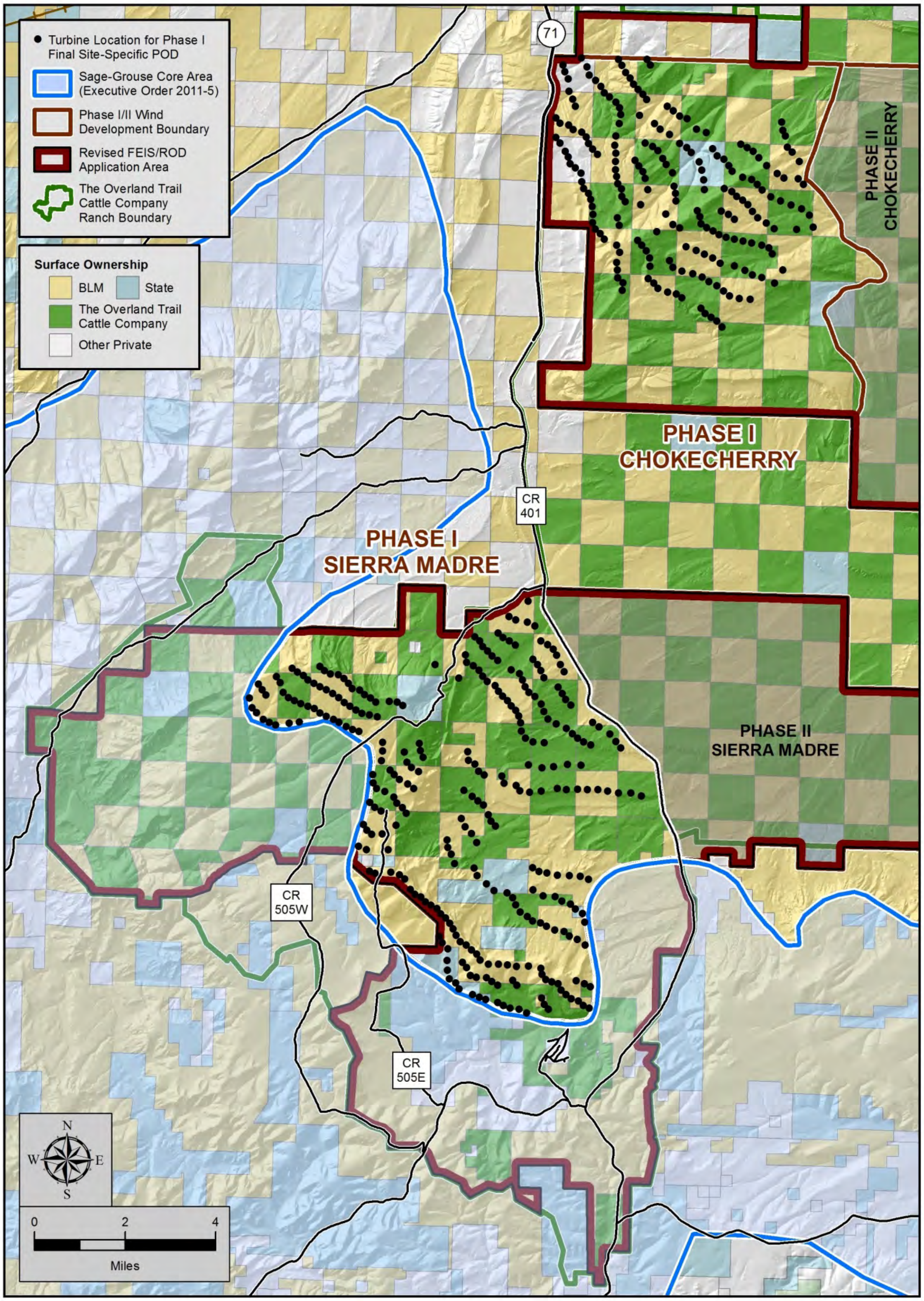

Figure 6.8. Revision 6: Final Phase I Site-Specific Plan of Development – January 2014.

6.2 Turbine No-Build Areas

This ECP is limited in scope to Phase I of the CCSM Project. Phase II of the CCSM Project will have a separate ECP and will be evaluated by USFWS independently; however, this section describes the Turbine No-Build Areas for the CCSM Project as a whole to provide context and demonstrate connectivity to other important eagle use areas.

As discussed in section 6.2, PCW designated over 105,000 acres of the Ranch as Turbine No-Build Areas to reduce impacts to eagles by avoiding placement of wind turbines in and adjacent to many eagle use areas, flight/movement corridors, and nesting and foraging habitats. The Turbine No-Build Areas were identified through a kernel density analysis of the long-watch raptor survey data, observed eagle flight paths, incidental observations, and consideration of recommendations from USFWS regarding important eagle use areas. No wind turbines will be constructed in or overhang the boundaries of the Turbine No-Build Areas. **E**agle use within the designated Turbine No-Build Areas represents approximately 80% of all eagle use observed during the 2011 and 2012 long-watch raptor surveys. Turbine No-Build Areas were designated as described below and shown on Figure 6.9.

6.2.1 Bolten Rim and Northern Sage Creek Basin

A Turbine No-Build Area was designated from the Bolten Rim south to the northern extent of the Sierra Madre WDA and from the Bolten Rim north into adjacent portions of the Chokecherry WDA. *See Figure 6.9.* This Turbine No-Build Area was developed based on survey observations made during long-watch raptor surveys and radar observations of eagle use surrounding occupied nests along the Bolten Rim. Observations of golden eagle use surrounding occupied nests on the Bolten Rim demonstrate that the majority of use occurs in the Turbine No-Build Area south of the Bolten Rim where prey resources, perching locations, and suitable soaring conditions are present.

South of the Bolten Rim, the Turbine No-Build Area is 5- to 6-kilometers (3- to 4-miles) wide to avoid placement of wind turbines in the highest quality eagle foraging locations identified within the CCSM Project Site. This area contains the highest density WTPD colonies within the Ranch and also contains three reservoirs (Kindt, Sage Creek, and Teton) that are used by multiple waterbird/waterfowl species and other potential prey species throughout much of the year. These prey resources are described in Appendix F and G. In addition, this area provides a suitable, wide flight/movement corridor from Atlantic Rim and Miller Hill to the North Platte River.

Along the eastern half of the Bolten Rim to the north the Turbine No-Build Area provides a 1600- to 2400-meter-wide (1- to 1.5-mile-wide) setback. Along the western half of the Bolten Rim to the north the Turbine No-Build Area provides a 800- to 3200-meter-wide (0.5- to 2-mile-wide) setback. These setbacks north of the rim avoid and minimize risks to identified nests and nesting substrates for golden eagles and avoid and minimize impacts to eagles that may use the Bolten Rim for soaring, kiting, perching, or foraging activities.

6.2.2 Hogback

A Turbine No-Build Area was designated along the hogback feature north of Chokecherry WDA. *See Figure 6.9*. PCW's Original Proposed Action identified wind turbine locations in this area. During raptor nest and eagle use surveys of the CCSM Project Site, an occupied eagle territory was located along the hogback. This Turbine No-Build Area minimizes risks to eagles by removing the potential for wind turbine development in this area.

6.2.3 Interior Chokecherry Rim

Long-watch raptor surveys identified that eagle use immediately west of the Interior Chokecherry Rim was substantially higher relative to other areas of the CCSM Project Site. The aspect of the Interior Chokecherry Rim is west to southwest and, as that is the predominant wind direction at the CCSM Project Site, the rim provides suitable topography to create uplift and slope-soaring conditions for eagle movement through the Chokecherry WDA. Prey base in the Chokecherry WDA is limited with no identified suitable WTPD colonies that could be used for foraging. *See Appendix F.* Because of the limited prey-base availability adjacent to the Interior Chokecherry Rim, it appears that the feature is used as a flight/movement corridor. The designation of a Turbine No-Build Area in the 1200- to 3200-meter-wide (0.75- to 2-mile-wide) corridor west and southwest of the Interior Chokecherry Rim provides connectivity to the area north of the Chokecherry WDA, the North Platte River corridor, and the Turbine No-Build Areas adjacent to the Bolten Rim; thus, providing for the use of this contiguous area as a flight/movement corridor. *See Figure 6.9*.

6.2.4 North Platte River Corridor

While this area is outside of Phase I, PCW has committed to not constructing wind turbines within 1600 meters (1 mile) of the North Platte River. Nest surveys have identified that the North Platte River corridor contains the largest number of bald and golden eagle nests and the highest quality foraging and nesting habitat within 8 kilometers (5 miles) of the CCSM Project Site. This Turbine No-Build Area reduces risks to eagles using the North Platte River corridor for nesting and non-nesting purposes. *See Figure 6.9*.

6.2.5 Hugus, Iron Springs, and Smith Draw Corridors

While this area is outside of Phase I, eagle flight path data collected during long-watch raptor surveys indicate that eagles periodically use the areas immediately over Smith, Iron Springs, and Hugus draws to move between the Interior Chokecherry Rim and the North Platte River corridor. To reduce potential impacts, PCW has designated a 250-meter-wide area on either side of each draw as a Turbine No-Build Area to provide contiguous flight/movement corridors between the North Platte River and Interior Chokecherry Rim. *See Figure 6.9*.

6.2.6 Miller Hill Rim

The area 1200 to 1600 meters (0.75 to 1 mile) east and north of the Miller Hill Rim was designated as a Turbine No-Build Area to avoid and minimize impacts to eagles that use mountain shrub and aspen-mixed conifer habitats. *See Figure 6.9*. The corridor adjacent to the Miller Hill Rim provides a flight/movement corridor between areas south of the CCSM Project in greater sage-grouse Core Areas with the Atlantic Rim and other areas north of the CCSM Project. Because prevailing winds are from the west and southwest, the Miller Hill rim does not provide suitable uplift and slope-soaring conditions except in the rare event of winds from the east and north.

6.2.7 Rasmussen Reservoir

While the area surrounding Rasmussen Reservoir is outside of Phase I, a 2.4- to 3.2-kilometer-wide (1.5- to 2-mile-wide) Turbine No-Build area was established south of the reservoir to provide a foraging and flight/movement corridor for nesting bald eagles. *See Figure 6.9*. A bald eagle nest was identified approximately 3.2 kilometers (2 miles) south of Rasmussen Reservoir, outside the Sierra Madre WDA. Eagle use surveys have identified bald eagle use at Rasmussen Reservoir during the periods in which the nest was occupied. *See Appendix C.* Prey base surveys also documented the presence of American coot, redhead duck, and multiple other waterbird/waterfowl species that provide suitable foraging opportunities at Rasmussen Reservoir. *See Appendix G.*

6.2.8 Sage Creek Rim

While this area is outside of Phase I, PCW established a Turbine No-Build Area north of the Sage Creek Rim to maintain a flight/movement corridor that was observed during eagle use surveys. *See Figure 6.9*. During 2011 and 2012 long-watch raptor surveys, eagle use and flight path data indicated that a corridor 800- to 1200-meters (0.5- to 0.75-mile) wide north of the Sage Creek Rim was consistently used by eagles moving from the west to the east along the southern edge of the Sierra Madre WDA. The aspect of the Sage Creek Rim faces to the northwest and provides potential soaring opportunities as the predominantly southwesterly and westerly winds interact with this topographic feature.

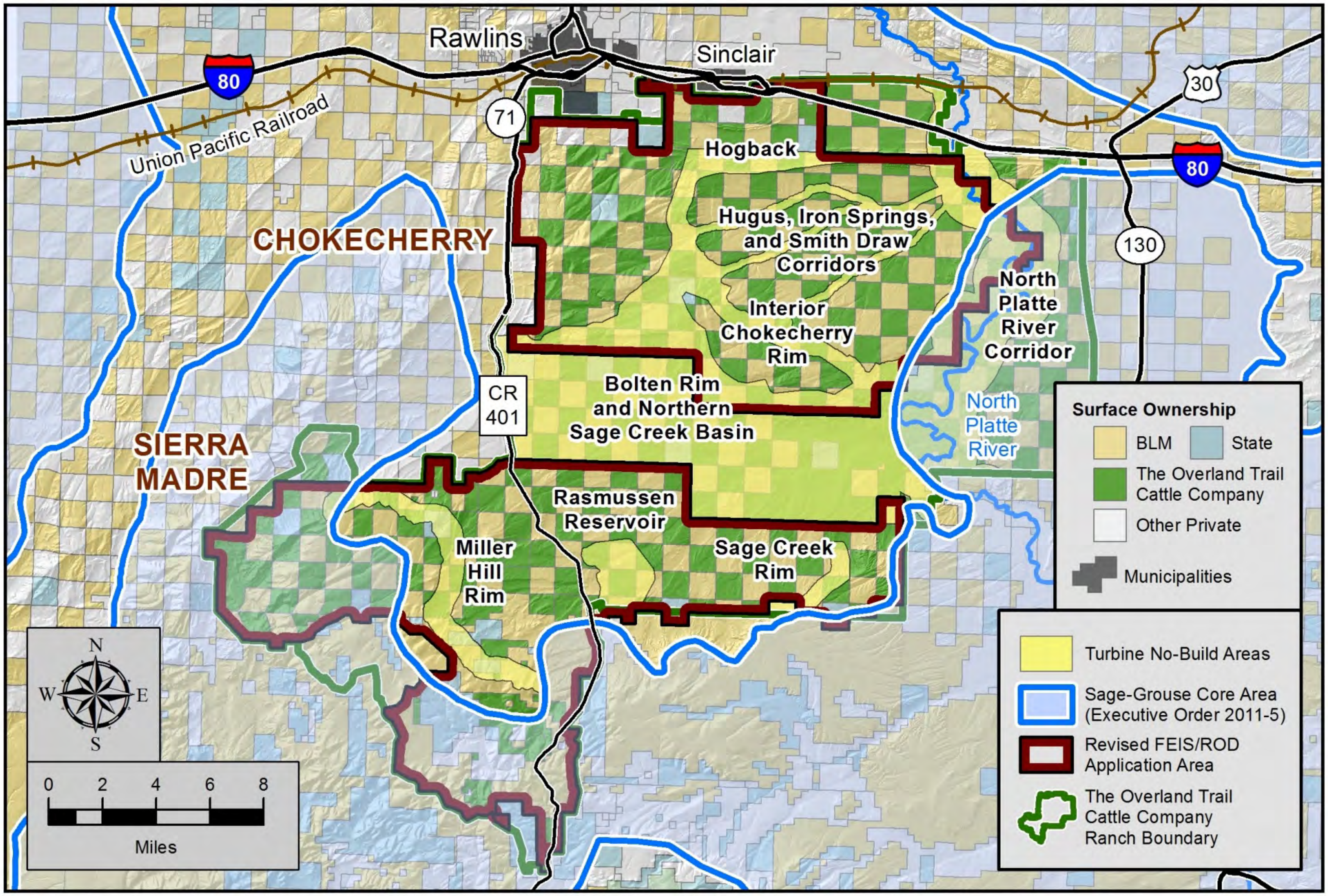

Figure 6.9. Turbine No-Build Areas for the CCSM Project.

6.3 Site-specific Avoidance and Minimization Measures

The avoidance and minimization recommendations developed by USFWS focus on identifying and avoiding areas such as occupied and unoccupied nests, areas of concentrated prey base, and other project-specific eagle activity areas, e.g. flight/movement corridors. *See USFWS 2013a; 2013c.* PCW has worked cooperatively with USFWS to apply appropriate avoidance and minimization measures to Phase I using site-specific data and information. USFWS provided its initial site-specific avoidance and minimization recommendations to PCW in August 2012. These recommendations were reviewed and refined numerous times through the end of 2013 to add specificity and to reflect the additional site-specific data and information collected during this period. *See Appendix H.* The Phase I wind turbine layout is the result of the application of the USFWS site-specific avoidance and minimization recommendations to the Phase I Development Area.

An account of the extensive coordination between PCW and USFWS, ongoing since 2010, to implement the recommendations made by USFWS and the avoidance and minimization measures for Phase I is set forth in Appendix H. A summary of the key recommendations and information regarding how each recommendation is addressed in Phase I is organized by subject matter in the following sections: (1) Eagle Nests; (2) Areas of Concentrated Prey Resources; and (3) Other Project-specific Eagle Activity Areas.

6.3.1 Eagle Nests

"Important eagle use areas," as defined in 50 C.F.R. §22.3, include eagle nests and landscape features surrounding eagle nests that are essential for the continued viability of the site for breeding, feeding, or sheltering eagles. As such, PCW and USFWS have expended significant effort since 2008 to identify eagle nests in the vicinity of Phase I and to develop avoidance and minimization measures to protect these nests and their associated important landscape features.

USFWS has developed standard avoidance and minimization recommendations for occupied and unoccupied eagle nests. *See USFWS 2013a; 2013c.* As described in section 5.1.2 and consistent with the USFWS recommendations, this Phase I ECP uses the terms "occupied nest" and "unoccupied nest" as defined in the ECP Guidance. *See USFWS 2013a.* The USFWS standard avoidance and minimization recommendations for occupied and unoccupied eagle nests are generally based on the ½-mean inter-nest distance (½-MIND). The ½-MIND is a site-specific distance calculated by USFWS that is based on an average distance among all occupied nests in a given year. The ½-MIND is calculated separately for bald and golden eagles and is intended to approximate the average eagle territory size. The ½-MIND calculated by USFWS for the CCSM Project, including Phase I, is 3,686 meters (2.3 miles) for bald eagles and 3,500 meters (2.2 miles) for golden eagles based on eagle nest data from 2012 for bald eagles and 2011 for golden eagles.

As noted in the ECP Guidance, the ½-MIND provides only a "coarse approximation for the territory boundary." *See USFWS 2013a.* The ECP Guidance encourages the use of site-specific data to identify appropriate, practicable avoidance and minimization measures. *See USFWS 2013a.* Further, while USFWS Region 6 adopted the ½-MIND distance as a standard recommended avoidance buffer for occupied eagle nests based on its use in the ECP Guidance, USFWS Region 6 recommends that site-specific information be used to adjust the buffers around eagle nests, "because the one-half mean inter-nest distance is a surrogate for territory size and only approximates eagle use." *See USFWS 2013c. See Appendix H.* The USFWS Region 6 Recommendations further acknowledge the coarse nature of this measure and provide that "[t]he ½-MIND [avoidance buffer] can be adjusted if site-specific data (e.g., telemetry, prey analysis, other data) are adequate to suggest the buffer should be larger/smaller/non-circular." *See USFWS 2013c.*

The following sections summarize the eagle nest and nesting territory avoidance and minimization measures developed for Phase I in response to the USFWS recommendations, including standard measures for occupied and unoccupied nests, as well as nest-specific measures for nests or nesting territories where site-specific data were used to make appropriate adjustments. These measures are based on eagle nest and eagle use data collected through 2014. *See Figure 6.10 & Figure 6.11.*[20] *See Chapter 5.0.* As discussed below, one of the primary avoidance and minimization measures for eagle nests recommended by USFWS and adopted by PCW is the creation of 800-meter buffers around eagle nests where wind turbines will not be placed. While PCW has removed all wind turbines within 800 meters of eagle nests based on the data collected through 2014, it is possible that new eagle nests will be discovered in the future. The Phase I wind turbine layout is final and it is no longer practicable for PCW to move wind turbines to new locations within the Phase I Development Area. Should new eagle nests be discovered within 800 meters of a wind turbine in the future, PCW will work cooperatively with USFWS through the adaptive management process described in section 8.7 to identify appropriate nest-specific avoidance and minimization measures such as curtailment.

[20] The eagle nest identification numbers used in Figure 6.10, Figure 6.11 and the following text correspond to the identification numbers assigned to the nests in the BLM RFO nest database and do not relate to the total number of nests identified within the CCSM Project or Phase I.

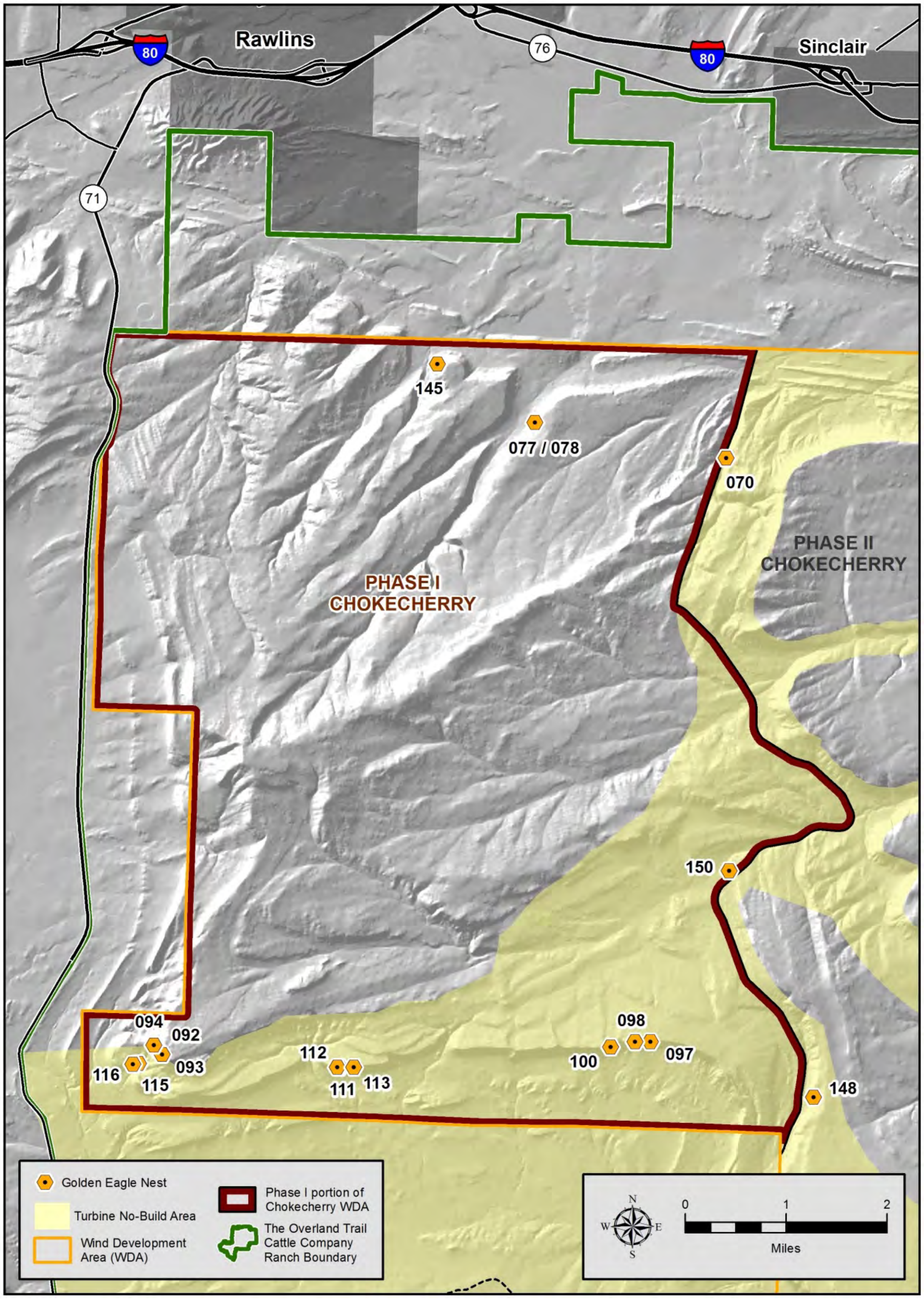

Figure 6.10. Phase I Chokecherry WDA Eagle Nests (1980 to 2014).

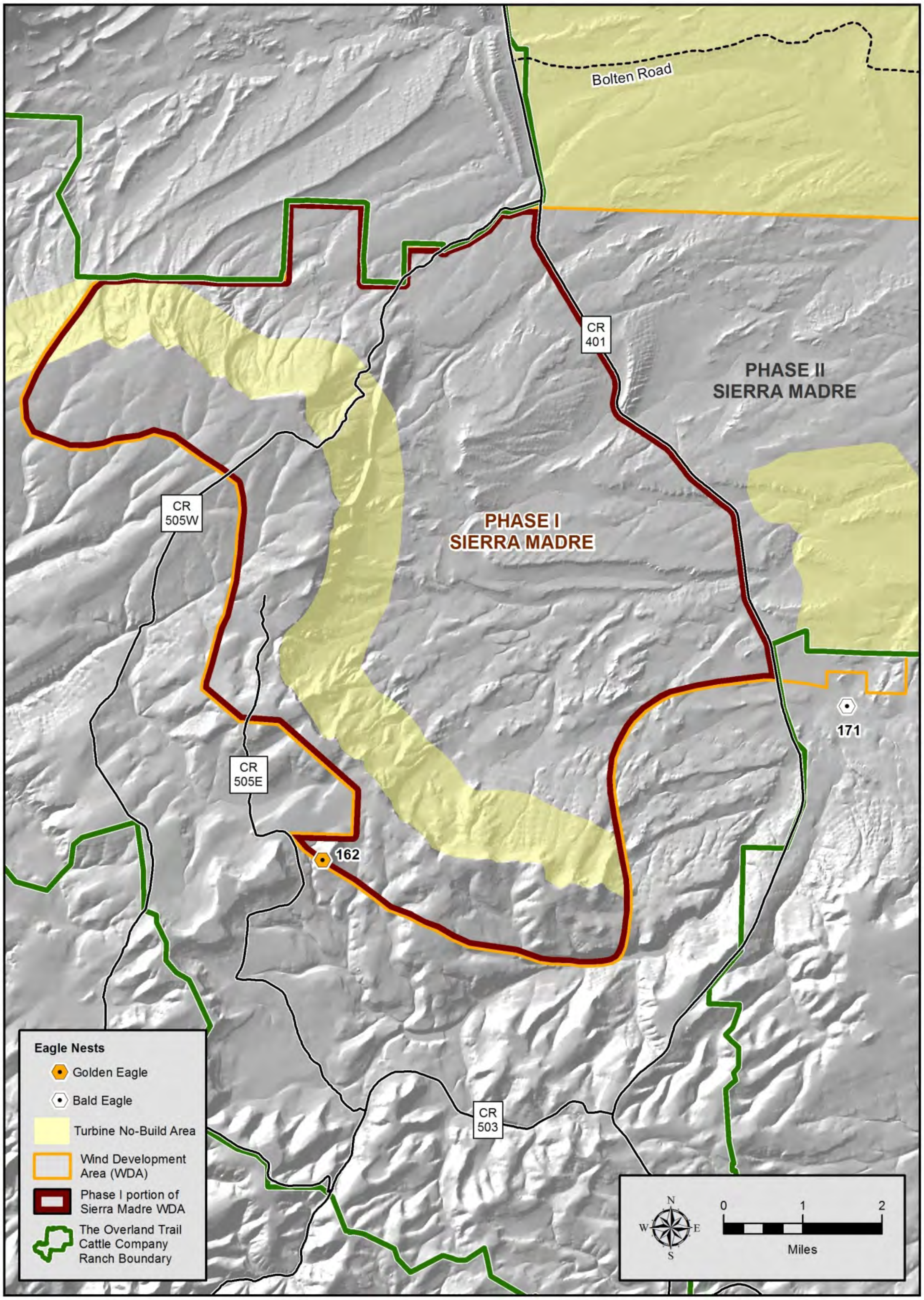

Figure 6.11. Phase I Sierra Madre WDA Eagle Nests (1980 to 2014).

Unoccupied Nests

USFWS Region 6 Recommendations state that for unoccupied nests the recommendations are applicable only to nests "that were not occupied during the last five years or last five years of field surveys." *See USFWS 2013c.* Therefore, for nests that do not meet this criterion or for unoccupied nests that become occupied, the standard avoidance and minimization measures for occupied nests or the nest-specific measures described in the following sections will apply in lieu of the measures described in this section. *See Figure 6.12. See "Occupied Nests" & "Nest-specific Measures."*

USFWS Region 6 recommends that "no turbines will be constructed within 0.5-mile (800-meters) of any unoccupied (historic) eagle nest." *See USFWS 2013c.* PCW developed the Phase I wind turbine layout using the survey and historic data described in section 5.2.2 such that no wind turbines are located within 800 meters of identified eagle nests.[21] *See Figure 6.10 & Figure 6.11.*

In addition, USFWS Region 6 recommends that "all turbines between 0.5-mile and 1.0 mile (1,600-meters) of any unoccupied nest will be curtailed during each year starting 15 January until 1 May, unless adequate nest surveys demonstrate that the nests are unoccupied." *See USFWS 2013c.* This recommendation was reviewed by PCW and USFWS using site-specific data gathered for the CCSM Project, including Phase I. Based on this site-specific data, PCW and USFWS developed an alternate curtailment strategy. For Phase I, PCW will curtail all wind turbines located between 800 and 1,600 meters of any unoccupied eagle nest each year during daylight hours (sunrise to sunset) starting February 1 until May 1 (i.e. sunset April 30), or until adequate nest surveys demonstrate that the nests are unoccupied. *See Section 9.2.* This alternate curtailment strategy is based upon the site-specific conditions and observed eagle use in Phase I and is therefore appropriate.

In developing the alternate curtailment strategy for unoccupied nests in Phase I, PCW and USFWS reviewed the site-specific data, including the 2011-2012 long-watch raptor survey data and the 2012 to 2013, 800-meter raptor count survey data. *See Section 5.2.1.* Site-specific long-watch raptor survey data collected in 2011 and 2012 demonstrates that eagle activity is very low within the CCSM Project Site, including Phase I, during early morning and late evening hours. In 42 hours of survey data collected prior to 8:00 AM in 2011 and 2012, only one eagle observation was recorded. This observation was recorded at 7:55 AM on August 18, 2011, substantially later than sunrise which occurred at approximately 6:12 AM on that day. Similarly, very few eagle observations occurred during the hours surrounding sunset. During April to June 2011 and January to June 2012 (selected to represent periods of use during nesting activities), only 11 minutes of eagle use were recorded in nearly 55 hours of survey time after 5:00 PM. These minutes represent only 0.78% of all observed eagle activity within the CCSM Project Site during spring 2011 and spring 2012, and all of this activity occurred prior to 5:20 PM and

[21] As noted earlier, while PCW has removed all wind turbines within 800 meters of eagle nests based on the data collected through 2014, it is possible that new eagle nests will be located in the future. Should new eagle nests be located within 800 meters of a wind turbine, PCW will work cooperatively with USFWS to identify appropriate nest-specific avoidance and minimization measures such as curtailment.

before sunset. In addition, PCW and USFWS reviewed the 2012-2013 800-meter raptor count data to determine the appropriate annual curtailment period. The raptor count data shows that eagle use within Phase I is very low during January and increases in mid-February. Based on the site-specific, scientific data, curtailment of wind turbines located between 800 and 1,600 meters of any unoccupied eagle nest each year during daylight hours (sunrise to sunset) starting February 1 until May 1 (i.e. sunset April 30), or until adequate nest surveys demonstrate that the nests are unoccupied, is an appropriate, practicable avoidance and minimization measure that protects eagles.

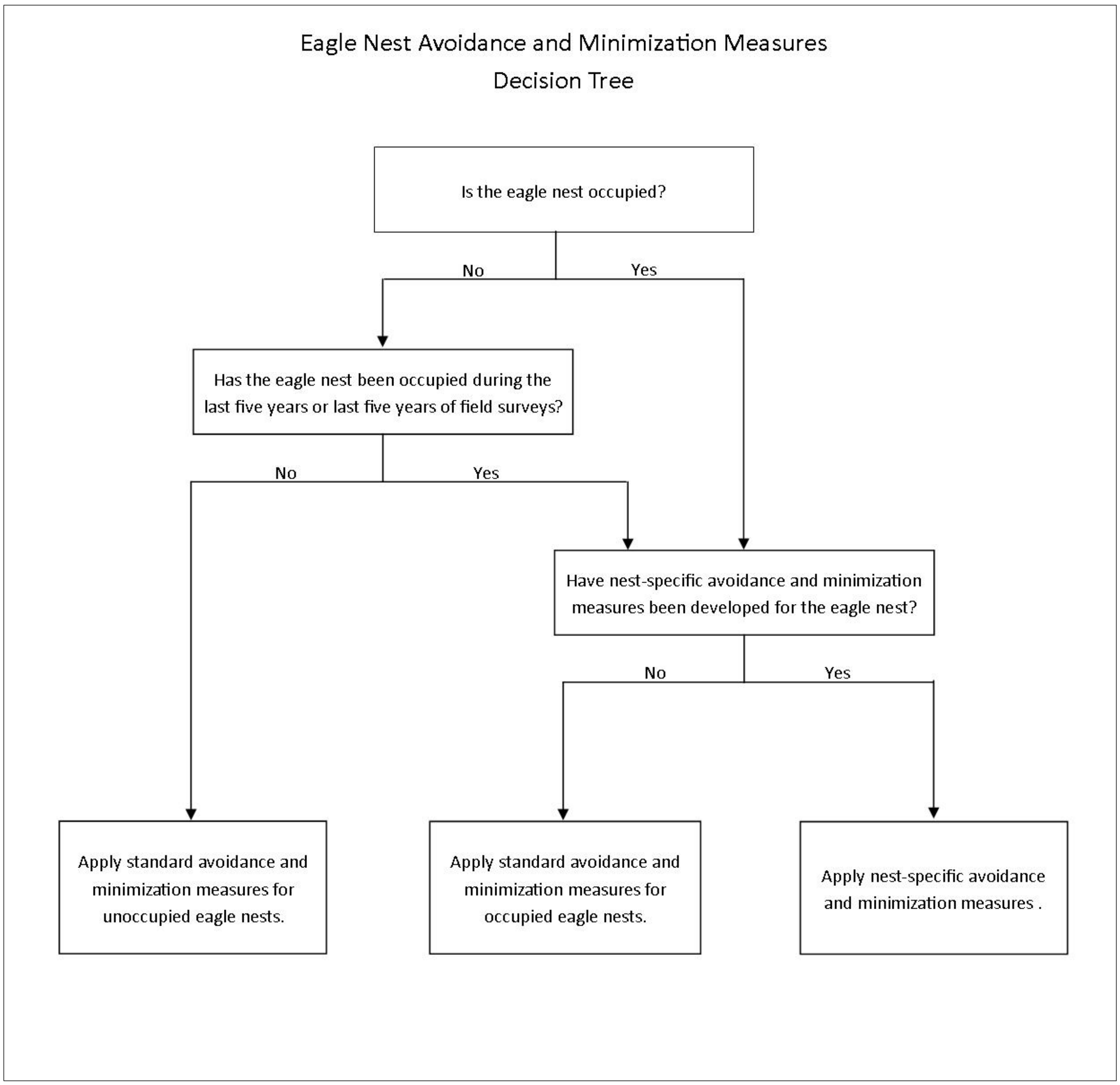

Figure 6.12. Application of Eagle Nest Avoidance and Minimization Measures.

Occupied Nests

In accordance with the USFWS Region 6 Recommendations, the avoidance and minimization measures described in this section are applicable to nests "that were occupied at least once during the last five years or last five years of field surveys." *See USFWS 2013c. See Figure 6.12.* However, this section does not apply to those nests for which nest-specific measures have been developed using site-specific information. *See Figure 6.12. See "Nest-specific Measures."* In addition, as additional data are collected for occupied nests or new nests are discovered, PCW may coordinate with USFWS to develop additional nest-specific avoidance and minimization measures that will replace these measures as appropriate. In the event a nest has not been occupied during the last five years or last five years of field surveys, the standard avoidance and minimization measures for unoccupied nests will apply. *See Figure 6.12. See "Unoccupied Nests."*

PCW developed the Phase I wind turbine layout using the survey and historic data described in section 5.2.2, such that no wind turbines are located within 800 meters of identified eagle nests.[22] *See Figure 6.10 & Figure 6.11*. Further, for those nests for which nest-specific measures have not been developed, PCW will establish a buffer within the ½-MIND of an occupied nest by curtailing wind turbines during daylight hours (sunrise to sunset) starting February 1 until May 1 (i.e. sunset April 30), or until adequate nest surveys demonstrate that the nests are unoccupied. *See Section 9.2. See Appendix H.*

Nest-specific Measures

In accordance with the USFWS recommendations, nest-specific avoidance and minimization measures were developed for eagle nests where adequate site-specific data suggest that the standard avoidance and minimization measures should be modified. *See USFWS 2013c. See Appendix H.* The avoidance and minimization measures described below will be applied to the individual named nests and their associated territories in lieu of the standard measures for occupied nests, i.e. the individual avoidance and minimization measures will be applied if the named nest was occupied at least once during the last five years or last five years of field surveys. In the event the individual nest has not been occupied during the last five years or last five years of field surveys, the standard avoidance and minimization measures for unoccupied nests will apply. *See Figure 6.12.*

[22] As noted earlier, while PCW has removed all wind turbines within 800 meters of eagle nests based on the data collected through 2014, it is possible that new eagle nests will be discovered in the future. Should new eagle nests be discovered within 800 meters of a wind turbine, PCW will work cooperatively with USFWS to identify appropriate nest-specific avoidance and minimization measures such as curtailment.

Nests #094, #098, and #112 and other nests in their associated territories

PCW is applying nest-specific avoidance and minimization measures to golden eagle nests #094, #098, #112, and other nests in their associated territories based on site-specific data.[23] *See Figure 6.13.* Golden eagle nests #094, #098, and #112 and the other nests in their associated territories are all located along the western Bolten Rim in the southern portion of the Chokecherry WDA within a Turbine No-Build Area that establishes a 800- to 3200-meter-wide (0.5- to 2.0-mile-wide) area north of the Bolten Rim in which wind turbines will not be constructed. The application of nest-specific avoidance and minimization measures to nests #094, #098, #112 and other nests in their associated territories is consistent with the ECP Guidance, which provides for use of site-specific data to identify appropriate, practicable avoidance and minimization measures.

For nests #094, #098, #112, and other nests in their associated territories, PCW has located wind turbines such that no wind turbines will be built within 800 meters (0.5 mile) of the nests. Further, in place of the USFWS recommended curtailment, PCW has adjusted the Phase I wind turbine layout such that no wind turbines are located within 1,600 meters (1 mile) of nests #094, #098, #112, and other nests in their associated territories. Based on site-specific data indicating that golden eagle use of areas surrounding the nests primarily occurs south of the Bolten Rim, when nest #094, #098, #112, or other nests in their associated territories are occupied, wind turbines within the ½-MIND surrounding the nests will not be curtailed.

In 2014, golden eagle nests #094, #098, and #112 were occupied. The site-specific data collected in 2014 and summarized in the 2014 Nest Summary Report demonstrate that golden eagle use of areas surrounding the nests located on the western Bolten Rim primarily occurs south of the rim more than 3,000 meters (1.9 miles) from the nearest wind turbine location. *See Figure 6.13*. As shown on Figure 6.13, there were two observations of use north of the Bolten Rim and all of these observations were within several hundred meters of the rim edge within the Turbine No-Build Area and 1,500 meters (0.9 mile) or more from the nearest wind turbine location. The observations are consistent with the use observed for other occupied nests on the Bolten Rim (in Phase II) as part of 2011, 2012, and 2013 monitoring. Therefore, this nest-specific alternate curtailment strategy is appropriate based on the site-specific conditions and observed eagle use surrounding nests #094, #098, #112, and other nests in their associated territories.

[23] Nests #092, #093, #115, and #116 are associated with the territory surrounding nest #094. Nests #109, #111, and #113 are associated with the territory surrounding nest #112. Nests #097 and #100 are associated with the territory surrounding nest #098. *See Figure 6.10.*

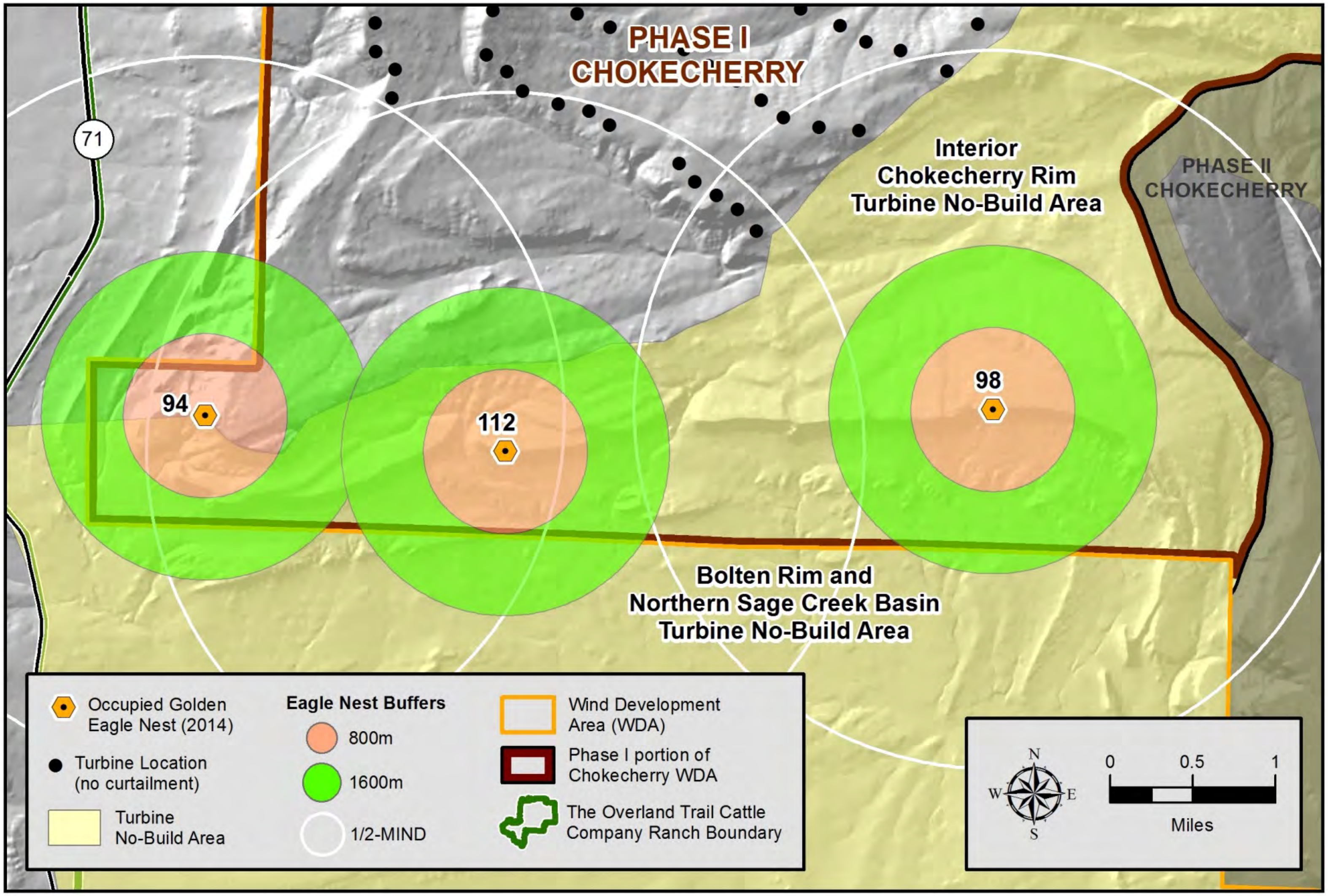

Figure 6.13. Avoidance and Minimization Measures for Nest #094, #098, #112, and their Associated Territories.

Nests #070, #077, #078, and #145

Nest #145 was occupied in 2008 and is located on a northwest facing cliff band along the north central edge of the Phase I portion of the Chokecherry WDA. Three nests are located in close proximity to nest #145, nests #070, #077, and #078. Nests #070, #077, and #078 were not occupied during the eagle nest surveys described in section 5.2.2. Nevertheless, PCW and USFWS developed nest-specific avoidance and minimization measures for nests #070, #077, #078, and #145 based on topographic features, potential prey-base locations, and eagle use observed in the vicinity of all four nests.

For nests #070, #077, #078, and #145, PCW has located wind turbines such that no wind turbines will be built within 800 meters (0.5 mile) of the nests. Further, in place of the USFWS recommended curtailment, PCW has adjusted the Phase I wind turbine layout such that no wind turbines are located within 1,600 meters (1 mile) of nest #070, #077, #078, or #145. This measure avoids and minimizes impact to the nests and provides a flight/movement corridor connecting the nests with the Interior Chokecherry Rim and Hogback Turbine No-Build Areas. This measure also avoids topographic features potentially used by eagles and provides connectivity to potential prey resources located north and northeast of the nests. *See Figure 6.14*. Further, implementing this measure will provide increased conservation benefits to eagles nesting in this area in the future.

In accordance with USFWS recommendations, if nest #070, #077, #078, or #145 becomes occupied, wind turbines within the ½-MIND of the occupied nest will be curtailed during daylight hours (sunrise to sunset) until adequate nest surveys demonstrate that the nest is unoccupied. *See Section 9.2.* PCW will work cooperatively with USFWS using the adaptive management process described in section 8.7 to modify the curtailment strategy if a nest becomes occupied and adequate site-specific data are collected to suggest that modification is appropriate.

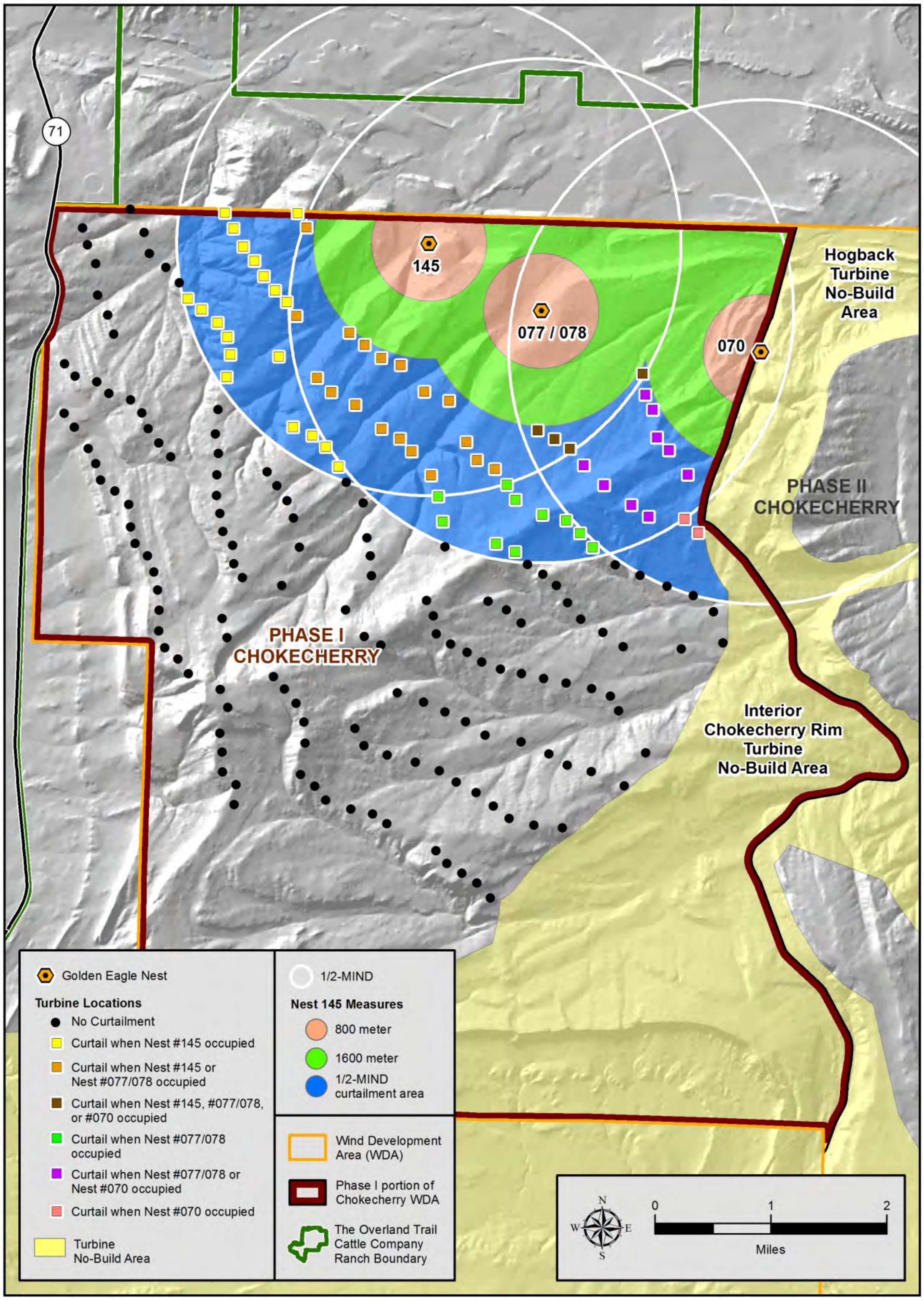

Figure 6.14. Nest #070, #077, #078 and #145 Avoidance and Minimization Measures.

Nest #150

Nest #150 is located outside of the eastern boundary of Phase I within the Turbine No-Build areas designed to avoid and minimize impacts to eagles using the Bolten Rim and Interior Chokecherry Rim. This nest is positioned on a small west-facing rock outcrop, approximately 2,850 meters (1.8 miles) north of the Bolten Rim. Nest #150 was occupied in 2014 and failed by the beginning of June. Areas within the ½-MIND surrounding nest #150 were surveyed in 2008 and 2011 through 2014.

PCW is applying nest-specific avoidance and minimization measures for golden eagle nest #150 based on site-specific data collected in 2011 through 2012 and 2014. *See Figure 6.15.* No wind turbines will be built within 800 meters (0.5 mile) of nest #150. Further, in place of the USFWS recommended curtailment, PCW has adjusted the Phase I wind turbine layout such that no wind turbines are located within 1,600 meters (1 mile) of nest #150 to provide additional protection for the nest. However, when nest #150 is occupied, wind turbines within the ½-MIND surrounding the nest will not be curtailed. This modification to the standard avoidance and minimization measure is based on the distance from the nest to the nearest Phase I wind turbine, which is 1,944 meters (1.2 miles) northwest of the nest. In addition, the nest is fully encompassed within Turbine No-Build areas designed to avoid and minimize impacts to eagles. Eagle flight path data collected in 2011 and 2012 during 671 hours of long-watch raptor surveys conducted at nearby survey locations also indicate that the majority of flight paths surrounding nest #150 occurred within the established Turbine No-Build areas, primarily along the Interior Chokecherry Rim. Finally, the 2012 and 2013 800-meter raptor count data corroborate the long-watch raptor survey data and indicate eagle use occurs almost exclusively within the Turbine No-Build areas surrounding nest #150.

The nest-specific measures developed for nest #150, including the establishment of Turbine No-Build areas, avoid and minimize impacts to the nest and provide a flight/movement corridor connecting nest #150 with the Interior Chokecherry Rim and Hogback Turbine No-Build Areas. These measures provide connectivity between the nest and potential foraging areas south of Chokecherry in the Sage Creek Basin, and north of Chokecherry as well. These measures are consistent with the ECP Guidance which provides for use of site-specific data to identify appropriate, practicable avoidance and minimization measures.

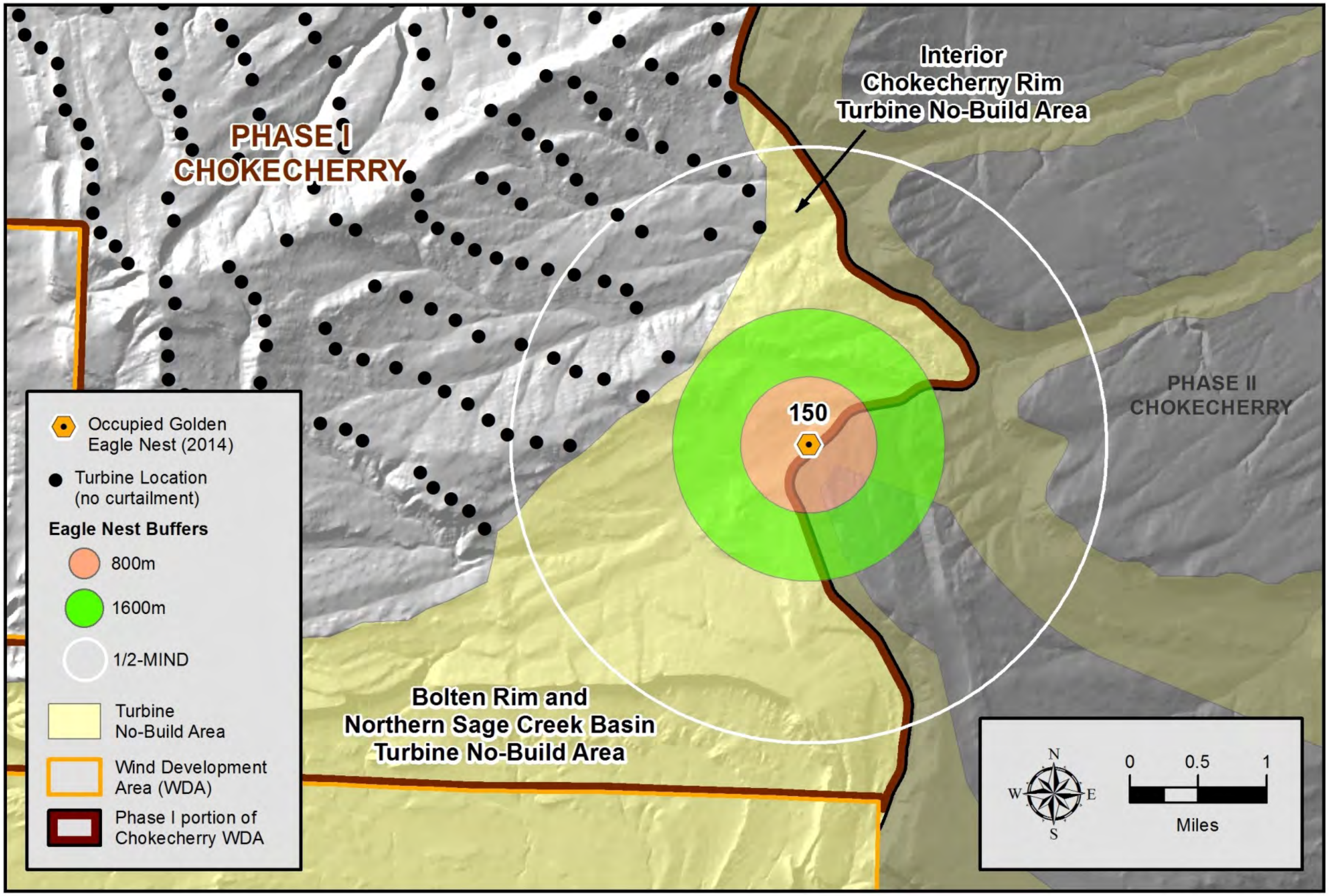

Figure 6.15. Nest #150 Avoidance and Minimization Measures.

Nest #162

Nest #162 is located in the southwest corner of the Phase I portion of the Sierra Madre WDA. *See Figure 6.16*. The nest is located on a ledge along the southwest face of a small, pyramid-shaped mesa. Nest #162 was occupied in 2011. Areas within the ½-MIND surrounding nest #162 were surveyed for eagle use in 2011 through 2014. During the period in which the nest was occupied, approximately 100 hours of survey data were collected to document flight paths and use surrounding the nest. An additional 163 hours of survey data were collected within the ½-MIND surrounding this nest in 2011 following the fledging of the juvenile golden eagle. Collectively, these data were used to identify nest-specific avoidance and minimization measures for nest #162.

Eagle flight path data collected during the period in which the nest was occupied in 2011 indicates that the majority of the observed eagle activity occurs south and west of the nest location in an area with documented greater sage-grouse use and pronghorn fawning activities. Two of the greater sage-grouse that were fitted with GPS transmitters by PCW were preyed upon by the eagles occupying this nest location as evidenced by the transmitters being recovered inside and at the base of the nest. Inspection of the nest after fledging indicated that the majority of prey remains in the nest were greater sage-grouse and pronghorn. Areas to the north and east of the nest within Phase I do not provide suitable habitat for consistent use by pronghorn or greater sage-grouse; this information and the lack of observed eagle flight paths in this area during the nesting period indicate that use from this nest occurs mainly outside of Phase I to the south and west.

Using the site-specific data collected for nest #162, PCW and USFWS developed nest-specific avoidance and minimization measures for the protection of eagles that may use nest #162. No wind turbines will be built within 800 meters (0.5 mile) of nest #162 and wind turbines within 1,600 meters (1 mile) of the nest will be curtailed seasonally during daylight hours (sunrise to sunset) starting February 1 until May 1 (i.e. sunset April 30) or until adequate nest surveys demonstrate that the nest is unoccupied. *See Section 9.2.* Further, to avoid and minimize impacts to a potential flight/movement corridor from the nest location to the Miller Hill Rim, nine additional wind turbines along the Miller Hill Rim east of the nest will be curtailed seasonally during daylight hours starting February 1 until May 1 (i.e. sunset April 30) or until adequate nest surveys demonstrate that the nest is unoccupied. *See Figure 6.16*. *See Section 9.2.*

If nest #162 becomes occupied, wind turbines within the ½-MIND of the nest, with the exception of 11 wind turbines located north and east of the nest in areas that lack eagle use, will be curtailed during daylight hours (sunrise to sunset) until adequate nest surveys demonstrate that the nest is unoccupied. *See Figure 6.16. See Section 9.2.* The 11 wind turbines located within the ½-MIND to the north and east will continue to operate normally with no curtailment based on the site-specific eagle use data.

Due to the majority of the use associated with nest #162 occurring to the south and west, this curtailment strategy avoids and minimizes impact to eagles that may use nest #162 and is consistent with the ECP Guidance, which provides for use of site-specific data to identify appropriate, practicable avoidance and minimization measures. *See Figure 6.16.*

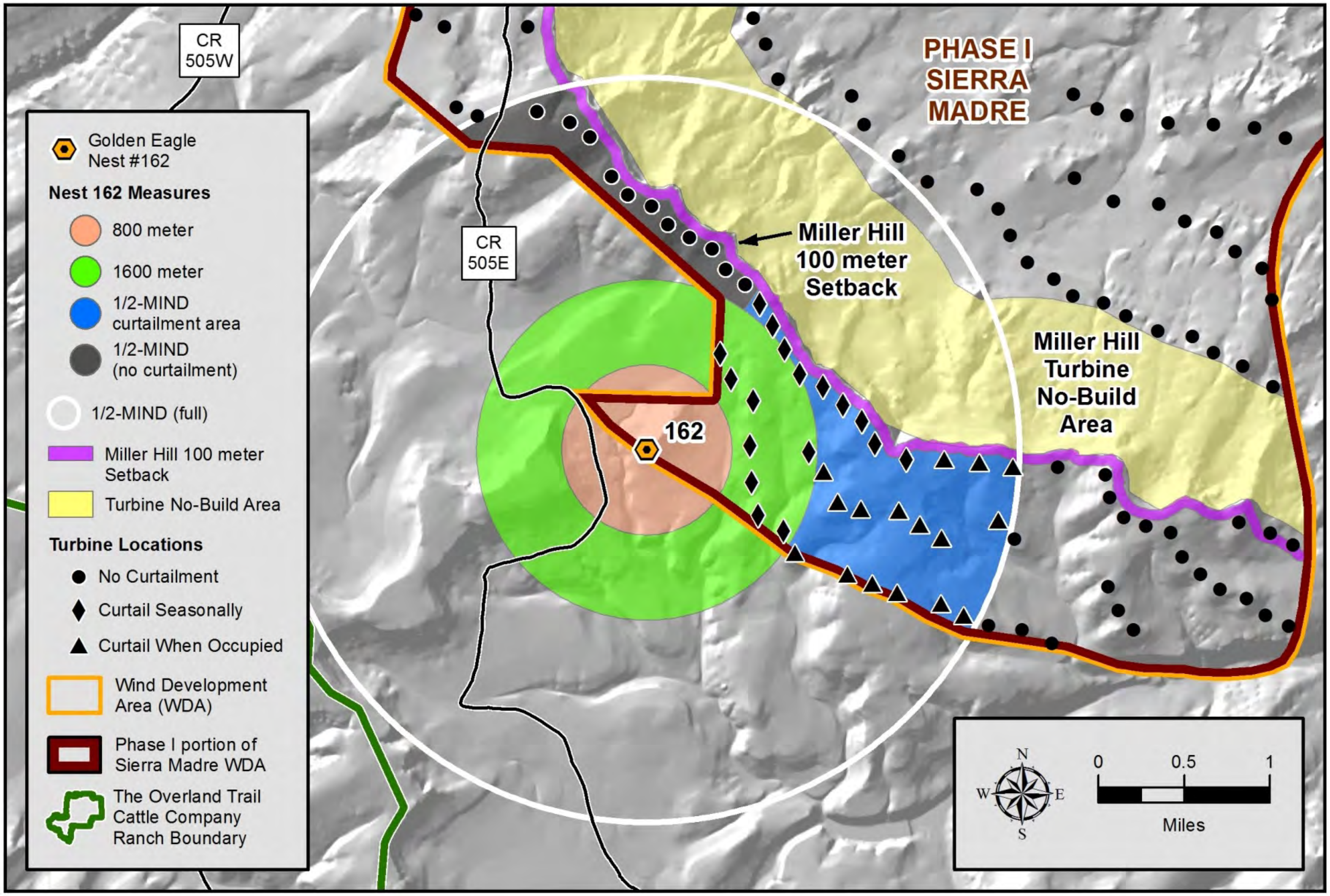

Figure 6.16. Nest #162 Avoidance and Minimization Measures.

6.3.2 Areas of Concentrated Prey Resources

While areas of concentrated prey resources are not “important eagle use areas” as defined in 50 C.F.R. §22.3, USFWS recommends that areas of concentrated prey resources should be avoided if they overlap with or are adjacent to important eagle use areas or areas USFWS has identified as “project-specific eagle activity areas.” *See USFWS 2013c.* PCW conducted prey base surveys for Phase I to delineate prey resources of sufficient size and density that are also associated with eagle use so as to identify those that may meet USFWS’s criteria for avoidance. *See Section 5.2.4. See Appendix F.* PCW’s prey base and eagle use surveys did not identify any areas of concentrated prey resources; however, USFWS recommended avoidance of one prey resource location with demonstrated eagle use within Phase I (Prey Area). *See Figure 6.17. See Appendix H.*

The Prey Area is a complex of multiple small, dispersed colonies of WTPD that was identified west of Rasmussen Reservoir. *See Figure 6.17.* During avian survey, eight eagle flight paths were mapped in this area. As recommended by USFWS, PCW reviewed the data for the Prey Area to identify appropriate avoidance and minimization measures. Upon review of the data, PCW noted that the WTPD colonies in the southeastern portion of the Prey Area were generally smaller with lower densities and more scattered distributions than the colonies in the northern portions of the area. In addition, all documented eagle use occurred in the northern portions of the Prey Area. Therefore, at the recommendation of USFWS, PCW revised the Phase I wind turbine layout (Version 5) by relocating 28 wind turbines from the northern portions of the Prey Area to other locations within the Phase I Development Area. The exclusion of 28 wind turbines from the Prey Area avoids potential impacts to eagles that may use the area for foraging or other activities. In addition, moving the 28 wind turbines from the Prey Area provides a 800- to 2400-meter-wide (0.5- to 1.5-mile-wide) corridor between the prey base area, the Miller Hill Turbine No-Build Area, and greater sage-grouse Core Areas. *See Figure 6.17*.

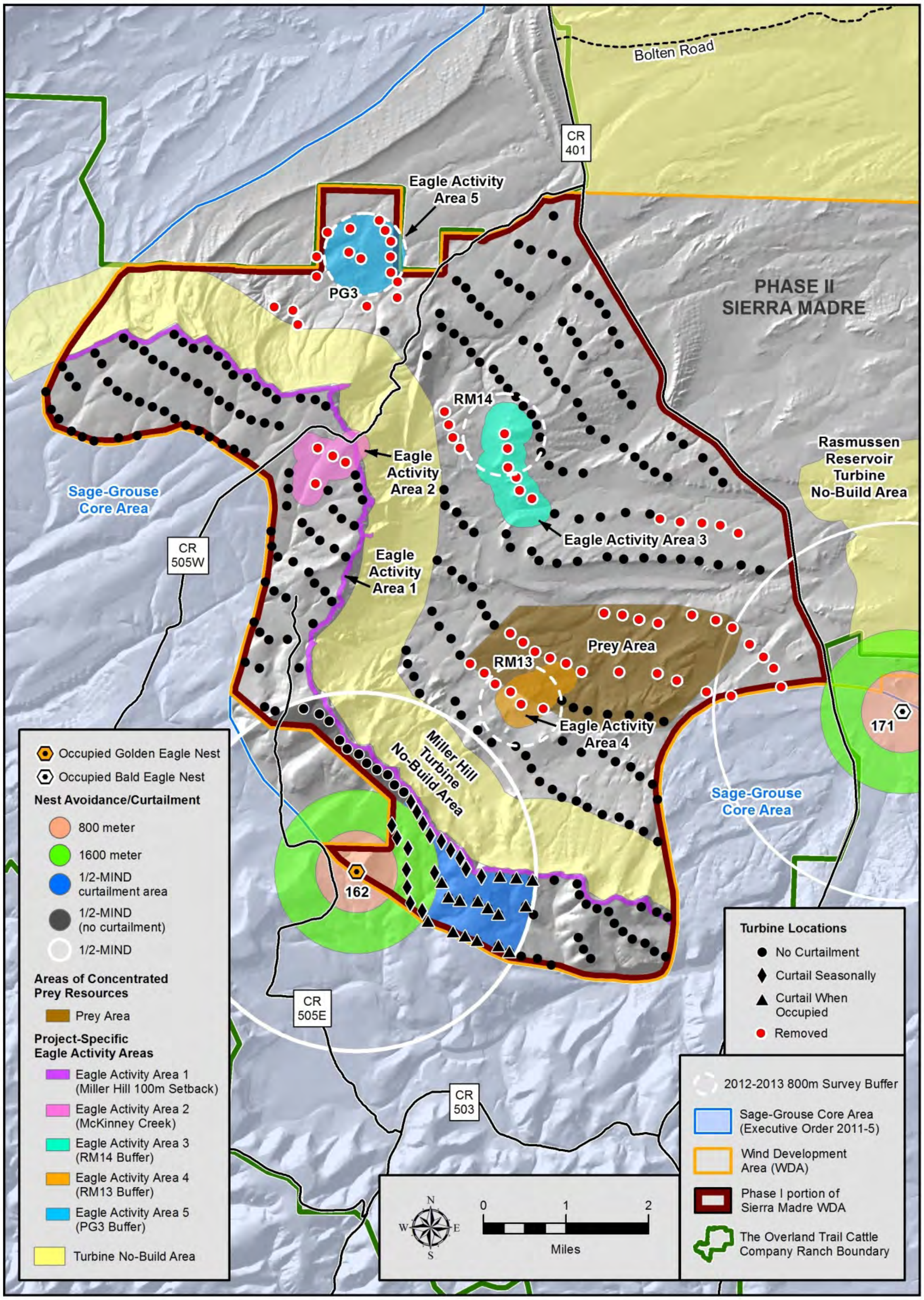

Figure 6.17. Prey Resource and Eagle Activity Area Avoidance and Minimization Measures.

6.3.3 Other Project-specific Eagle Activity Areas

In addition to important eagle use areas, USFWS Region 6 recommends avoidance of areas referred to as "other project-specific eagle activity areas." USFWS states that "although project-specific, certain areas (e.g., topographic relief creating uplifts, migration corridors, perch sites) are typically used by eagles; therefore, it is appropriate to identify these areas and provide buffer recommendations for them." *See USFWS 2013c.* The following section summarizes the avoidance and minimization measures developed cooperatively by PCW and USFWS for the project-specific eagle activity areas identified by USFWS.

Miller Hill

USFWS identified Miller Hill Rim as a project-specific eagle activity area and recommended a 100-meter (328-foot) setback along the rim (Eagle Activity Area 1) to avoid and minimize impacts to eagles using this area. *See Figure 6.17.* In response to the USFWS recommendation, PCW evaluated its data on the use of Miller Hill Rim by eagles to identify appropriate avoidance and minimization measures. Eagles are known to use uplifts from winds along cliffs to gain and maintain altitude for soaring and kiting. However, PCW's observations of eagles in this area generally note powered flight from Upper Miller Hill to Lower Miller Hill with few observations of soaring and kiting along Miller Hill Rim. PCW's extensive wind data for the area confirms that winds in the Miller Hill area are from the west and southwest for as much as 75% of the time, as shown on the wind rose from meteorological tower Sierra Madre 3 located on Upper Miller Hill. *See Figure 6.18*. Since Miller Hill rises from the southwest to the northeast and the rim faces to the east and northeast, downdraft conditions are commonly created along the rim. The strong directionality of the winds in this area and the predominantly downdraft conditions on Miller Hill (as opposed to the uplifts necessary for soaring and kiting) means that the Miller Hill Rim does not provide regular soaring and kiting opportunities for eagles. However, it is possible that the Miller Hill Rim may be used for soaring and kiting during low wind conditions or infrequently when winds are from the east or northeast; therefore, a setback from the rim avoids and minimizes impact to eagles under these conditions.

Following consideration of the site-specific data for Phase I, PCW implemented the USFWS recommended 100-meter (328-foot) setback by siting all wind turbines in Upper Miller Hill a minimum of 100 meters (328 feet) from Miller Hill Rim. *See Figure 6.17*. Further, PCW moved the bases of the wind turbines farther than 100 meters (328 feet) from the Miller Hill Rim to avoid overhang of blades into the 100-meter (328-foot) setback (generally the wind turbine bases are 160 meters (525 feet) or more from the rim). To implement the setback, PCW revised the Phase I wind turbine layout (Version 5) by relocating 65 wind turbines to other locations within the Phase I Development Area.[24]

[24] The 65 wind turbines relocated in response to establishment of the Miller Hill Rim 100-meter (328-foot) setback are not shown on Figure 6.14 for reasons of scale and clarity; however, the movement of these wind turbines to other locations within the Phase I Development Area can be seen when comparing Figure 6.7 and Figure 6.8.

Implementation of the setback avoids and minimizes impact to eagles that use Eagle Activity Area 1. In addition, the setback provides increased connectivity to the Miller Hill Turbine No-Build Area.

McKinney Creek

USFWS identified west and southwest facing slopes in the McKinney Creek headwaters as a project-specific eagle activity area and recommended placing a 300-meter (984-foot) buffer around these slopes roughly adjacent to County Road 505W (Eagle Activity Area 2). *See Figure 6.17.* Similar to the Miller Hill Rim setback (Eagle Activity Area 1), this recommendation is related to eagle soaring and kiting behavior along the Miller Hill Rim. As documented above, eagle soaring and kiting behavior along Miller Hill Rim occurs infrequently. Analysis of eagle flight paths collected between 2011 and 2013 in Eagle Activity Area 2 indicates that eagles generally fly perpendicular to Miller Hill Rim in this area and movement consists primarily of direct powered flight. This demonstrates that eagles are using the predominant westerly and southwesterly wind directions to move through the area. However, to address the USFWS recommendation, PCW revised the Phase I wind turbine layout (Version 5) by moving four wind turbines to other locations within the Phase I Development Area. When combined with the setback established for Eagle Activity Area 1, the removal of wind turbines from Eagle Activity Area 2 creates a 1200- to 1600-meter-wide (0.75- to 1-mile-wide) corridor that provides a connection to undeveloped portions of Miller Hill, the Miller Hill Turbine No-Build Area, and greater sage-grouse Core Areas. *See Figure 6.17.*

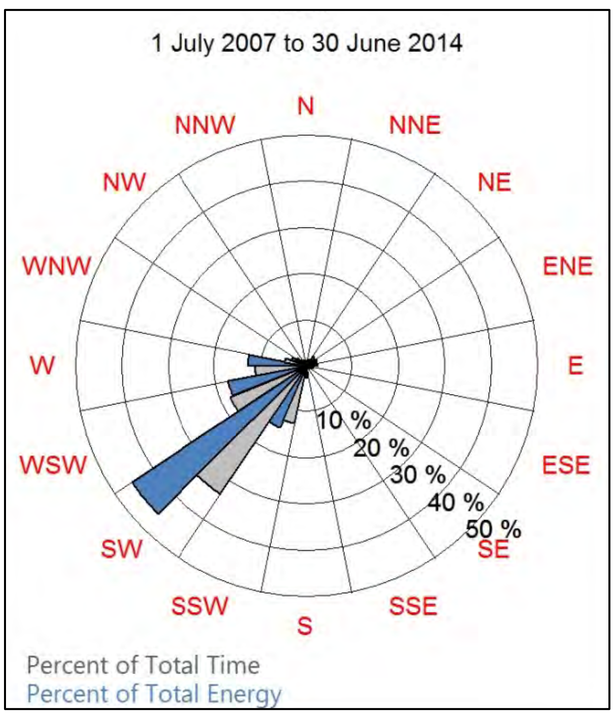

Figure 6.18. July 2007 to June 2014 Wind Rose for Meteorological Tower Sierra Madre 3.

Lower Miller Hill

USFWS identified certain slopes adjacent to Raptor Monitoring site 13 (RM13) and Raptor Monitoring site 14 (RM14) as project-specific eagle activity areas and recommended placing a 300-meter (984-foot) buffer around these areas (Eagle Activity Areas 3 and 4, respectively). *See Figure 6.17*. PCW monitored the RM13 survey location for eagle use in 2011 and monitored the RM14 survey location for eagle use in 2011, 2012, and 2013. Eagle use in both areas indicates that certain slopes surrounding the monitoring sites could be used by eagles for soaring and kiting. To implement the USFWS recommendations, PCW revised the Phase I wind turbine layout (Version 5) by relocating 3 wind turbines near RM13 and 11 wind turbines near RM14 to other locations within the Phase I Development Area. Implementation of the buffer around RM13 avoids and minimizes impact to eagles that may use the area and provides additional connectivity to Prey Area 1. *See Figure 6.17*. Designation of the buffer around the RM14 survey location avoids and minimizes potential impacts to eagles in the area and provides additional connectivity with the Miller Hill Turbine No-Build Area, Eagle Activity Areas 1 and 2, and greater sage-grouse Core Areas. *See Figure 6.17*.

Other Potential Project-specific Eagle Activity Area

PCW identified one additional area with observed eagle use and prey resources and that provides connectivity to other important eagle use areas. Eagle Activity Area 5 is located north of Miller Hill and contains several small WTPD colonies that may contain suitable foraging opportunities for eagles. During eagle use surveys, PCW observed eagle flight paths and foraging behaviors in this area. PCW revised the Phase I wind turbine layout (Version 5) by relocating 17 wind turbines from Eagle Activity Area 5 to other locations within the Phase I Development Area. The exclusion of 17 wind turbines from Eagle Activity Area 5 avoids potential impacts to eagles that may use the area for foraging or other activities. In addition, moving the 17 wind turbines provides increased connectivity to the Miller Hill Turbine No-Build Area as well as other undeveloped habitats north of Miller Hill. *See Figure 6.17*.

6.4 Infrastructure Avoidance and Minimization Measures

PCW has designed Phase I to avoid and minimize risks to eagles, including potential disturbance take. As requested by USFWS, PCW evaluated all eagle nests located within 800 meters (0.5 mile) of Phase I. Based on the eagle nest surveys completed through 2014, there are no eagle nests within 800 meters of a Phase I wind turbine, and there are only 5 nests within 800 meters of Phase I infrastructure, as follows:

- Bald eagle nest #055: 160 meters (0.1 mile) from North Platte River Water Extraction Facility
- Golden eagle nest #145: 160 meters (0.1 mile) from Road Rock Quarry
- Golden eagle nest #147: 640 meters (0.4 mile)from Phase I Haul Road and transmission line
- Golden eagle nest #148: 160 meters (0.1 mile) from Phase I Haul Road and transmission line
- Golden eagle nest #150: 100 meters (0.06 mile)from Phase I Haul Road and transmission line

As described below, the Phase I infrastructure within 800 meters (0.5 mile) of the five eagle nests was located to avoid and minimize risks to eagles to the extent practical such that the remaining take is unavoidable.

6.4.1 North Platte River Water Extraction Facility

The North Platte River Water Extraction Facility will extract surface water from the North Platte River for delivery via pipeline to the CCSM Project, including Phase I. The facility consists of a submersible pump (approximately 50 horsepower) mounted in a 72-inch precast concrete wet well adjacent to the North Platte River. The wet well and pump will be below grade to minimize visibility and noise. The power source for the pump will be a diesel generator located over 3.2 kilometers (2 miles) away at a booster station. PCW will operate the facility remotely as needed to supply water. The facility will be inspected at least weekly during normal operation. During the winter months, the facility will be shut down and the pump will be removed from the wet well.

The North Platte River Water Extraction Facility is located on the North Platte River at the intersection of an existing Ranch road and Carbon County Road 374S. This location is outside of greater sage-grouse Core Areas near WGFD's Fort Steele/Rochelle Public Access Area approximately 3.2 kilometers (2 miles) south of Interstate 80. WGFD's Fort Steele/Rochelle Public Access Area allows for public fishing and hunting and the river in that location is heavily used for fishing and recreational boating activities.

The location of the North Platte River Water Extraction Facility near existing sources of potential disturbance, such as public roads and river access points, minimizes the potential for the facility to disturb bald eagle nest #055. Further, the location of the facility facilitates the use of the existing Ranch road for access to the CCSM Project, minimizing the amount of ground disturbance required for the facility and reducing impacts on other resources such as soil, vegetation, and water quality.

There are numerous bald eagle nests along the North Platte River and the majority of the North Platte River adjacent to the CCSM Project is within greater sage-grouse Core Area. Alternative facility locations outside of greater sage-grouse Core Areas would be in previously undisturbed areas that are also within 800 meters (0.5 mile) of eagle nests, in some cases more than one, and as such would create a higher risk for potential disturbance. The North Platte River Water Extraction Facility is located consistent with the requirements of BLM's ROD and avoids and minimizes risks to eagles to the extent practicable.

6.4.2 Road Rock Quarry

The Road Rock Quarry is a single-site, sandstone/shale surface rock quarry operation designed to provide aggregate for construction of Phase I. Located at the site of an existing quarry, the primary material to be obtained from the Road Rock Quarry is unweathered sandstone and shale. Operations at the quarry generally consist of stripping and stockpiling topsoil and overburden to expose the underlying material for excavation. The target material is then removed by excavation and/or drilling and blasting, transferred to a staging area for separation and crushing, and stockpiled for use throughout Phase I. The quarry will improve the efficiency of Phase I by decreasing the number of train and truck trips from off-site quarries necessary to supply the project with road base aggregate. Development of the Quarry will also further ensure that local material shortages do not occur during construction of Phase I. In addition, the lower volume of materials delivered by train allows a portion of the material handling facilities and aggregate storage stockpiles at the West Sinclair Rail Facility to be eliminated, reducing the required surface disturbance and the cost of the West Sinclair Rail Facility.

The Road Rock Quarry is located at an existing quarry that has been operated intermittently over the last 100 years. No other feasible locations for an on-site quarry with suitable material in sufficient quantities were identified. The CCSM Project alternatives analyzed in BLM's FEIS provided for delivery of aggregate by rail and truck from off-site sources. At the time the BLM FEIS was completed, a feasible on-site source of aggregate had not been identified. Subsequent to the BLM FEIS, PCW identified the existing quarry site, with rock material that was a suitable source of base aggregate for Phase I, on land acquired by TOTCO. The EA for the Phase I Infrastructure Components analyzed the environmental impacts of the Road Rock Quarry and BLM's Decision Record determined that the Road Rock Quarry "would reduce the net adverse impacts associated with the project." *See BLM 2014a; 2014b.* The location of the Road Rock Quarry at an existing active quarry minimizes new surface disturbance and impacts to biological resources, including bald and golden eagles.

6.4.3 Phase I Haul Road and Transmission Lines

In accordance with BLM's ROD, the Phase I Haul Road and transmission line are co-located between the WDAs and within the WDAs the transmission lines follow the Phase I roads as closely as practical. The Phase I Haul Road is a key component of the CCSM Project's transportation strategy and the internal transmission lines provide critical electrical connections between the collection substations and interconnection substation.

The Phase I Haul Road is designed for efficient transport of materials, components, equipment, and personnel throughout the CCSM Project Site. The Phase I Haul Road provides access to Interstate 80, the West Sinclair Rail Facility, the Road Rock Quarry, and the Phase I WDAs. To meet the Phase I construction schedule, the road is designed to handle oversize loads while maintaining two-way traffic at speeds of up to 40 mph. The road design also minimizes the use of public roads to reduce potential impacts to public safety. While the Phase I Haul Road is designed for speeds of up to 40 mph, in compliance with the ROD, PCW will post speed limits commensurate with road types, traffic volumes, vehicle types, and site-specific conditions to ensure safe and efficient traffic flow and to reduce wildlife collisions and disturbance and airborne dust. *See BLM 2012a at App. D.* During construction, the primary traffic on the Phase I Haul Road will be material and equipment deliveries along with traffic associated with an estimated construction workforce of up to 945 workers. Following construction, traffic will be greatly reduced and will generally be limited to traffic from an operation staff of approximately 114 workers.

The CCSM Project's 230 kV internal transmission lines will transfer the electrical generation from the collection substations to the interconnection substation. The use of 230 kV lines reduces the number of lines and the transmission line follows the Phase I roads as closely as practical. PCW intends to construct the internal transmission lines using steel monopole structures. Minimum horizontal and vertical clearances will be calculated using National Electric Safety Code or similar requirements. The Avian Power Line Interaction Committee (APLIC) has issued guidelines designed to reduce operational and avian risks that result from avian interactions with electric facilities. *See APLIC 2005; 2006; 2012.* The internal transmission system will be designed to meet APLIC recommendations by ensuring there are sufficient separation distances between components.

BLM's FEIS analyzed multiple alternatives for the location of the Phase I Haul Road and internal transmission lines including: (1) routing the CCSM Project traffic on existing public roads; (2) establishing a new route parallel to existing public roads; (3) upgrading an existing Ranch road through Hugus Draw to create an internal haul road and transmission line; and (4) upgrading an existing two-track road through Wild Horse Canyon to create an internal haul road and transmission line.

In the ROD, BLM determined that the preferred alternative is to locate the haul road and transmission line internal to the CCSM Project along the existing road through Hugus Draw, primarily because the location avoids steep terrain and is located further from important recreation areas. However, BLM also notes that upgrading the existing road through Hugus Draw would have less surface disturbance and associated impacts to soils and vegetation than creating a new alignment parallel to the public roads or upgrading the two-track through Wild Horse Canyon. BLM further recognizes that if existing public roads are used, PCW must upgrade these roads and BLM acknowledges that PCW does not own or have access to the private land adjacent to these roads that would be required to upgrade the existing road or create a parallel route.

Consistent with BLM's ROD, the Phase I Haul Road and internal transmission line alignment in the vicinity of golden eagle nests #147, #148, and #150 follows the existing Ranch road through Hugus Draw. While routing the haul road through Wild Horse Canyon was evaluated in the BLM FEIS and is also consistent with some of the benefits identified by BLM, as noted in the ROD, there would be substantial additional surface disturbance required. Additional impacts to eagles and known eagle use areas are also likely on the route through Wild Horse Canyon. The alternative location through Wild Horse Canyon would route the haul road in the vicinity of a number of raptor nests, multiple large prairie dog colonies and the Wild Horse Canyon greater sage-grouse lek, one the largest and most active greater sage-grouse leks in the Chokecherry WDA. Further, the existing road through Wild Horse Canyon is a two-track road that is not frequently used; therefore, existing disturbance in that area is minimal in comparison to existing disturbance on the road through Hugus Draw.

In conclusion, for all of the reasons detailed above, locating the Phase I Haul Road and internal transmission line on the existing Ranch road through Hugus Draw, i.e. in an area with an existing well-used road and the associated disturbance, avoids and minimizes risks to eagles to the extent practical.

6.5 Preliminary Risk Assessment Following Stage 4 (Project Siting)

PCW has worked closely with USFWS to develop measures to avoid and minimize impacts to bald and golden eagles. The comprehensive measures described in this chapter avoid or minimize risks in important eagle use areas as well as other areas commonly used by eagles including topographic features, prey resources, and flight/movement corridors.

Through the implementation of the avoidance and minimization measures described in this chapter, PCW developed a final wind turbine layout for Phase I. *See Section 6.1.8.* The final layout reflects PCW's micrositing efforts and incorporates the avoidance and minimization measures recommended by USFWS as described in this ECP. As a result, the Phase I wind turbine layout complies with the ECP Guidance and Wind Energy Guidelines and represents the culmination of an iterative approach to siting and site characterization consistent with Stages 1-4 of the ECP Guidance and Tiers 1-3 of the Wind Energy Guidelines. The resulting Phase I wind turbine layout - when combined with the various conservation and mitigation measures, monitoring and adaptive management practices, and experimental ACPs described throughout this Phase I ECP - avoids and minimizes impacts to bald and golden eagles such that additional take is unavoidable. Following the application of the avoidance and minimization measures described in this chapter, PCW characterized Phase I as a Category 2 project.

7.0 Predicting Eagle Fatalities (ECP Guidance Stage 3)

In compliance with Stage 3 of the ECP Guidance, this chapter identifies both direct mortality and other risks to eagles for Phase I. Stage 3 of the ECP Guidance recommends that USFWS and the project developer use data from Stage 2 to generate predictions of eagle risk in the form of an estimated average number of fatalities per year extrapolated to the tenure of the permit.[25] Stage 3 of the ECP Guidance also instructs USFWS and the project developer to evaluate Stage 2 data to determine whether disturbance take is likely, and if so, at what level. In accordance with USFWS Region 6 Recommendations, the eagle fatality estimate for Phase I was completed after application of the avoidance and minimization measures described in chapter 6.0.

7.1 Results of Eagle Fatality Modeling

USFWS uses a Bayesian model to predict the number of eagle fatalities for a wind energy facility. *See USFWS 2013d*. The USFWS model estimates annual eagle fatalities as the product of the rate of eagle exposure to wind turbine hazards (exposure rate), the probability that eagle exposure will result in a collision with a wind turbine (collision probability), and an expansion factor that scales the resulting fatality rate to the project-specific affected potential exposure area and time. Within a Bayesian framework, USFWS defines prior distributions for the exposure rate and collision probability. The expansion factor is constant. Using site-specific data, the USFWS model calculates the exposure posterior distribution using the observed data. The number of predicted annual fatalities is estimated as the expanded product of the posterior exposure distribution and collision probability prior. *See USFWS 2013d.*

Both PCW and USFWS used the USFWS model to predict the number of eagle fatalities for Phase I; however, by analyzing the data in different ways and varying specific assumptions, as described below, PCW and USFWS developed differing fatality estimates. Both fatality estimates are described in this Phase I ECP along with their assumptions to provide context for each estimate. Even though PCW has presented its own fatality estimate, PCW has developed the compensatory mitigation in this Phase I ECP based on the USFWS fatality predictions described in section 7.1.1.

7.1.1 USFWS Fatality Predictions

The USFWS Bayesian modeling approach is flexible and allows for modification, which is advantageous because the USFWS model can be updated as additional information becomes available about eagle fatalities at wind energy facilities. The development of the USFWS fatality prediction for Phase I is detailed in Appendix I and is summarized below for reference.

[25] The ECP Guidance calls for a review and update of the fatality estimate every five years based on monitoring results. *See USFWS 2013a.*

Assumptions

The USFWS model allows for a number of assumptions to account for uncertainty and to incorporate variability. For purposes of the Phase I fatality prediction analysis, the USFWS model assumes the following:

1. The USFWS model uses a prior distribution on eagle exposure and a prior distribution on collision risk that is developed from monitoring data at other wind facilities. It is assumed that this prior distribution is representative of expected impacts of Phase I.
2. The USFWS model uses pre-construction eagle use data to estimate eagle exposure. The model assumes that these data are spatially and temporally representative and are homogenous within the Phase I portion of each WDA.
3. The USFWS model assumes that the hazardous area is the 3-dimensional rotor-swept volume around a wind turbine or proposed wind turbine from the ground surface to 200 meters above the ground surface with a width equal to the rotor diameter.
4. The USFWS model assumes the eagle population present in Phase I is open (infinite), and therefore assumes the replacement of an eagle with another eagle occurs immediately after a fatality event.
5. The USFWS model assumes that eagles are only at risk of colliding with wind turbines during daylight hours.
6. The USFWS model assumes that the daylight hours used to calculate exposure rate for Phase I are accurately represented by a mean value for each wind turbine across the entire year.
7. The USFWS model assumes that risk of fatality across Phase I is the same across the year and across all seasons.
8. The USFWS model sums the total eagle minutes observed at each survey location whether they were multiple minutes from a single eagle or single minutes for multiple eagles. These sums are combined into a single datum for each portion of the Phase I WDAs, which removes any dependency structure in the dataset.

Using the assumptions listed above, the USFWS model output is a probability distribution of predicted eagle fatalities on an annual basis. USFWS has chosen the 80% upper credible interval (UCI) as the basis for interpretation. The interpretation of the 80% UCI value is that there is an 80% chance of causing fewer fatalities than predicted and a 20% chance of causing more fatalities than predicted.

Data

As described in Appendix I, two datasets were used in USFWS's fatality model. The 2011-2012 long-watch raptor survey data was used to help inform the prior distribution with site-specific information, and the 1-hour 800-meter raptor count surveys conducted at 40 and 60 locations between August 2012 and August 2013 were used in the USFWS predictive fatality model for Phase I.

The 2011 to 2012, long-watch raptor survey data were collected across Phase I to better understand patterns of eagle use. Long-watch raptor surveys were designed to map flight paths and behaviors for purposes of identifying important eagle use areas. The long-watch raptor survey observation points were located on promenades and ridgelines that often had relatively higher eagle use than the surrounding landscape. Data collected included eagle minutes that were attributed to flight paths extending up to 4,000 meters surrounding each long-watch raptor survey point. *See Chapter 5.0.* The long-watch raptor survey data were used to update the USFWS model prior distribution for the Phase I fatality estimates. However, because the USFWS model relies upon 800-meter raptor count data, USFWS used only those eagle observations within 800 meters of each long-watch raptor survey point.

The 2012 to 2013, 800-meter raptor count surveys were specifically designed to provide data for use in the USFWS predictive fatality model. Data collection protocols were developed in cooperation with USFWS and are consistent with the ECP Guidance and USFWS model assumptions. *See Chapter 5.0. See Appendix B.* The 2012 to 2013, 800-meter raptor count survey locations were distributed in a spatially-balanced random manner across Phase I and are spatially representative of expected eagle use within Phase I. In addition, survey events were scheduled to ensure that surveys were spread evenly across all daylight hours and all seasons at each of the sampling locations and, as a result, are representative of temporal eagle use.

Model Results

On May 27, 2014, USFWS finalized the Summary Document for Review of Eagle Use Data and Eagle Fatality Prediction Analysis for the Chokecherry and Sierra Madre Wind Energy Project Phase I. *See Appendix I.* As described above and in Appendix I, USFWS used a Bayesian model to evaluate the potential impacts of Phase I on eagles. Phase I will use a mixed fleet of wind turbines with varying rotor sizes. Currently, PCW is evaluating wind turbines with rotor diameters between 103 meters and 120 meters. To capture the potential range of impacts, the USFWS model was run for both 103-meter and 120-meter wind turbine rotor diameters which resulted in the following fatality estimate ranges for Phase I:

- At the 80% UCI, the USFWS model predicts 10-14 golden eagle fatalities and 1.4-2 bald eagle fatalities annually for Phase I. *See Appendix I.*
- At the average (50% UCI), the USFWS model predicts 6.8-9.2 golden eagle fatalities and 0.9-1.3 bald eagle fatalities annually for Phase I. *See Appendix I.*

7.1.2 PCW Fatality Predictions

PCW retained an expert, Dr. Joshua Millspaugh of the University of Missouri, to conduct an independent assessment of eagle fatalities for Phase I. Dr. Millspaugh used the USFWS model to calculate estimated fatalities with certain modifications to the assumptions that he determined were appropriate. *See Appendix J.* Specifically, the adjustments include:

1. The USFWS model was modified to directly consider the abundance of eagles present across Phase I and to make the number of fatalities a function of the number of eagles present across Phase I. The modification assumes that 30 golden eagles and 8 bald eagles are present across Phase I on an annual basis. *See Appendix J.*
2. The USFWS model was modified to address how curtailment of wind turbines surrounding occupied eagle nests is modeled. Eagle use data were modified to exclude eagle minutes and observation hours from 800-meter raptor counts immediately adjacent to golden eagle nest #162 during the curtailment season (February 1 to April 30). *See Section 6.3.1.*
3. Input data used to estimate fatalities were adjusted by calculating an average bias associated with rounding minutes up and then applying an appropriate correction factor.
4. The input data used to estimate fatalities were modified to use only those eagle minutes from 800-meter raptor count locations that fall within 800 meters of a wind turbine location.
5. The USFWS model was run separately for each season to account for seasonally explicit risk.

After applying the modifications described above, Dr. Millspaugh ran the USFWS model for a 120-meter diameter wind turbine rotor (the maximum proposed) which resulted in the following fatality estimates for Phase I:

- At the 80% UCI, with Dr. Millspaugh's modifications, the USFWS model predicts 9 golden eagle fatalities and 2 bald eagle fatalities annually for Phase I. *See Appendix J.*
- At the average (50% UCI), with Dr. Millspaugh's modifications, the USFWS model predicts 7 golden eagle fatalities and 1 bald eagle fatality annually for Phase I. *See Appendix J.*

Additional detail on Dr. Millspaugh's assessment of eagle fatalities for Phase I and the support for the modifications he made to the assumptions used in the USFWS model are included in Appendix J.

7.2 Other Eagle Risk Assessment

PCW has completed an assessment of other risks to eagles, including potential disturbance take, for Phase I in accordance with the ECP Guidance and USFWS Region 6 Recommendations. Phase I was designed to avoid and minimize impacts to eagle nests and other important eagle use areas to the extent practicable such that any remaining take (including disturbance take) of bald eagles and golden eagles is unavoidable. *See Chapter 6.0*. In addition to its application for a programmatic ETP for Phase I, PCW has applied to USFWS for a standard ETP for disturbance take that may occur during Phase I construction. *See Chapter 1.0.* Any disturbance take that may occur during Phase I operation would be covered under the programmatic ETP.

7.2.1 Eagle Nests

This section describes PCW's evaluation of potential disturbance to eagle nests within 800 meters (0.5 mile) of Phase I, as recommended by USFWS. *See USFWS 2014b.* Based on the eagle nest surveys described in section 5.2.2, there are 5 nests within 800 meters (0.5 mile) of Phase I. *See Figure 7.1.* These nests are located proximate to the Phase I infrastructure, specifically the Phase I Haul Road, transmission line, and Road Rock Quarry. As described in detail in section 6.4, the Phase I infrastructure located within 800 meters (0.5 mile) of a nest was carefully sited to avoid and minimize impacts, but due to siting constraints this infrastructure could not be relocated.

Of the five nests located within 800 meters (0.5 mile) of Phase I infrastructure, one golden eagle nest is located approximately 160 meters (0.1 mile) from the Road Rock Quarry, one bald eagle nest is located approximately 160 meters (0.1 mile) from the North Platte Water Extraction Facility and access road, and three golden eagle nests are located 100 meters (0.06 mile), 160 meters (0.1 mile), and 640 meters (0.4 mile) from the Phase I Haul Road and transmission line. These five eagle nests are within Turbine No-Build Areas; thus, any potential for disturbance associated with wind turbine construction and operation has been avoided.

Sources of potential disturbance to the five nests located within 800 meters (0.5 mile) of Phase I consist of noise, human activity, and traffic during construction and operation of Phase I, with the risk of disturbance primarily occurring during construction due to increased activity levels. PCW will implement a monitoring program for these nests as described in chapter 9.0.[26] Should any of these nests become occupied, PCW will consult with USFWS to evaluate the potential for disturbance take. *See Section 9.3.5.* Each eagle nest within 800 meters (0.5 mile) of Phase I is described in additional detail below.

[26] For the first year of construction, if construction is not underway by February 1 PCW will postpone the monitoring program until one week prior to the commencement of construction provided that construction activities will occur during the nesting season.

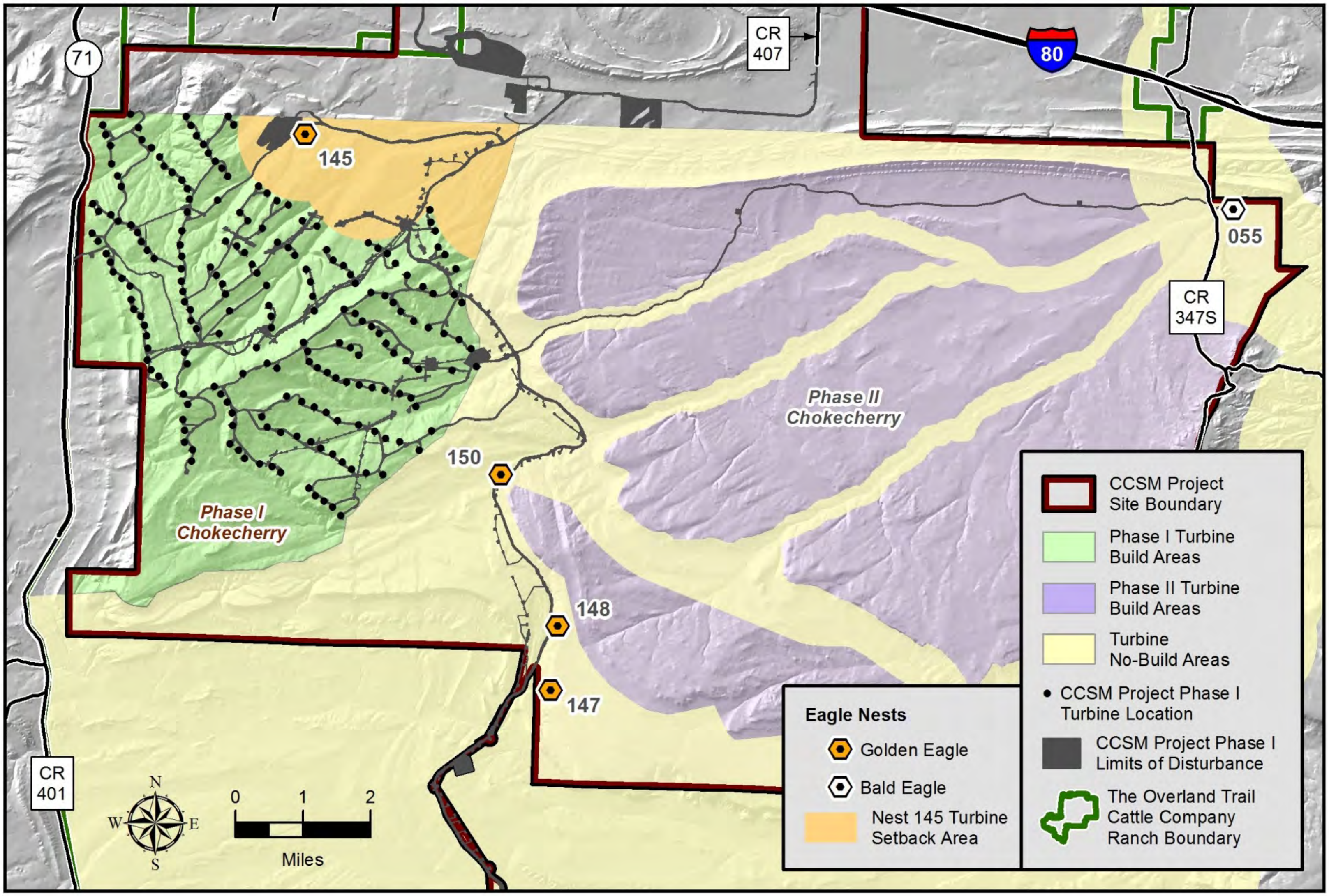

Figure 7.1. Eagle Nests within 800 meters (0.5 mile) of Phase I.

Bald Eagle Nest #055

Bald eagle nest #055 is located within WGFD's Fort Steele/Rochelle Public Access Area where public fishing and hunting activities occur along the banks of the North Platte River surrounding the nest. There are a number of existing sources of disturbance within 800 meters (0.5 mile) of bald eagle nest #055. There is a public road approximately 210 meters (690 feet) east of the nest and Carbon County Road 374S is approximately 450 meters (1,490 feet) to the west. There is also a private Ranch road approximately 45 meters (490 feet) west of the nest. In addition, numerous boats using the area for recreation pass this nest on a daily basis during the nesting season. *See BLM 2013a.*

Bald eagle nest #055 is located 160 meters (0.1 mile) from the North Platte River Water Extraction Facility and access road. The water extraction facility is the primary water supply for Phase I. Potential sources of disruption to bald eagle nest #055 from Phase I include noise, human activity, and traffic during construction and operation of the water extraction facility, with the risk of disturbance primarily occurring during construction due to increased activity levels. As described in chapter 6.0, Phase I has been sited and designed to minimize impacts to bald eagle nest #055. *See Section 6.4.* Once constructed, the facility will not be regularly attended and traffic will be minimal. In addition, the design of the water extraction facility includes measures to reduce noise and other impacts including the placement of the pump in a below-grade wet well.

The water extraction facility cannot safely and feasibly be shut down for long periods of time once operational; however, the design of the facility eliminates most of the noise and traffic. Due to the design of the facility and the autonomous operation, the sources of disturbance from the water extraction facility are not expected to be significant. Further, in conjunction with the existing level of activity, the Phase I activities are not expected to significantly affect the potential for disturbance of bald eagle nest #055. PCW has committed to the monitoring described in chapter 9.0 for potential disturbance take at bald eagle nest #055. In the event that potential disturbance take is detected, PCW will consult with USFWS.

Golden Eagle Nest #145

Golden eagle nest #145 is located approximately 400 meters (0.25 mile) east of an existing quarry. The existing quarry has been operated intermittently at varying intensities over the past 100 years. The area surrounding the quarry has been substantially altered as part of past mining operations and there are a number of access and service roads. Phase I includes a quarry operation at the location of the existing quarry. Surface disturbance associated with operation of the Phase I quarry will occur within 160 meters (0.1 mile) of the nest. As described in chapter 6.0, the quarry is an existing quarry that will be operated to avoid and minimize impacts to eagles. *See Section 6.4.* Potential sources of disruption from Phase I include noise, human activity, and traffic during operation of the quarry (concurrent with construction of Phase I). Following completion of Phase I construction, mining operations at the quarry will cease; therefore, any effects are temporary.

Quarry operation is critical to the construction of Phase I and cannot be suspended. In fact, suspending operation of the quarry would likely lengthen the construction schedule and increase the traffic associated with Phase I causing additional adverse impacts. PCW has committed to the monitoring described in chapter 9.0 for potential disturbance take at golden eagle nest #145. In the event that potential disturbance take is detected, PCW will consult with USFWS.

Golden Eagle Nest #147

Golden eagle nest #147 is located in a side canyon 640 meters (0.4 mile) from an existing well-traveled Ranch road. The nest faces south to southeast and has limited, if any, visibility of the road. As described in chapter 6.0, the Phase I Haul Road and transmission line follow the existing Ranch road in this location to minimize impacts to eagles and other resources. *See Section 6.4.* Potential sources of disruption to golden eagle nest #147 from Phase I include noise, human activity, and traffic during construction and operation, with the risk of disturbance primarily occurring during construction due to increased activity levels. Noise from construction of the haul road and transmission line near golden eagle nest #147 will be short-lived. During construction of the remainder of Phase I, increased traffic levels will be present. During operation, traffic will be significantly reduced consisting only of the traffic associated with the permanent workforce.

The haul road provides critical access for personnel to all areas of Phase I. The haul road cannot feasibly be shut down or re-routed. While Phase I will increase the amount of traffic on the road near golden eagle nest #147, disturbance is already present due to the existing road and the nest will have limited visibility of Phase I. PCW has committed to the monitoring described in chapter 9.0 for potential disturbance take at golden eagle nest #147. In the event that potential disturbance take is detected, PCW will consult with USFWS.

Golden Eagle Nests #148 and #150

Golden eagle nests #148 and #150 are located 160 and 100 meters (0.1 and 0.06 mile), respectively, from an existing well-traveled Ranch road. As described in chapter 6.0, the Phase I Haul Road and transmission line follow the existing Ranch road in this location to minimize impacts to eagles and other resources. *See Section 6.4.* Potential sources of disruption to golden eagle nests #148 and #150 from Phase I include noise, human activity, and traffic during construction and operation, with the risk of disturbance primarily occurring during construction due to increased activity levels. Noise from construction of the haul road and transmission line near golden eagle nests #148 and #150 will be short-lived. During construction of the remainder of Phase I, increased traffic levels will be present. During operation, traffic will be significantly reduced consisting only of the traffic associated with the permanent workforce.

The haul road provides critical access for personnel to all areas of Phase I. The haul road cannot feasibly be shut down or re-routed. While Phase I will increase the amount of traffic on the road near golden eagle nests #148 and #150, some disturbance is already present due to the existing road. PCW has committed to the monitoring described in chapter 9.0 for potential disturbance take at golden eagle nests #148 and #150. In the event that potential disturbance take is detected, PCW will consult with USFWS.

7.2.2 Other Important Eagle Use Areas

There are no eagle communal roost locations, migration corridors, or migration stopover sites in Phase I. *See Chapter 5.0.* Impacts to potential areas of concentrated prey resources and other important eagle use areas were avoided or minimized. *See Chapter 6.0*. Therefore, impacts to other important eagle use areas have been avoided or minimized to the extent practicable such that any remaining take (including disturbance take) of bald eagles and golden eagles is unavoidable.

7.3 Assessment of Programmatic Take

USFWS is required to evaluate and consider the effects of programmatic ETPs on eagles at the eagle management unit and local-area population scales, including cumulative effects, as part of its permit application review process. *See 50 C.F.R. §22.26 (f)(1); USFWS 2009*. As part of the assessment of cumulative impacts to both bald and golden eagles at the local area population scale, USFWS Region 6 will review all available internal records on known eagle mortalities within the local-area populations. This review will consider eagle mortality records from all sources of known mortality. Known causes of eagle fatalities in the western United States include vehicle collision, powerline electrocution or collision, wind turbine collision, lead poisoning, and unknown or natural causes. Other factors that may impact eagles, eagle habitat, and prey base within the local-area population are urbanization and land conversion, increased fire frequency, energy development, residential development, transportation related impacts (road construction, vehicle and train collisions, etc.), illegal poisoning or shooting, prey-base control (e.g., prairie dog control measures), and other forms of non-purposeful take. *See USFWS 2009; Kochert and Steenhof 2002*. Climate change is also reported to impact eagles, eagle habitat and prey base. *See USFWS 2009*. USFWS will present its analysis of effects on eagle management unit populations, local-area populations, and cumulative effects, in its EIS to evaluate potential issuance of ETPs for Phase I.

7.4 Risk Assessment Following Stage 3

Following completion of the Stage 3 risk assessment, PCW characterized Phase I as a Category 2 project. According to the ECP Guidance, a project is a Category 2 if, as currently sited and planned, it is (1) reasonably likely to take eagles at a rate greater than is consistent with maintaining stable or increasing populations, but (2) the risk might be reduced to an acceptable level through a combination of conservation measures and reasonable compensatory mitigation, per an effective and verifiable ECP.

The ECP Guidance further states that a project is in Category 2 if it:

1. Has an important eagle use area or migration concentration site within the project area but not in the project footprint; or
2. Has an annual eagle fatality estimate between 0.03 eagles per year and 5% of the estimated local-area population size; or
3. Causes cumulative annual take of the local-area population of less than 5% of the estimated local-area population size.

Through the avoidance and minimization process described in chapter 6.0, PCW has avoided important eagle use areas within Phase I. PCW has also avoided and minimized the risk to eagles to the extent possible and has committed to reasonable compensatory mitigation, as set forth in chapter 8.0, to offset unavoidable take from Phase I such that there is no net loss to the golden eagle population. Based upon the information presented in this ECP, PCW believes that Phase I meets the criteria for a Category 2 project. However, the UFWS will evaluate the risk categorization for Phase I following its assessment of potential programmatic take in the EIS.

8.0 Additional Avoidance and Minimization of Risks, Advanced Conservation Practices, and Compensatory Mitigation (ECP Guidance Stage 4)

This chapter describes conservation measures, Best Management Practices (BMPs), and experimental Advanced Conservation Practices (ACPs) for Phase I. When implemented with the avoidance and minimization measures described in chapter 6.0, the conservation measures, BMPs and experimental ACPs described in this chapter will further reduce risk to eagles and result in decreased fatalities. After application of these measures, PCW will provide the compensatory mitigation described in section 8.5. The compensatory mitigation will offset the predicted unavoidable take such that the no-net-loss standard established by USFWS is achieved. *See USFWS 2013a.* Finally, it is expected that over the life of Phase I, additional BMPs and experimental ACPs will become available. As such, adaptive management is essential and will be employed to ensure that risk to eagles continues to be minimized and take remains unavoidable. The adaptive management approach and framework that will be used for Phase I is described in section 8.7.

8.1 Conservation Measures

PCW has developed conservation measures to avoid and minimize impacts to eagles from Phase I. These measures will reduce impacts to eagles by removing threats from wind turbines and other infrastructure, as well as risks that could be associated with changes in the availability of the prey base within Phase I. The following measures and practices have been integrated into Phase I:

1. Land Management

   PCW's affiliate, TOTCO, currently manages an agricultural operation consisting primarily of cattle grazing and hay production within the Phase I Development Area and in adjacent portions of the Ranch. TOTCO uses active livestock management to minimize impacts of grazing activities on wildlife and wildlife habitat. PCW and TOTCO have entered into an agreement to promote and maintain through collaborative efforts the availability and use of high quality habitat to sustain and enhance terrestrial and aquatic wildlife populations on the Ranch in conjunction with various land uses, including the continuation of ranching and other agricultural operations as well as development of the wind energy resource. *See PCW 2014a. See Appendix K*. The commitments made by PCW and TOTCO in the Conservation Plan and Landowner Agreement include but are not limited to continuing active management of the Ranch with a goal of meeting the Wyoming Standards for Healthy Rangeland, implementing reclamation with the objective of ecosystem reconstruction, and implementing appropriate weed management. These commitments and the other measures described in the Conservation Plan and Landowner Agreement will be implemented in coordination with BLM and WGFD and will reduce impacts to eagles by conserving or enhancing habitat, as well as by protecting important eagle foraging, breeding, and nesting habitat for the life of the CCSM Project, including Phase I.

2. Conservation Easement

PCW will forego installing wind turbines on about 27,500 acres of private land owned by TOTCO, much of which had been proposed for wind energy development and is subject to a wind energy development agreement between PCW and TOTCO. Instead, in conjunction with the commencement of commercial operation of Phase I, PCW will join with TOTCO to place this land into a conservation easement. The conservation easement will prohibit in perpetuity wind development activities on the lands subject to the easement. While the conservation easement will be placed on the 27,500 acres of private land owned by TOTCO on which PCW has wind development rights, the easement will also effectively prevent wind energy development on the interspersed sections of federal land due to the checkerboard land ownership pattern. Therefore, the easement essentially protects approximately 48,000 acres of land. The easement will include important eagle use areas and high-quality eagle foraging habitats adjacent to key nesting locations along the North Platte River and in other areas with documented eagle use. *See Figure 8.1.* By prohibiting wind energy development in these important eagle use areas, risk to eagles and their habitats from wind energy development will be eliminated in perpetuity.

3. Prey Base (Greater Sage-grouse) Conservation

PCW has implemented a Sage-Grouse Conservation Plan that provides for monitoring of greater sage-grouse within the Ranch and adjacent areas. *See BLM 2012a, App. B at App. N.* PCW's Sage-Grouse Conservation Plan includes conservation measures that will improve habitat and minimize and/or reduce potential threats to greater sage-grouse and other wildlife species. The measures included in the Sage-Grouse Conservation Plan are designed to conserve greater sage-grouse populations and habitat; however, they also have direct benefits to eagles by maintaining contiguous habitat patches, conserving and promoting prey base populations, and improving habitat quality throughout the Ranch.

Greater sage-grouse are a known prey item of bald and golden eagles in the vicinity of the CCSM Project. Greater sage-grouse tags have been recovered from golden eagle and bald eagle nests, and recovered carcasses often have evidence of mortality caused by eagles. *J. Kehmeier, personal communication.* The conservation measures that will be implemented for the CCSM Project, including Phase I, include the minimization or removal of some existing threats to greater sage-grouse survival and productivity (e.g., removal and marking of fences, water development projects, and riparian/wetland habitat enhancement). The Greater Sage-Grouse Conservation Plan also includes the identification of additional conservation projects that will serve to achieve conservation goals. *See BLM 2012a, App. B at App. N.*

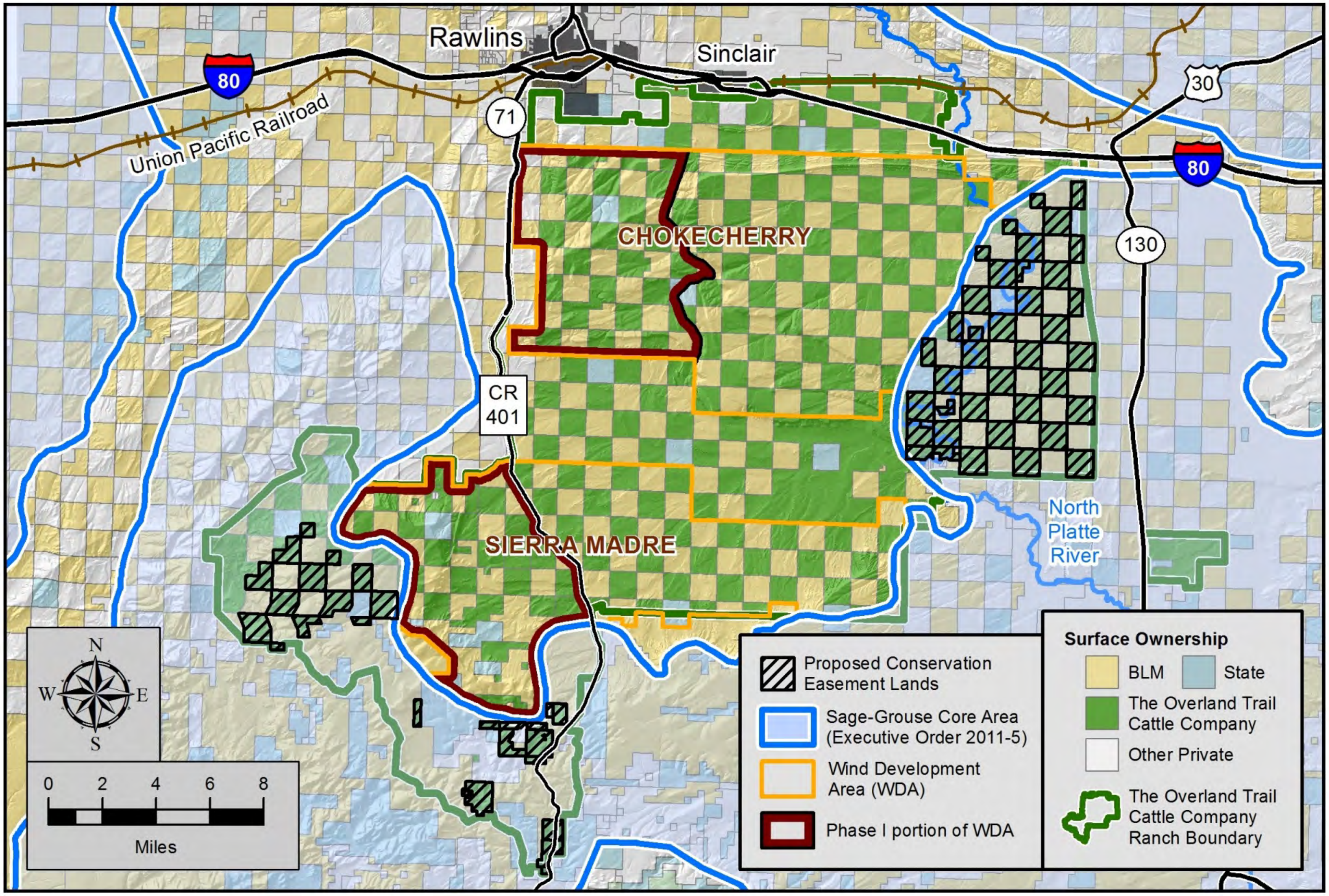

Figure 8.1. Conservation Easements Proposed by PCW in Coordination with TOTCO.

4. Sequencing

BLM analyzed mitigation measure GEN-1 in its FEIS. GEN-1 states:

> "Limit surface disturbance to areas where turbines would be constructed within 12 months with a goal to mitigate impacts from surface disturbance to wildlife, soils, water, and vegetation (e.g., weeds)."

Sequencing construction to minimize the duration of surface disturbance minimizes impacts to habitats used by eagles, other avian species, and their potential prey. In addition, sequencing construction minimizes the area being constructed at any given time; thus, minimizing disruption and fragmentation.

5. Mesic Habitat Improvement

PCW has committed to implement mesic habitat improvement projects on the Ranch. The primary objective of PCW's proposed mesic habitat improvement projects is to modify water sources to create and enhance natural free-flowing water and wet meadow habitats that are used by eagle prey species. Habitat improvement projects may include installation of upland "bubblers" and water diversions to create and enhance natural free-flowing water, enhance wet meadow habitat, and flood bottomland draws. "Bubblers" may be supplied with water from both artesian wells and other wells actively pumped by windmills. Other habitat improvement project may include development of additional water sources through water diversion pipelines from existing reservoirs and stock tank pipeline networks. Habitat improvement projects will be completed in a manner to minimize standing water and discourage use by mosquitoes, which might carry West Nile virus. Improving mesic habitat for eagle prey species will provide additional foraging opportunities for eagles and enhance overall eagle habitat quality.

6. Relic Agricultural Field Enhancements

There are approximately 2,023 acres of relic agricultural fields in the eastern portion of the Ranch outside Phase I that are currently dominated with either monocultures of cheatgrass (*Bromus tectorum*), crested wheatgrass (*Agropyron cristatum* sp.) or other introduced species. These relic agricultural fields currently provide little value for wildlife. The primary objective of the relic agricultural field enhancement projects is to establish conditions suitable for year-round use by wildlife species including eagle prey species. To achieve these objectives, as appropriate, PCW will plant additional sagebrush/shrub cover and/or establish high-value forage and cover sources in the relic agricultural fields. Relic agricultural field enhancements will improve prey base availability in areas outside Phase I, providing new foraging locations for eagles.

7. Wildfire Emergency Stabilization and Burned Area Rehabilitation

Wildfire, particularly in low-elevation Wyoming big sagebrush systems, has resulted in significant habitat loss primarily because of subsequent invasion by cheatgrass (*Bromus tectorum*) and other invasive species. *See BLM 2011a*. PCW will work with BLM to prioritize stabilization and burned area revegetation projects on the Ranch to: (1) maintain unburned intact sagebrush habitat when at risk from adjacent threats; (2) stabilize soils; (3) re-establish hydrologic function; (4) promote biological integrity; (5) promote plant resiliency; (6) limit expansion or dominance of invasive species; and (7) re-establish native species. For example, in 2010, a 170-acre wildfire occurred within the Chokecherry WDA. Following the fire, PCW and TOTCO seeded portions of the burned area to stabilize soils, reduce the risk of non-native plant invasion, and encourage use by wildlife species, including eagle prey species. Rehabilitating burned areas and conserving intact unburned habitats reestablishes habitat function and use by eagle prey species resulting in benefits to eagle populations.

8. Water Tank Escape Ramps

PCW collaborated with the Saratoga High School chapter of the Future Farmers of America to construct and install metal mesh avian escape ladders in water tanks on the Ranch. Escape ramps reduce the risk of drowning to all avian species as well as other wildlife species. *See Lafón 2006*. PCW will continue to install escape ramps in water tanks across the Ranch where there is an identified risk to wildlife resulting in benefits to eagle prey species and eagles.

9. Elimination of Greater Sage-grouse Hunting

TOTCO has indefinitely suspended access for hunting of greater sage-grouse on all of its private land and other areas under its control, thereby reducing direct mortality of greater sage-grouse, a prey species for eagles. Suspension of greater sage-grouse hunting access will continue throughout the life of the CCSM Project, including Phase I, or as otherwise agreed to between PCW, TOTCO and WGFD. Elimination of greater sage-grouse hunting removes any potential carcasses that would be created from injured or unrecovered birds shot by hunters. This removes a potential source of carrion containing lead shot that might otherwise attract eagles. This measure will reduce eagle fatalities resulting from lead shot ingestion. Studies have concluded that elevated blood lead levels are prevalent and quantifiable in both bald and golden eagles, and may have a significant impact on eagle populations. *See Allison 2012; Cochrane et al. 2015*. In addition, reduction of mortality to greater sage-grouse, a potential eagle prey species, will enhance prey availability and benefit eagles.

10. Carcass Removal and Handling

All operation and maintenance staff will be trained to appropriately handle, remove, and dispose of all large animal carcasses that are encountered within the CCSM Project Site, including Phase I. Disposal protocols will be developed in coordination with USFWS and WGFD to ensure compliance with relevant state and federal wildlife statutes. Disposal areas will be located outside of the Phase I Development Area to avoid attracting eagles and other species. Preferred disposal areas might include the conservation easement east of the North Platte River; this would add foraging opportunities for eagles in important eagle use areas.

11. Winter Access

Roads will be maintained in winter in accordance with PCW's Winter Access Plan, attached as an appendix to the site-specific PODs for Phase I. *See PCW 2014b; 2014c; 2014d; 2015b*. PCW's Winter Access Plan specifies that where roads are plowed, breaks will be created in any snow banks alongside roads to allow for passage of ungulates across the landscape. This will minimize the likelihood of concentrated ungulate use along roads that may result in increased vehicle collisions that could attract eagles or other predators/scavengers.

12. Environmental Training Program

As part of the Environmental Compliance and Monitoring Plan for Phase I, PCW will implement an Environmental Training Program to support compliance with environmental permits, including permit requirements and conservation measures outlined in this Phase I ECP. *See PCW 2014b; 2014c; 2014d; 2015b*. The training program will be designed to consistently communicate requirements for Phase I to every individual working on-site so that both managers and workers understand PCW's expectations, the permit requirements, and how to incorporate them into their daily work activities. All personnel working on Phase I will be required to attend environmental training prior to working on-site. PCW will maintain environmental training attendance records through the end of construction. Elements of the training will follow the APLIC recommendations training course format and will incorporate site-specific training modules to minimize risks to avian species, including eagles. *See APLIC 2006; 2012.*

In addition to the specific measures listed above, PCW will adhere to all avoidance, minimization, and mitigation measures identified in the site-specific PODs and the BLM ROW grant for Phase I. These include measures identified in BLM's ROD for the CCSM Project as well as numerous ACMs. *See Appendix K.* Adherence to timing and spatial stipulations will benefit eagles and eagle prey species by either preventing or limiting disturbance in critical areas at critical times of the year. The measures described in chapter 6.0 are the design measures that have been used to place wind energy facilities to avoid and minimize risk to eagles, such that take is unavoidable.

8.2 Construction and Operation

In accordance with chapter 7 of the Wind Energy Guidelines, PCW has incorporated best management practices for construction and operation into Phase I. *See USFWS 2012a.* The use of these best management practices will reduce potential impacts to eagles. The following best management practices recommended by USFWS in the Wind Energy Guidelines benefitting eagles have been incorporated into Phase I: [27]

1. PCW has minimized, to the extent practicable, the area disturbed by pre-construction site monitoring and testing activities and installations.

2. PCW has avoided locating wind energy facilities in areas identified as having a demonstrated and unmitigatable high risk to eagles. *See Chapter 6.0.*

3. PCW has used available data from state and federal agencies, specifically BLM, WGFD and USFWS, to identify sensitive resources and establish the layout of roads, power lines, fences, and other infrastructure.

4. PCW has minimized, to the extent practicable, roads, power lines, fences, and other infrastructure. Where appropriate, PCW will use wildlife compatible design standards for fencing.

5. PCW will use native species when seeding or planting during reclamation in compliance with the Reclamation Plans for Phase I. *See PCW 2015b.*

6. PCW has located collection system power lines underground to the extent practical. All overhead power lines for Phase I are designed to meet APLIC recommendations. *See APLIC 2006; 2012*.

7. All permanent meteorological and communication towers for Phase I will be self-supporting, i.e. not guyed. *See PCW 2015b.*

8. PCW has designed Phase I to include the minimum number of permanent meteorological towers necessary.

9. PCW will use construction and management practices that minimize activities that may attract prey and predators. *See Appendix K.*

[27] The numbering of this list corresponds to the numbering of the BMPs in chapter 7 of the Wind Energy Guidelines. *See USFWS 2012a.*

10. Lighting of Phase I wind turbines will meet FAA requirements and will likely consist of medium intensity synchronized red LED lights. Only a portion of the wind turbines will be lit. *See PCW 2015b.*

11. Exterior lighting at operation and maintenance facilities and substations for Phase I will be shielded downward and is designed to use a combined switch and motion-detection system for exterior lights to minimize the time the lights are on while providing adequate safety for personnel. All internal wind turbine nacelle and tower lighting will be used only when personnel are inspecting or maintaining the wind turbine. *See PCW 2014c; 2015b.*

12. PCW has designed Phase I to comply with the spatial and timing stipulations required by BLM in the ROD. These stipulations address sensitive habitats and species. *See Appendix K.*

13. PCW has designated Turbine No-build Areas to provide sufficient flight/movement corridors for eagles. *See Chapter 6.0.*

14. PCW has created an Erosion Control Plan and a preliminary Stormwater Pollution Prevention Plan for Phase I. *See PCW 2014b; 2014c; 2014d; 2015b*.

15. PCW will use tubular wind turbine towers to reduce ability of birds to perch and to reduce risk of collision. *See PCW 2015b.*

16. PCW has agreed to work with BLM and TOTCO to close unnecessary roadways and reclaim such roads where practicable. *See Appendix K.*

17. PCW has minimized the number, size, and length of Phase I roads to the extent practicable. *See Appendix K.*

18. PCW has designed Phase I to minimize impacts to wetlands and waters of the US. *See Appendix K.*

19. PCW will instruct personnel to drive at appropriate speeds, be alert for wildlife, and use additional caution in low visibility conditions.

20. All employees, contractors, and site visitors will receive a site orientation during which they will be instructed to avoid harassment and disturbance of wildlife. *See PCW 2014b; 2014c; 2014d; 2015b*.

21. PCW will comply with fire prevention standards and will develop a fire safety plan to reduce fire hazard from vehicles and human activities. The health and safety plan will address measures to be taken in the event of a wildfire. *See Appendix K.*

22. PCW will develop a hazardous material management plan as part of the health and safety plan. This plan will address employee training and spill response procedures. *See Appendix K.*

23. PCW has developed a weed management plan for Phase I that will reduce the introduction and spread of invasive species. *See PCW 2014b; 2014c; 2014d; 2015b*.

24. PCW will comply with all applicable rules and regulations for invasive species control.

25. PCW has developed a waste management plan for Phase I that includes appropriate good housekeeping procedures. *See PCW 2014b; 2014c; 2014d; 2015b*.

26. PCW will promptly remove large animal carcasses.

27. PCW has proposed wildlife habitat enhancements located outside of Phase I. *See Section 8.1.*

8.3 Decommissioning

In accordance with chapter 7 of the Wind Energy Guidelines, PCW has incorporated best management practices for decommissioning and reclamation into Phase I. *See USFWS 2012a.* The use of these best management practices will reduce potential impacts to eagles. The following recommended best management practices benefitting eagles have been incorporated into Phase I: [28]

1. PCW will decommission Phase I to minimize new surface disturbance and minimize the removal of native vegetation, to the extent practicable. *See PCW 2014b; 2014c; 2014d; 2015b*.

2. PCW will remove the pedestal portion of the wind turbine foundations. *See PCW 2015b.*

3. PCW has developed a Reclamation Plan for Phase I that addresses removal and storage of topsoil, as well as appropriate revegetation. *See PCW 2015b.*

4. PCW has developed a Reclamation Plan for Phase I that addresses soil stabilization and revegetation. *See PCW 2015b.*

[28] The numbering of this list corresponds to the numbering of the BMPs in chapter 7 of the Wind Energy Guidelines. *See USFWS 2012a.*

5. PCW has developed a Reclamation Plan for Phase I that addresses landscape restoration, including hydrology. *See PCW 2015b.*

6. PCW has developed weed control plans that address the monitoring and control of noxious weeds. *See PCW 2014b; 2014c; 2014d; 2015b*. In addition, the Reclamation Plan for Phase I includes monitoring during revegetation until reclamation standards are achieved. *See PCW 2015b.*

7. At the end of the CCSM Project, PCW will decommission unnecessary overhead power lines, including poles. *See PCW 2015b.*

8. PCW will install and monitor erosion control measures during reclamation in accordance with the Reclamation Plan for Phase I until reclamation standards are achieved. *See PCW 2015b.*

9. At the end of the CCSM Project, PCW will remove any unnecessary fencing. *See Appendix K.*

10. PCW has developed preliminary Spill Prevention Control and Countermeasures Plans for Phase I to address petroleum product releases. *See PCW 2014b; 2014c; 2014d; 2015b*. These plans will be finalized prior to the commencement of Phase I construction. In addition, the Reclamation Plan and Waste Management Plan for Phase I address the proper disposal of unsuitable soil, including contaminated soil. *See PCW 2015b.*

8.4 Advanced Conservation Practices

Advanced Conservation Practices (ACPs) are defined as "scientifically supportable measures that are approved by the [USFWS] and represent the best available techniques to reduce eagle disturbance and ongoing mortalities to a level where remaining take is unavoidable." *See 50 C.F.R. §22.3*. As described in the ECP Guidance, USFWS has not currently approved any ACPs for wind energy projects; therefore, ACPs will be implemented at wind energy facilities on an "experimental" basis. *See USFWS 2013a at p. iv*. To further the goals of USFWS to develop and evaluate ACPs for wind energy projects, PCW and USFWS will review and apply experimental ACPs for Phase I as part of the adaptive management process described in section 8.7. In fact, PCW has already agreed to seasonal curtailment for specific Phase I wind turbines as described in chapter 6.0. As indicated in Appendix E of the ECP Guidance, seasonal and daily shut-downs (curtailment) are examples of measures that may be considered as experimental ACPs by USFWS.

8.5 Compensatory Mitigation

USFWS manages bald eagles roughly by USFWS Region. *See USFWS 2009 at p. 25.* Phase I falls within the USFWS Region 6 Bald Eagle Management Unit which has an estimated population of 5,385 bald eagles. *See USFWS 2009 at Figure 3; 2013a*. USFWS has determined that predicted recurring bald eagle take does not exceed the calculated bald eagle management unit take thresholds; therefore, no compensatory mitigation is required for bald eagles at this time. *See USFWS 2009; 2013a.* If in the future, the recurring take of bald eagles exceeds the bald eagle management unit take thresholds, PCW will provide compensatory mitigation for Phase I as required by USFWS.

USFWS uses Bird Conservation Regions (BCRs) to manage populations of golden eagles. Phase I is located within the Northern Rockies BCR (BCR 10). As described in section 7.3, USFWS will conduct an analysis of impacts to the local area population of golden eagles in accordance with the ECP Guidance. According to the ECP Guidance, the local area population for golden eagles is calculated by buffering Phase I by 16 kilometers (10 miles) to capture potential nesting territories surrounding Phase I and then buffering that area by 230 kilometers (140 miles) to account for the average natal dispersal distance of golden eagles. Using these distances, the local area population analysis area for Phase I overlaps 4 different BCRs (BCRs 10, 16, 17, and 18) in three states (central and south-central Wyoming, north-central and northwest Colorado, and a small portion of northeast Utah). *See Figure 8.2.* USFWS has estimated that collectively, these 4 BCRs support a population of 18,822 golden eagles. *See USFWS 2013a.*

For golden eagles, USFWS determined that golden eagle populations throughout the United States might not be able to sustain any additional unmitigated mortality, and set the take thresholds for this species at zero for BCR-level populations in all regional management units. *See USFWS 2009.* This means that any new authorized take of golden eagles must be at least equally offset by compensatory mitigation, i.e. specific conservation actions to replace or otherwise make up for the loss of each eagle associated with a project. *See USFWS 2009; 2013a.* Therefore, PCW will provide compensatory mitigation as required by USFWS to offset the predicted unavoidable golden eagle take from Phase I such that the no-net-loss standard is achieved. *See USFWS 2013a.* If golden eagle populations increase to levels where take does not exceed the management unit take thresholds, PCW and USFWS will evaluate changes to the compensatory mitigation required to offset take associated with Phase I in accordance with the adaptive management process described in section 8.7.

Consistent with the ECP Guidance, compensatory mitigation will initially be based on the 80% UCI of the predicted mean annual fatality rate over a five-year period and will be adjusted in consultation with USFWS for future years based on the observed fatality rate over the initial five-year post-construction monitoring period. *See USFWS 2013a.* PCW's compensatory mitigation may be implemented anywhere within the four BCR's included in the local area population analysis area to ensure that the mitigation benefits the affected eagle populations; however, it is PCW's preference to implement compensatory mitigation as close to Phase I as practicable.

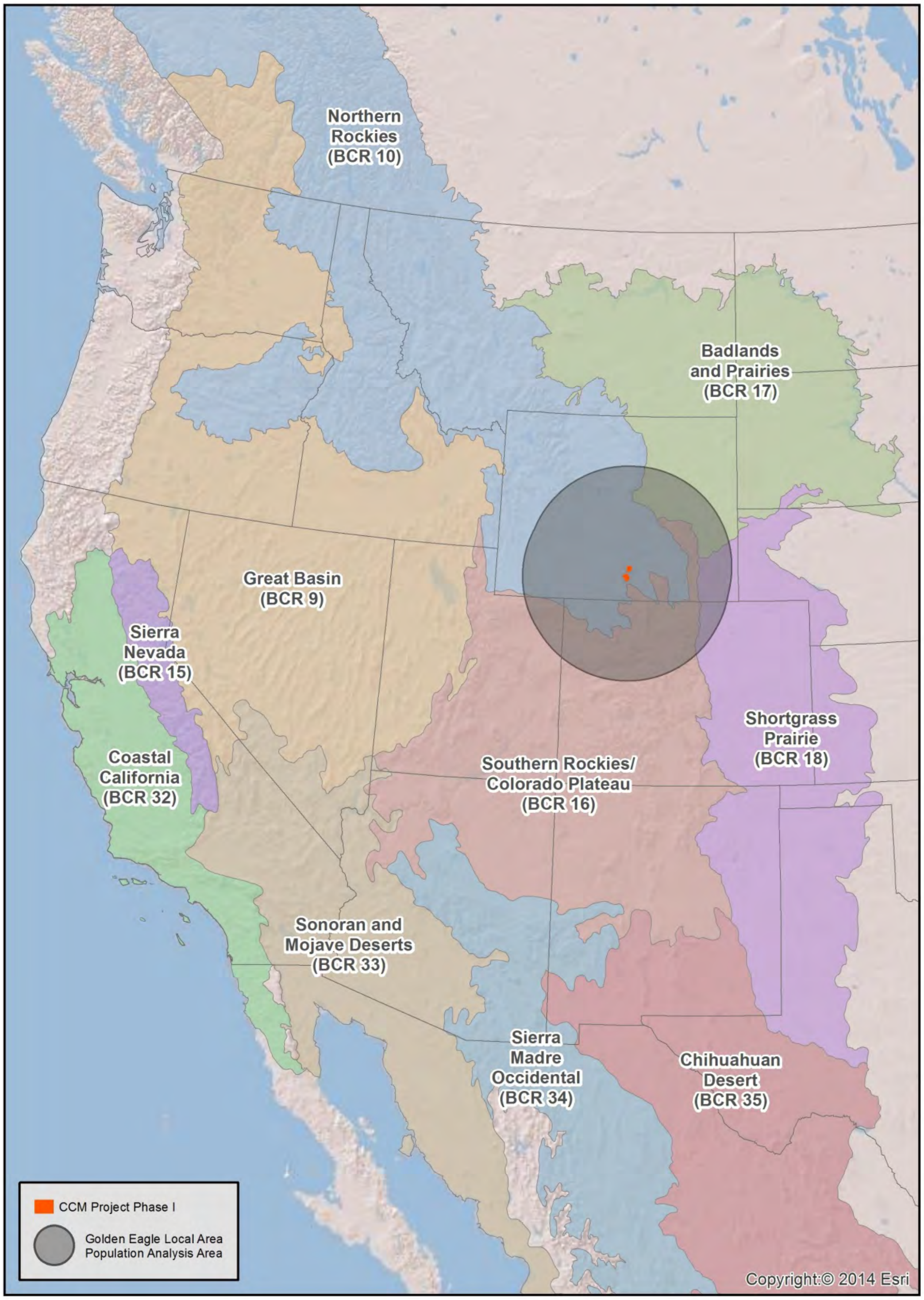

Figure 8.2. Phase I Local-Area Population Analysis Area and Bird Conservation Regions in the Western United States.

The following sections describe the compensatory mitigation measures that PCW will employ, in conjunction with the issuance of the programmatic eagle take permit, to offset unavoidable take from Phase I such that there is no net loss to the golden eagle population. As utility power pole retrofits are currently the only USFWS-approved compensatory mitigation, PCW has identified utility power pole retrofits as the primary method to compensate for unavoidable take. However, alternative, experimental approaches for compensation of unavoidable take are discussed below. Should USFWS approve these or other methods in the future, they may be considered in conjunction with or in place of utility power pole retrofits through the adaptive management process for Phase I. *See Section 8.7.*

8.5.1 Causes of Golden Eagle Mortality

A compilation of the causes of 4,300 bald and golden eagle deaths during the early 1960s to mid-1990s found that humans caused more than 70% of recorded deaths, with accidental trauma (e.g., collisions with vehicles, power lines, and other structures) being the primary factor (27%), followed by electrocution (25%), illegal shooting (15%), and poisoning (6%). *See Franson et al. 2002.* These threats continue to affect golden eagles today.

Collisions and electrocutions from power lines have accounted for numerous bald and golden eagle deaths over a 30-year period. *See Lehman, et al. 2007.* Studies have reported that golden eagles, particularly immature birds, are the most commonly electrocuted raptor in the United States. *See Harness and Wilson 2001; Lehman et al. 2007; Lehman et al. 2010.* Many power pole designs place conductors and ground wires close enough together that a large bird like a golden eagle can touch them simultaneously with its wings or other body parts causing electrocution. *See Lehman et al. 2007.* The majority of electrocutions are associated with low-voltage power lines or transformers, rather than high-voltage transmission lines. *See Lehman 2001; Lehman et al. 2007.* Most eagle (and other bird) electrocutions occur on distribution lines (35 kV or less). Transmission lines of 69 kV and above pose a very low electrocution risk to eagles because the lines are designed with sufficient spacing between conductors (electric wires or lines) such that phase to phase or phase to ground contact is not generally possible. *See APLIC 2006.* Electric distribution lines carry lower voltages and have closer conductor spacing, which presents a greater electrocution hazard to eagles and other avian species. *See APLIC 2006.*

8.5.2 Utility Power Pole Retrofits

Utility power pole retrofits will be used by PCW as compensatory mitigation to offset unavoidable take of golden eagles from Phase I. *See USFWS 2013a.* Power pole retrofits were identified by USFWS as the primary compensatory mitigation mechanism to ensure that golden eagle fatalities are mitigated to meet the USFWS no-net-loss standard. *See USFWS 2013a.* The ECP Guidance indicates that an eagle permit holder may either contribute funds to a third-party-mitigation account, for example the National Fish and Wildlife Foundation's (NFWF's) Bald and Golden Eagle Protection Act account, or contract directly with a utility or utilities to complete the required number of retrofits. USFWS encourages project developers or operators to contract directly for retrofits as opposed to contributing $7,500 per pole to a third-party-mitigation account.[29] PCW's preference is to contract with utilities directly to complete the retrofits.

APLIC has developed guidance documents identifying minimization methods for avian electrocutions and collisions. APLIC also released national Avian Protection Plan Guidelines (APP Guidelines) in conjunction with USFWS in 2005. *See APLIC 2005.* In addition, APLIC provides electric utilities, wildlife agencies, and other stakeholders with guidance for reducing bird electrocutions and collisions with power lines based on the most current information, including its Suggested Practices for Avian Protection of Power Lines: State of the Art in 2006 (2006 Suggested Practices) and Mitigating Bird Collisions with Power Lines: The State of the Art in 2012 (Collision Manual). *See APLIC 2006; 2012.* Together, implementing the measures outlined in the APP Guidelines, the 2006 Suggested Practices and the Collision Manual to retrofit utility power poles mitigates risks to eagles.

PCW will work with electric utilities, including investor owned utilities, electric cooperatives and their members, and/or public power districts, to retrofit power poles to meet APLIC recommendations to offset potential take from Phase I. As part of its power pole retrofit program, PCW may also consider rebuilding entire existing electric lines to meet APLIC recommendations if USFWS appropriately credits the long-term benefit of the rebuild. In the Western United States, electric lines may remain in service for 50 years or more; therefore, rebuilding an existing line to current APLIC recommendations should provide a long-term benefit to eagles. *See Morell 2008.*

USFWS will assess compensatory mitigation in 5-year increments regardless of permit tenure. *See 50 C.F.R. §22.26(h).* PCW has initiated conversations with a number of utilities throughout Wyoming and Colorado to explore the feasibility of completing retrofits on power poles that are non-APLIC compliant for the first five-year period of a programmatic ETP. Each of these utilities and cooperatives have given PCW assurances that they have more than enough power poles in need of initial or updated retrofitting to cover the first five-year compensatory mitigation period for Phase I, and likely for subsequent five-year periods. Given that nine Rural Utilities Services (RUS) members own approximately 39,000 kilometers (24,000 miles) of distribution lines in Wyoming alone, and Colorado has at least as many kilometers of distribution lines, PCW expects there will be ample power poles in need of retrofits to cover the initial five-year compensatory mitigation period and any additional mitigation required in subsequent five-year periods. *See RUS 2013.*

Subject to a decision by USFWS to issue a programmatic ETP, PCW will have contracts in place with electric utilities to implement the compensatory mitigation required for the initial five-year programmatic ETP period. Following finalization of the contract(s), PCW will provide a power pole retrofit implementation plan to USFWS. To develop this plan, PCW and its utility partners will identify power poles that pose potential risks to eagles. Such potential risks may include: (1) power poles that are non-APLIC compliant; (2) power poles in or near favorable habitat; (3) power poles with known eagle

29 USFWS believes that $7,500 represents a reasonable estimate for the current cost to retrofit a power pole in the United States. *See USFWS 2013a, App. G at page 90.*

incidents; or (4) other quantifiable risks as established by best available scientific information. The power pole retrofit implementation plan will describe the agreed upon retrofit program including the number of power poles to be retrofit for each utility, the location of the retrofits, the schedule for completion, and the monitoring and maintenance obligations. To ensure the timely completion of power pole retrofits, PCW may give preference to mitigation projects that can be rapidly permitted and implemented.

Following completion of the retrofits, PCW and its utility partners will monitor and maintain retrofit power poles as provided for in the plan to ensure that the measures taken remain effective. Power poles retrofit in accordance with the Suggested Practices should require infrequent follow-up monitoring. *See APLIC 2006.* Most utilities conduct regular line inspections, which are generally sufficient to ensure that the retrofits remain in place and are serviceable.

As stated above, compensatory mitigation for Phase I will occur within the four BCRs included in the golden eagle local area population analysis area. While it is PCW's preference to implement compensatory mitigation as close to Phase I as practicable, the location of the mitigation is ultimately dependent upon the willingness of individual electric utilities to enter into contracts with PCW to complete the power pole retrofit program.

8.5.3 Calculation of Necessary Compensatory Mitigation

USFWS uses Resource Equivalency Analysis (REA) to quantify the number of power pole retrofits needed to offset the take of golden eagles at a wind project. *See USFWS 2013a, App. G.* Within the context of the ECP Guidance, REA is a methodology used to compare the injury to or loss of eagles caused by wind facilities (debit) to the benefits from projects designed to improve eagle survival or increase productivity (credits). Compensation is evaluated in terms of eagles and their associated services instead of by monetary valuation methods.

In its 30-year permit rule, USFWS stated that it will assess fatality estimates in 5-year increments regardless of permit tenure. At the end of the first 5-year period, actual take will be compared with predicted take, and if actual take is different, adjustments to the compensatory mitigation requirements may be made. As discussed in section 7.1.1, USFWS estimates that up to 14 golden eagle fatalities a year may result from Phase I (80% UCI). Extrapolated over a five year period, this would result in the take of 70 golden eagles under the USFWS assumptions. *See Appendix I.*

USFWS also prepared an initial estimate of the credit owed for a 5-year permitted take of golden eagles for Phase I based on the REA. *See Appendix I.* According to USFWS calculations, for a permitted take of 70 golden eagles (up to 14 golden eagles per year over a 5-year period), the number of power poles to be retrofit to achieve the no-net-loss standard for golden eagles would be either: (1) 3,889 poles assuming the measures used to retrofit poles last for 5 years (i.e., 5 years of avoided loss); or (2) 2,088 poles assuming the measures taken to retrofit poles lasts for 10 years (i.e., 10 years of avoided loss). The estimated number of power pole retrofits required is subject to change based upon factors such as the final wind turbine rotor diameter, the longevity of the power pole retrofits, or the timing of power pole retrofit implementation. Regardless, in conjunction with the issuance of the programmatic ETP, PCW agrees to offset unavoidable take from Phase I to meet the USFWS no-net-loss standard by retrofitting the requisite number of power poles as agreed to with USFWS. *See USFWS 2013a.*

8.5.4 Alternate Compensatory Mitigation Measures

There are a number of potential compensatory mitigation measures that may eventually provide an alternative to power pole retrofits; however, USFWS has not yet quantified the benefit of these measures. PCW is willing to consider one or more of these measures, either in place of or in addition to power pole retrofits, if USFWS quantifies the benefit to eagles of the mitigation measure and approves the use of these measures as mitigation for Phase I. The scientific challenge associated with using these potential measures for compensatory mitigation is providing a credible prediction of the numerical effects of these mitigation measures on eagle survival or productivity, especially when the empirical data needed for making these predictions are currently unavailable.

Carcass Removal

In the United States, a known cause of mortality to eagles, both bald and golden, is vehicle collisions. *See Lutmerding, et al. 2012; Millsap, et al. 2004*. Eagles are susceptible to being struck by vehicles while feeding on carcasses along roadsides, particularly in areas of the United States where large numbers of ungulates concentrate seasonally (e.g. winter, breeding season, etc.). According to the ECP Guidance, a project developer or operator may decide to collect data (or use existing data if it is available) on the annual number of eagle mortalities that result from vehicle collisions in a specified geographic area or along a specific stretch of roadway. These data could then be used to generate an estimate of the number of eagle mortalities that could be prevented in the same area by removing carcasses from roadsides. If there was sufficient evidence that this was a valid compensatory mitigation strategy (i.e., quantifiable and verifiable), the project developer or operator could contract to have these roadsides "cleaned" of carcasses during the time of year that ungulates concentrate and eagles are known to be struck. The credible estimate of eagle mortalities that would be avoided through carcass removal would be the value of the compensatory mitigation achieved.

This alternate compensatory mitigation measure is currently being evaluated in relation to the Mohave County Wind Farm in Arizona. *See BLM 2013b at Attachment 2.* If appropriate and approved by USFWS as quantifiable compensatory mitigation, PCW would work with USFWS and state and local highway departments to identify appropriate carcass removal protocols, including the frequency of carcass removals. Carcasses removed from area highways would be disposed of away from Phase I.

Habitat Improvements or Modifications

Habitat loss, encroachment from urbanization, and conversion of habitat to agricultural uses has negatively impacted golden eagles. *See Kochert et al. 2002*. Golden eagle breeding territories were less successful in areas lacking a mosaic of native vegetation since the habitat was unable to support abundant jackrabbit populations, their preferred prey. *See Thompson et al. 1982*. Good *et al.* (2007) noted that factors that could cause population declines such as habitat loss are increasing. In some areas, especially in southern California and the Colorado Front Range, urbanization and human population growth have made areas historically used by golden eagles unsuitable for breeding. *See Boeker 1974; Scott 1985*. Widespread agricultural development in portions of the golden eagle range has contributed to a reduction of jackrabbit populations and has been a factor in rendering areas less suitable for nesting and wintering eagles. *See Beecham and Kochert 1975; U.S. Department of Interior 1979; Craig et al. 1986*.

The increasing number, frequency, and intensity of wildfires also may affect golden eagle habitat. *See Dennison et al. 2014.* In the Intermountain West, fires have caused large-scale losses of shrubs and jackrabbit habitat in areas used by golden eagles. More than 98,000 acres of shrub lands were consumed by wildfires between 1981 and 1987 in the Snake River Birds of Prey National Conservation Area, and adversely affected nesting populations. Nesting success at burned territories declined after major fires. *See Kochert et al. 1999.* Kochert *et al.* (1999) documented that burned territories abandoned by the original nesting pair were taken over by neighboring pairs increasing the size of their territories. This resulted in a decreased number of nesting pairs in the initial area. Between 2001 and 2006, fire burned approximately 566,800 acres within the range of the golden eagle in the lower 48 States. *See USFWS 2009*.

The fires affecting golden eagle populations in the Snake River Birds of Prey National Conservation Area were associated with the presence of cheatgrass. *See Kochert et al. 1999.* There is evidence that the widespread abundance of cheatgrass, red brome (*Bromus rubens*), and other non-native annual grasses has led to the establishment of a frequent annual grass/fire cycle in areas that had relatively low fire frequency prior to their invasion. *See Whisenant 1990; Brooks et al. 2004; Link et al. 2006.* The interval of natural fires in sagebrush shrub habitat has been shortened via invasions of annual non-native grasses. *See Crawford et al. 2004*.

Empirically-derived declines in populations of prairie dogs, a prey species for golden eagles, have been suggested as a habitat-related factor affecting golden eagle populations. *See Kochert et al. 2002.* Most of the remaining prairie dogs in the southern grasslands are associated with playas (seasonally wet depressions or dry lake beds), which are small and dispersed. While apparent declines in white-tailed and black-tailed prairie dogs may not currently be sufficient to result in listing of either species under the ESA, prey abundance can affect golden eagle populations and breeding success. *See Smith and Murphy 1979; Bates and Moretti 1994; Watson 1997; McIntyre and Adams 1999*.

Destruction or adverse modification of eagle habitat or their prey base reduces eagle populations; therefore, modification or improvement of eagle habitat or their prey base could be a potential compensatory mitigation measure. For instance, if an artificial or natural habitat type is identified as attracting prey for eagles or other large raptors, then re-creating that habitat type may establish new or improved important eagle use areas. Artificial perch and nesting structures may also be constructed in areas with little or no current or possible future development creating "safe" zones for eagles. These artificial structures could be placed in areas with adequate prey to minimize the likelihood that eagles using those structures would overlap with development areas.

Habitat enhancements could be used to increase prey base populations. Where prey base populations have been removed or reduced as part of past land management activities, prey base reintroductions to create new foraging areas may be effective to create important eagle use areas. WTPD and other prey base species could be reintroduced in suitable areas.

Fire prevention and control, and restoration of habitats impacted by fire may also sustain and improve eagle populations. Programs to prevent fires in important eagle use areas, such as removal or prevention of spread of cheatgrass, may provide a benefit to eagles.

As documented in section 8.1, PCW has already implemented a number of habitat improvement and modification measures that benefit bald and golden eagles, such as fence marking and removal, water tank escape ramps, revegetation of burn areas, prey base enhancement, and Ranch management practices that meet healthy rangeland standards.

If the conservation uplift resulting from habitat improvement and modification can be quantified in a manner accepted by USFWS, perhaps through a resource equivalency analysis model, then these conservation measures could be used as compensatory mitigation. If appropriate and approved by USFWS as quantifiable compensatory mitigation, PCW would work with USFWS to implement habitat improvement and modification measures.

Conservation Easements

Conservation easements, either in conjunction with habitat improvement and modification or as a standalone measure, could be used as compensatory mitigation. Permanent protection of important eagle use areas would preserve nesting territories, foraging areas, concentration areas and other areas important to the life cycle needs of eagles. As described in section 8.1, approximately 27,500 acres of private land on the Ranch will be placed in a conservation easement ensuring that wind development activities will not occur on much of the area surrounding the CCSM Project, including Phase I. If appropriate and approved by USFWS as quantifiable compensatory mitigation, PCW would work with USFWS to establish additional conservation easements.

Lead Abatement

Lead shot and bullet fragments in the carcasses and viscera of game and other animals can pose a hazard to raptors including eagles. Diurnal raptors are one of the main avian groups affected by lead toxicosis, and lead poisoning accounts for an estimated 10% to 15% of the recorded post-fledging mortality in bald eagles and golden eagles in Canada and the United States. *See Miller et al. 2002; Scheuhammer and Norris 1996.* Craig *et al.* (1990) noted that 12 of 16 (75%) eagles found in Idaho during a 9-year period had lead exposure and suggested that lead poisoning in golden eagles may be a greater problem than previously believed. Bald eagles and golden eagles admitted to The Raptor Research Center at the University of Minnesota had a 17.5% incidence of lead poisoning before the 1991 federal ban on lead shot for hunting waterfowl and a 26.8% incidence of lead poisoning after the ban. *See Kramer and Redig 1997*. Lead poisoning is a concern for eagles in most parts of their western range.

In Washington, blood tests detected elevated lead levels in more than half of 14 birds tested, with four of the birds having lead levels indicative of toxicosis. *See Watson and Davies 2009*.

Lead shot, bullet abatement, and hunter education programs may reduce eagle fatalities through decreasing the number of incidents of lead poisoning. Cochrane *et al*. (2015) identified methods to account for lead abatement in the USFWS Resource Equivalency Analysis that is currently used to quantify necessary levels of compensatory mitigation. If appropriate and approved by USFWS as quantifiable compensatory mitigation, PCW would work with USFWS to implement programs designed at reducing lead and bullet shot usage or reducing gut-piles left by hunters in areas accessible to eagles. PCW would also work with TOTCO to reduce or eliminate the use of lead shot and bullets and to remove gut piles.

Wind-Wildlife Research Mitigation Fund

If appropriate and approved by USFWS as quantifiable compensatory mitigation, PCW would work with USFWS to develop and implement a wind-wildlife research and mitigation fund. Monies placed in this fund could be used to pay for enhancing eagle and prey base habitat or other appropriate measures to conserve eagle populations. Monies could also be used to research and develop additional conservation and mitigation measures to benefit eagles or to fund research related to wind energy impacts on golden eagles. Funding amounts for this research mitigation fund would be determined by PCW in consultation with USFWS if it is determined that this is an appropriate compensatory mitigation measure.

8.6 Effectiveness Monitoring

PCW will monitor the effectiveness of the conservation measures, BMPs, experimental ACPs, and avoidance and minimization measures described throughout this Phase I ECP. PCW commits to conduct post-construction monitoring as detailed in chapter 9.0. The purpose of post-construction monitoring is to quantify fatalities that occur in Phase I, to evaluate the effectiveness of existing avoidance and minimization measures, and to identify appropriate additional avoidance and minimization measures through the adaptive management process to further minimize risks that contribute to fatalities. *See Section 8.7 & Chapter 9.0*. Additional monitoring for other resources (greater sage-grouse, water resources, etc.) and other issues (reclamation, stormwater, etc.) will follow the procedures and protocols identified in each of the resource or issue-specific monitoring plans.

8.7 Adaptive Management

As described in the ECP Guidance, USFWS's "long-term approach is to implement eagle take permitting in a formal adaptive management framework." *See USFWS 2013a at p.xi.* In fact, USFWS "recognizes that adaptive management is a normative concept in modern ecological decision-making (Callicott *et al.* 1999), and embraces it as a fundamental tool." *See USFWS 2013a, App. A.* Adaptive management is a process that implements specific management practices, assesses the outcomes of those practices, and then makes adjustments to the practices to better manage outcomes. In the context of wind energy, USFWS has identified four specific sets of decisions that will be approached through adaptive management: (1) adaptive management of wind project operations; (2) adaptive management of wind project siting and design recommendations; (3) adaptive management of compensatory mitigation; and (4) adaptive management of population-level take thresholds. *See USFWS 2013a at p 28.*

Adaptive management for Phase I has two primary components: (1) the USFWS five-year permit review established by regulation; and (2) PCW's voluntary Phase I Annual Review that provides a more frequent opportunity for PCW and USFWS to review the Phase I post-construction monitoring results and the observed take in the context of the predicted take

8.7.1 Five-year Permit Review

In keeping with the adaptive management approach, the USFWS programmatic eagle take permit is structured in discreet review periods of five years. During each five-year review, USFWS will reassess post-construction monitoring, fatality rates, effectiveness of measures to reduce take, the appropriate amount and effectiveness of compensatory mitigation, and the status of the eagle population. *See 50 C.F.R. §22.26(h).* Following its review, USFWS may make changes to a programmatic ETP as necessary. *See 50 C.F.R. §22.26(h).*

USFWS recognizes that "The adaptive management process will depend heavily on pre- and post-construction data from individual projects." *See USFWS 2013a at p. xi.* In support of the USFWS adaptive management approach to eagle take permitting, PCW has collected a robust pre-construction data set and has also designed an intensive post-construction monitoring program for Phase I. *See Chapters 5 & 9.* Further, PCW has developed an adaptive management program for Phase I (the Phase I Annual Review) to use these data to proactively incorporate adaptive management into Phase I operation on a more frequent basis than the USFWS five-year permit review.

8.7.2 Phase I Annual Review

The intent of the Phase I Annual Review is to provide a more frequent adaptive management process in which the uncertainty related to the factors that influence the Phase I collision risk can be monitored, evaluated, and minimized to the extent practicable. While the goal of this Phase I ECP is to avoid eagle mortality, it is anticipated that some level of unavoidable take will occur even though experimental ACPs are being implemented. As a result, the Phase I Annual Review is intended to adjust post-construction monitoring protocols, conservation measures, BMPs, and/or experimental ACPs as warranted. According to the ECP Guidance, "the purpose of adaptive management of operations is to reduce mortality of eagles while also reducing the impact of conservation measures and ACPs on power generation at wind facilities." *See USFWS 2013a, App. A.*

The Phase I adaptive management process will be implemented as follows:

1. PCW will implement the post-construction monitoring protocols, conservation measures, BMPs, and/or experimental ACPs set forth in this Phase I ECP and any programmatic ETP issued by USFWS.

2. At least annually, PCW and USFWS will meet to complete the Phase I Annual Review during which the Phase I post-construction monitoring results and the observed take will be reviewed in the context of the predicted take.

3. Following review of the post-construction monitoring results and the observed take, PCW and USFWS will consider adjustments to the post-construction monitoring protocols, conservation measures, BMPs, and/or experimental ACPs as warranted.

4. PCW will implement the adjustments to the post-construction monitoring protocols, conservation measures, BMPs, and/or experimental ACPs deemed necessary during the Phase I Annual Review.

Implementation of the Phase I adaptive management process will provide a more frequent opportunity for USFWS to provide PCW with feedback on the implementation of the monitoring protocols and avoidance and minimization measures included in this Phase I ECP.

8.8 Risk Assessment Following Stage 4

Following completion of the Stage 4 risk assessment, PCW believes Phase I is a Category 2 project because, although it has a risk of ongoing take of eagles, this risk can be minimized as PCW has documented in this Phase I ECP. As a Category 2 project, Phase I is, 1) reasonably likely to take eagles at a rate greater than is consistent with maintaining stable or increasing populations, but 2) the risk has been reduced to an acceptable level through a combination of conservation measures and reasonable compensatory mitigation outlined in this Phase I ECP. *See USFWS 2013a.*

PCW has implemented each of the four stages of the ECP Guidance to assess and address the risk to eagles from the CCSM project, including Phase I, over a period of approximately 7 years.

First, PCW performed landscape-scale screening of and broad characterization of the Ranch prior to finalizing the CCSM Project Site. Although initial planning and siting efforts for the CCSM Project were completed prior to the issuance of the ECP Guidance, PCW's early site analysis, BLM's data gathering and preparation of the EIS, and coordination with USFWS ensured that initial project design efforts used the best available information regarding eagle use patterns including the location of potential eagle nesting habitats, foraging areas, roost locations, and other areas that could potentially be used by eagles.

Second, PCW developed and implemented scientifically rigorous surveys, monitoring, assessment, and research designs resulting in the identification of important eagle use areas including nesting and foraging locations. These data gathering efforts were developed and completed in close coordination with USFWS and other federal and state agencies. The collection of thousands of hours of avian use data including those collected as part of long-watch raptor surveys, 800-meter raptor count surveys, raptor nest surveys, prey base surveys, avian radar surveys, breeding bird surveys, and migratory bird surveys have identified the important eagle use areas in Phase I including nesting habitats, potential foraging habitats, potential roost locations, and other eagle use areas. The data collected as part of Stage 2 were used to substantially redesign the CCSM Project, including Phase I, to avoid and minimize impacts to bald and golden eagles to the extent practicable.

Third, USFWS used this data in its eagle fatality model to predict eagle fatalities that would occur as a result of the construction and operation of Phase I. The data collected as part of Stage 2 were appropriate for use in the eagle fatality model and resulted in estimation of potential eagle fatalities that could occur as a result of construction and operation of Phase I. At the 80% UCI, USFWS predicts 10-14 golden eagle fatalities and 1.4-1.9 bald eagle fatalities annually for Phase I.

Fourth, PCW used the data to avoid and minimize risks to eagles to the extent practicable such that any remaining take is unavoidable and is offset by appropriate compensatory mitigation. PCW's close coordination with USFWS to substantially redesign Phase I was informed by the information that was collected and evaluated as part of Stages 1, 2, and 3 of the ECP Guidance. The avoidance and minimization efforts completed for Phase I demonstrate that impacts within important eagle use areas including nesting habitats, foraging habitats, potential roost sites, and other eagle use areas have been avoided and minimized to the extent practicable such that any remaining take is unavoidable. PCW's compensatory mitigation plan, post-construction monitoring program, and adaptive management approach created as part of Stage 4 provide the measures necessary to offset any remaining take that occurs. PCW has proposed adequate compensatory mitigation for up to 14 golden eagles fatalities per year as estimated by USFWS. As a result of these avoidance and minimization efforts and PCW's compensatory mitigation plan and associated monitoring, PCW believes Phase I is a Category 2 project with impacts that have been effectively avoided, minimized, or mitigated to ensure that project activities are consistent with the USFWS goal of maintaining stable or increasing populations of bald and golden eagles.

In sum, this Phase I ECP documents PCW's: (a) identification of important eagle use areas; (b) the comprehensive actions it has already taken and those it has committed to in the future to avoid and minimize adverse effects to eagles, as well as its commitment to compensatory mitigation; and (c) the procedures it will employ to monitor for impacts to eagles during construction and operation of Phase I such that PCW believes Phase I meets the standards in 50 C.F.R. §22.26 for issuance of ETPs.

9.0 Post-construction Monitoring (ECP Guidance Stage 5)

Post-construction monitoring is required for all programmatic ETPs. *See 50 C.F.R. §22.26(c)(2).* Consistent with Stage 5 of the ECP Guidance, PCW will conduct post-construction monitoring for eagle fatalities and disturbance effects at Phase I. While the ECP Guidance notes that post-construction monitoring for eagles can be combined with monitoring for other wildlife species, PCW has developed an eagle-specific post-construction monitoring program for Phase I. The purpose of post-construction monitoring is to generate empirical data for comparison with the pre-construction risk-assessment fatality and disturbance predictions. *See USFWS 2013a at p.22.* Post-construction monitoring has two basic components when applied to eagle take: (1) estimating the mean annual fatality rate to ensure that the permitted level of eagle take is not exceeded; and (2) assessing possible disturbance effects on neighboring nests and communal roosts. Further, as described in the ECP Guidance, the USFWS adaptive management approach to programmatic ETPs depends heavily on pre- and post-construction data from individual projects. *See USFWS 2013a at p. xi.*

This chapter describes the Phase I post-construction monitoring program for eagles and the methods that will be used to assess and quantify site-specific and eagle-specific sampling biases and sources of error. Eagle-specific searcher efficiency and carcass persistence trials will be conducted to identify potential sampling biases, characterize variability of datasets used for fatality modeling, and reduce uncertainty in model estimates. Implementation of these methods takes into consideration the relative rarity of eagle collisions with wind turbines and will provide defensible, science-based estimates of post-construction eagle fatalities for comparison with the USFWS fatality model estimates and permitted take.

9.1 Eagle Fatality Monitoring

According to the ECP Guidance, all wind facilities that are permitted to take eagles must conduct fatality monitoring to ensure compliance with regulatory requirements. The primary objectives of fatality monitoring are to: (1) estimate eagle fatality rates for comparison with the model-based predictions prior to construction; and (2) determine whether there are any patterns of fatalities within Phase I such that factors associated with those fatalities can be identified and addressed, if possible, through adaptive management and the application of additional conservation measures and experimental ACPs. *See Section 8.7.*

PCW will complete eagle fatality monitoring for Phase I using current, scale-modified protocols to document take. The ECP Guidance recognizes that site-specific characteristics should be accounted for in the design of post-construction fatality monitoring protocols for eagles. *See USFWS 2013a, App. H.* Accounting for site-specific differences in vegetation cover and height, snow cover, season, and carcass persistence reduces many of the inherent biases and sampling errors that affect eagle fatality model estimates. The Phase I eagle fatality monitoring program addresses the potential influence of these factors and identifies approaches to optimize eagle fatality monitoring while maintaining appropriate levels of certainty that permitted take is not exceeded. *See Péron et al. 2013.*

Consistent with the ECP Guidance, to reduce sampling biases and potential sources of error, PCW's eagle fatality monitoring program accounts for:

1. Potential variability of fatality rates by year, season, and location;
2. Effects of carcass removal by scavengers;
3. Variable searcher efficiency;
4. Site-specific conditions including vegetation, topography, and snow cover; and
5. Undetected fatalities or injured birds that occur outside of monitoring plots.

As provided for in this Phase I ECP, PCW and USFWS will review the results of the Phase I eagle fatality monitoring program at least once annually and, if deemed appropriate, the fatality monitoring program may be modified as approved by USFWS through the adaptive management process described in section 8.7.

9.1.1 Eagle Fatality Monitoring Duration

USFWS anticipates that in most cases, intensive post-construction eagle fatality monitoring to estimate the annual fatality rate will be conducted for at least the first two years after issuance of the programmatic ETP, followed by less intense monitoring for up to three years after the expiration date of the programmatic ETP, in accordance with the monitoring requirements at 50 C.F.R. §22.26(c)(2). *See USFWS 2013a at p. ix.* PCW will conduct fatality searches following the protocols set forth in this Phase I ECP for the first 24 months following commencement of commercial operation. After the first 24 months of commercial operation, PCW will consult with USFWS through the adaptive management process described in section 8.7 to develop appropriate fatality survey methods for the remaining permit term.

9.1.2 Eagle Fatality Monitoring Protocol

During the first 24 months following commencement of commercial operation of Phase I, each of the 500 wind turbines in Phase I will be searched once per month.[30] This initial frequency was determined to be appropriate to account for carcass scavenging rates in northeastern Utah and northwestern Colorado. *See Lehman et al. 2010.* Following initial survey and carcass persistence trial results, the frequency of searches may be adjusted based on site-specific scavenging rates. *See Sections 9.1.3 & 9.1.4.*

[30] Note that searches will not be performed when weather conditions make wind turbines inaccessible or unsafe to access in a standard road vehicle.

In shrub-dominated habitats or other habitats with some level of lateral visual obstruction, initial searches will be conducted using 10-meter transect widths (approximately 33 feet on either side of the transect). *See Figure 9.1.* In barren/sparsely vegetated or grassland/hay meadow habitats, searches will be conducted using 20-meter transects (approximately 66 feet on either side of the transect). *See Figure 9.2 & Figure 9.3.* Wider transect spacing in these habitats is warranted because of the relatively large size of eagle carcasses and the high visibility in these habitats. Following initial surveys and searcher efficiency trials, transect widths for surveys may be adjusted to reflect site-specific searcher efficiency by major habitat type (shrub, grassland, barren, etc.). *See Section 9.1.4.*

Figure 9.1. Representative Shrub-dominated Habitat (10-meter monitoring spacing).

Figure 9.2. Representative Barren/Sparsely-vegetated Habitat (20-meter monitoring spacing).

Figure 9.3. Representative Grassland/Hay Meadow Habitat (20-meter monitoring spacing).

All searches will be conducted within square plots oriented such that the largest distance searched (i.e., the diagonal of the square) will be aligned in the direction of prevailing winds as described by Erickson *et al.* (2003). Based on scientific literature, factors specific to Phase I, and the estimated wind turbine size, a search plot size of 240 meters by 240 meters (approximately 787 feet by 787 feet) will be used for each wind turbine location. *See Hull and Muir 2010*. Using results of the carcass persistence and searcher efficiency trials described in the following sections, the number of wind turbines searched, the interval between searches, transect spacing, and search plot size may be adjusted as necessary through the adaptive management process described in section 8.7 to optimize the sampling design and meet the fatality estimate certainty goals described in section 9.1.5. *See Péron et al. 2013*. *See Sections 9.1.3 & 9.1.4.*

PCW will collect the following information for each eagle fatality monitoring survey:

1. Date
2. Start time
3. End time
4. Interval since last search
5. Searcher name
6. Which wind turbine plot was searched (including decimal-degree latitude longitude or UTM coordinates and datum)
7. Habitat and vegetation characteristics, site topography, and any noticeable changes in conditions since previous visit (i.e., fire, increased or decreased herbaceous canopy height or cover, etc.)

8. Weather data for each search, including wind speed or Beaufort wind scale precipitation, snow cover, cloud cover, or other relevant weather condition
9. GPS track of the search path

When an eagle fatality is discovered, the searcher will mark the carcass with a flag. After completing the search of that wind turbine, the searcher will immediately return to the flagged carcass to collect carcass data as described below, which follows the recommendations set forth in the ECP Guidance and Wind Energy Guidelines. *See USFWS 2013a.* All carcasses, parts, or feathers will be photo-documented. All potential injuries or lack thereof, signs of scavenging, and identifying characteristics will be documented. The preferred method of recording data will be electronically using a data recording device (such as a field computer or notepad), but the searcher may also record information on a paper form. The searcher will record the following information for each fatality:

1. Date
2. Species
3. Age and sex, if possible
4. Band number and notation if wearing a radio-transmitter or auxiliary marker
5. Observer name
6. Wind turbine number or other identifying characteristic
7. Distance of the carcass from the wind turbine
8. Azimuth of the carcass from the wind turbine
9. Decimal-degree latitude longitude or UTM coordinates of the wind turbine and carcass
10. Habitat surrounding the carcass
11. Condition of the carcass (entire, partial, scavenged)
12. Description of the carcass
13. A rough estimate of the time since death (e.g., <1 day, > a week), and how estimated
14. A series of digital photographs of the carcass and landscape surrounding the location
15. Information on carcass disposition and a tag number as provided by USFWS

The information collected (including photographs) will be included in each quarterly report submitted to USFWS under section 9.1.6. PCW will notify the USFWS Office of Law Enforcement (OLE) of any eagle fatality or injuries as soon as practicable, but no later than 24 hours following discovery. While searchers are not trained or qualified to investigate or evaluate evidence of criminal activity associated with an eagle carcass, if in the judgment of the searcher criminal activity is suspected or observed, the carcass will be left in place and a USFWS Law Enforcement Officer will be notified immediately. Handling and disposition of carcasses will be as provided for under section 9.6.

9.1.3 Carcass Persistence Trials

As recommended in the ECP Guidance, PCW will conduct carcass persistence trials during eagle fatality monitoring. Carcass persistence trials will be conducted once each season for the first 24 months of eagle fatality monitoring. [31] Eagle carcasses will not be made available by USFWS for carcass persistence trials; therefore, PCW will use the best available suitable surrogates for eagles (i.e., raptors of similar size and color). PCW will revisit carcasses placed as part of carcass persistence trials on days 1 through 7, 14, 21, and 28. *See Erickson et al. 2003; Young et al. 2003*. If carcasses are still present on day 28, they will be visited by PCW weekly until they are scavenged or for 90 days, whichever is sooner. Seasonal carcass persistence trials will account for the effects of weather, differential carcass decay/desiccation rates, scavenger densities, and scavenger behavior across seasons. When appropriate, carcasses placed for searcher efficiency trials will be used to conduct the carcass persistence trials and will follow the same placement and visitation schedule described above.

The data from the carcass persistent trials will be used in a suitable statistical estimator (e.g., Péron and Hines 2014, Huso 2011, Huso *et al.* 2012, and Shoenfeld 2004) to account for imperfect carcass detectability and to produce unbiased estimates of fatality. *See Section 9.1.5.* The data may also be used to adjust the post-construction fatality search interval and sampling coverage as approved by USFWS through the adaptive management process described in section 8.7.

9.1.4 Searcher Efficiency Trials

As recommended in the ECP Guidance, PCW will conduct searcher efficiency trials during eagle fatality monitoring. Searcher efficiency trials will be conducted once each season for the first 24 months of eagle fatality monitoring.[31] Searcher efficiency will be calculated as the proportion of trial carcasses found by a searcher relative to the total number of carcasses placed for that searcher's trial. Searcher efficiency trials will be conducted blindly, without the knowledge of the searcher involved, and simultaneously with formal eagle fatality monitoring at a subset of the searched wind turbines. Each efficiency trial will be conducted using the same search protocols described above for eagle fatality monitoring. *See Section 9.1.2.* The trials will be conducted seasonally to account for different field conditions (e.g., vegetation growth, snow) that may affect the ability of the searchers to locate eagle carcasses.

Carcasses used for searcher efficiency trials will be determined in consultation with USFWS. These may include dark colored geese or turkeys although other surrogates (large raptors) may be used if available.[32] All carcasses will be individually marked to differentiate them from any carcasses that might

[31] For purposes of eagle fatality monitoring, carcass persistence trials, and searcher efficiency trials, seasons are defined as: (1) summer during the vegetation growing season; (2) late fall or early spring outside of the vegetation growing season (no snow present); and (3) in winter outside of the vegetation growing season (snow present).
[32] For purposes of the searcher efficiency trials, carcasses of a similar size and color to eagle carcasses are sufficient. However, these carcasses are not appropriate for use in the carcass persistence trials described in section 9.1.3 due to differences in scavenging rates that may be significant.

be present that are not part of the trial. The appropriate number of carcasses to use for searcher efficiency trials will be determined in coordination with USFWS and will take into account site-specific carcass persistence rates in Phase I. *See Section 9.1.3.* Currently available fatality models (e.g. Huso 2011, Huso *et al.* 2012, Shoenfeld 2004) require that a minimum of 10 carcasses be placed for each fatality group parameter and searcher (e.g., 10 per season per searcher per model covariate). However because detectability and carcass persistence for eagles is expected to differ from that of small-bodied passerines and other raptor species (as noted in Lehman *et al.* 2010) and because newly developed fatality estimators may become available, PCW will work with USFWS to identify the appropriate number of carcasses required to achieve desired results.

For each searcher efficiency trial, carcasses will be placed during the morning (on the same day as eagle fatality monitoring searches) before searches are conducted. The person conducting the blind test (the tester) will place the carcasses at randomly generated locations within the survey plot and drop the carcasses from waist level to ensure the carcasses land in a random position and location. The location of the placed carcasses and vegetation type will be recorded by the tester with a handheld Global Positioning System (GPS) unit. To ensure the trials are blind, searchers will be unaware of the chosen date, the wind turbine plots selected, and the specific locations and number of carcasses placed for each trial. The tester will distinguish the placed carcasses with unique leg bands or other appropriate means to ensure the placed carcasses are distinguishable from carcasses potentially attributable to Phase I. The marking method used will not increase the visibility of the carcass to ensure that searcher efficiency trials are unbiased.

For analysis of searcher efficiency, placed carcasses discovered by the searcher will be compared to the total number of carcasses placed by the tester. Separate searcher efficiency rates will be calculated for each season, for each searcher, and for each covariate used in fatality model estimates. These rates will be coded into the observed fatality data for use in the adjusted fatality estimate analyses. *See Section 9.1.5*. The data may also be used to adjust transect spacing for fatality surveys, either seasonally or by vegetation type, as approved by USFWS through the adaptive management process described in Section 8.7.

9.1.5 Adjusted Eagle Fatality Estimates

PCW will coordinate with USFWS to identify an appropriate statistical estimator to calculate an adjusted fatality estimate for eagles using data from the eagle fatality monitoring program. Fatality estimates are based on observed carcasses found during eagle fatality monitoring, the probability that a searcher will miss a carcass (searcher efficiency correction factor), the probability that a carcass will be removed before a searcher can locate it (carcass persistence correction factor), the date of the last search at a particular search plot prior to finding a carcass (search interval), the proportion of wind turbines searched to the total number of wind turbines at the facility, and the proportion of searchable areas beneath each wind turbine (or similar search area correction). Categorical covariates (i.e., season, carcass type, sample area, searcher, vegetation attributes) that significantly improve the fit of the searcher efficiency and carcass persistence models will be used, as applicable, in the adjusted eagle fatality estimate.

Adjusted fatality estimates will be compared to permitted take levels to ensure that there is a minimum of 80% certainty that permitted take has not been exceeded. While it is PCW's goal to achieve 95% certainty in fatality estimates for comparison to permitted take, this level of certainty may not always be achievable because of site-specific factors (i.e., proportion of area that can be safely searched, site-specific searcher efficiency, site-specific carcass persistence, etc.). If 95% certainty cannot be reasonably achieved, PCW will maintain a minimum of 80% certainty in fatality estimates at all times during the first 24 months of post-construction eagle fatality monitoring. To achieve the necessary certainty in the fatality estimates, PCW and USFWS may revise the eagle fatality monitoring protocol as needed in accordance with the adaptive management process described in section 8.7.

9.1.6 Reporting

During eagle fatality monitoring, PCW will electronically submit quarterly reports to USFWS detailing eagle fatality monitoring results. The quarterly reports will include all fatality data, including incidental records. The quarterly reports will be submitted within 30 days following the end of each calendar quarter.

Annual reports detailing the eagle fatality monitoring results and adjusted fatality estimates will be submitted to USFWS by February 15 of each year. The annual reports will discuss fatalities in the context of spatial and seasonal distribution, and, as warranted, will present recommendations for future monitoring, conservation measures, and/or adaptive management. All eagle fatality monitoring reports to USFWS will be considered confidential and not subject to public disclosure, as provided for under the Freedom of Information Act's exemption applying to confidential commercial information. *See U.S.C. § 552(b)(4).*

9.2 Eagle Nest Surveys

Consistent with the ECP Guidance, PCW will conduct eagle nest surveys to determine nest occupancy for all eagle nests within the Phase I mean inter-nest distance (MIND) throughout the term of the ETPs. *See Figure 9.4.* USFWS has calculated the MIND for golden eagles at 7,000 meters (4.3 miles) for the CCSM Project. *See Section 6.3.1.* PCW will use eagle nest surveys to identify occupied and unoccupied nests for purposes of: (1) applying appropriate eagle nest avoidance and minimization measures; and (2) evaluating potential disturbance take. *See Sections 6.3.1, 7.2, & 9.3.* If occupied nests are identified during nest surveys, PCW will conduct additional follow-up monitoring to determine nest success and productivity.

Ground-based nest surveys will begin on January 15 of each year from established observation points. Nests will be observed approximately once every three to four weeks through May 1 to identify occupied nests.[33] During construction and for the first two years (24 months) following commencement of commercial operation, PCW will also conduct one round of aerial nest surveys between April 1 and May 1 as weather allows. The purpose of the aerial surveys is to confirm ground observations. If a nest is not occupied by May 1 of any year, then it will be classified as unoccupied for that year and will not be checked further. After the first 24 months of commercial operation, PCW will consult with USFWS through the adaptive management process described in section 8.7 to evaluate the necessity and practicality of continued aerial surveys for the remaining permit term.

If a nest is occupied, PCW will continue to monitor the nest to determine nest success and productivity. Each occupied eagle nest will be evaluated using ground-based surveys once every four to six weeks post-hatch to identify approximate fledging/failure dates. Ground-based surveys of each occupied nest will continue until the nest surveys demonstrate that the nests are unoccupied.

Eagle nest survey and productivity data recorded during the year will be reported annually to USFWS as part of the annual eagle fatality monitoring reports. *See Section 9.1.6.* These annual reports will detail the eagle nest monitoring results, and, as warranted, will present recommendations for future monitoring, conservation measures, and/or adaptive management. Based upon the nest survey data, the eagle nest avoidance and minimization measures described in section 6.3.1 may be adjusted as approved by USFWS through the adaptive management process described in section 8.7. All eagle nest monitoring reports to USFWS will be considered confidential and not subject to public disclosure, as provided for under the Freedom of Information Act's exemption applying to confidential commercial information. *See U.S.C. § 552(b)(4).*

[33] Surveys will not be performed when weather conditions make nests inaccessible or unsafe to access in a standard road vehicle.

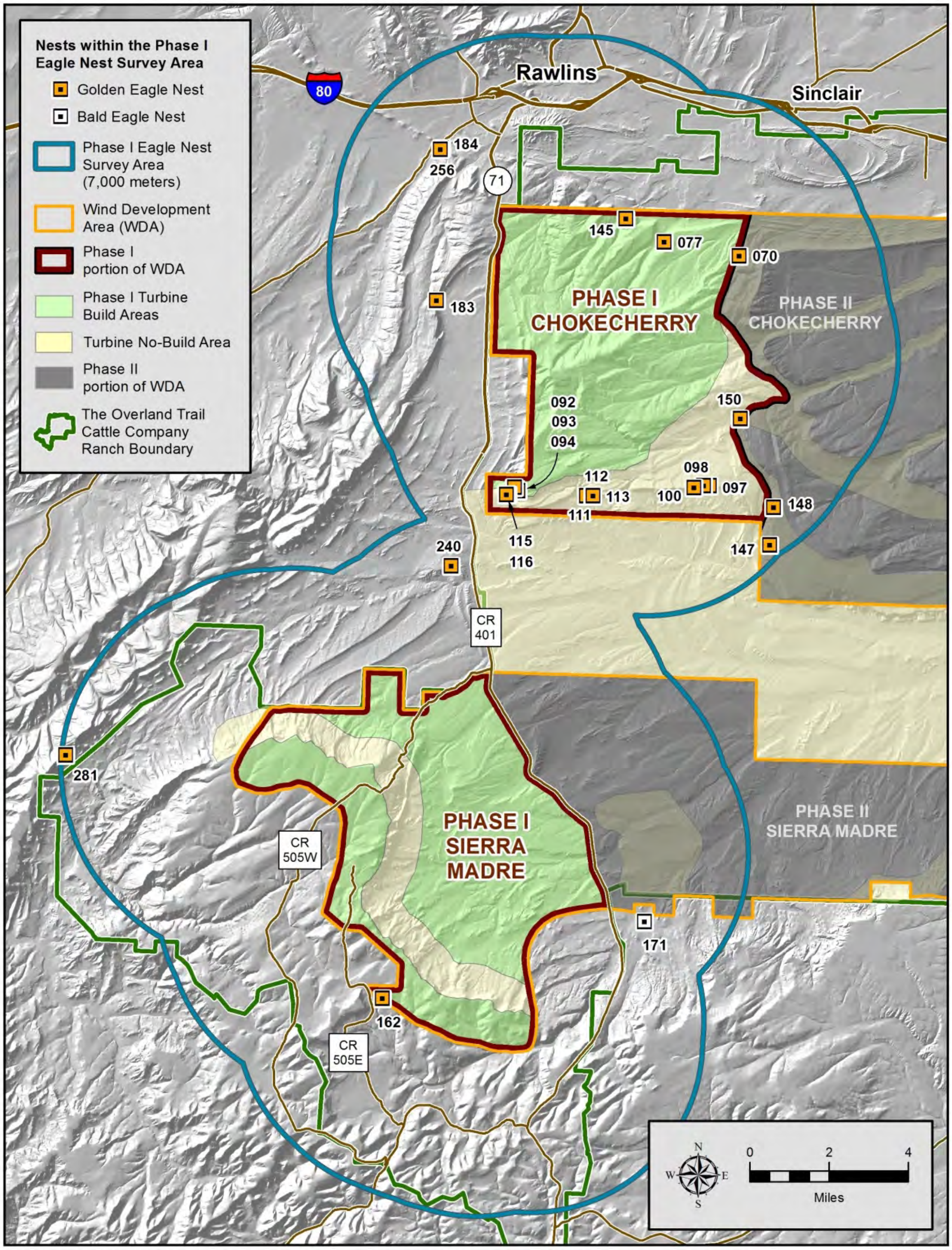

Figure 9.4. Phase I Post-construction Eagle Nest Survey Area.

9.3 Disturbance Monitoring

According to the ECP Guidance, project developers may be required to monitor eagle nesting territories and communal roost sites identified in the Stage 2 assessments as stated in the permit regulations at 50 C.F.R. §22.26(c)(2) for at least two years after project construction and for up to three years after the cessation of the permitted activity. The objective of such monitoring is to determine post-construction: (1) territory or roost occupancy rates; (2) nest success rates; and (3) productivity. On a project-by-project basis, changes in any of these reproductive measures may not be indicative of disturbance. However, patterns could become apparent when findings from many projects are evaluated in the context of a meta-analysis within the adaptive management framework. *See USFWS 2013a at p. 98.* Consistent with the ECP Guidance, PCW will conduct the eagle nest surveys as described in section 9.2 and disturbance monitoring as described below to identify potential disturbance effects and disturbance take from Phase I. If disturbance take is detected, it will be addressed as described in section 9.3.5.

9.3.1 Nest Disturbance Monitoring

PCW will conduct disturbance monitoring of all eagle nests within 800 meters (0.5 mile) of Phase I infrastructure during construction.[34,35] The nest survey protocol for eagle nest disturbance monitoring will be the same as that described in section 9.2. Generally, eagle nests within 800 meters of Phase I infrastructure are within the Phase I Eagle Nest Survey Area and will be monitored throughout the term of the ETPs as described in section 9.2. However, there is one eagle nest within 800 meters of the Phase I infrastructure (bald eagle nest #055) that falls outside of the Phase I Eagle Nest Survey Area. The nest is a located near the North Platte River approximately 160 meters (0.1 mile) from the access road leading to the North Platte River Water Extraction Facility. *See Section 6.4.* While this nest is outside of the Phase I Eagle Nest Survey Area, it will be monitored during construction due to the potential for disturbance.

9.3.2 Disturbance Monitoring of Communal Roosts

As detailed in chapter 5.0, there are no communal roosts within the Phase I MIND based on PCW's pre-construction survey data and BLM historical records. Therefore, no monitoring of communal eagle roosts is necessary.

9.3.3 Disturbance Monitoring of Other Important Eagle Use Areas

Other important eagle use areas not associated with nests include foraging and sheltering areas. Sheltering areas are primarily along cliff faces and edges. PCW's commitment to Turbine No-Build Areas

[34] Disturbance monitoring of eagle nests outside the Phase I Eagle Nest Survey Area will not be conducted post-construction because, as discussed in section 6.4, the potential for disturbance of nests within 800 meters of the Phase I infrastructure exists primarily during construction.

[35] For the first year of construction, if construction is not underway by January 15 PCW will postpone the monitoring program until one week prior to the commencement of construction provided that construction activities will occur during the nesting season.

and set-backs from geologic features such as the Bolten Rim and the Miller Hill Rim as described in chapter 6.0, avoids and minimizes potential impacts to eagle sheltering areas. In addition, following consultation with USFWS, PCW has located wind turbines outside important prey base and foraging areas which further avoids and minimizes potential impacts to eagles. *See Section 6.3.2.* Therefore, PCW will not conduct further monitoring of these areas. If through incidental observations PCW detects eagle behaviors within foraging and sheltering areas that may be indicative of disturbance, PCW will consult with USFWS and, through the adaptive management process described in section 8.7, additional conservation measures including experimental ACPs may be implemented.

9.3.4 Reporting

During eagle disturbance monitoring, PCW will submit annual reports to USFWS as part of the annual eagle fatality monitoring reports. *See Section 9.1.6.* These annual reports will detail the eagle disturbance monitoring results, and, as warranted, will present recommendations for future monitoring, conservation measures, and/or adaptive management. All eagle disturbance monitoring reports to USFWS will be considered confidential and not subject to public disclosure, as provided for under the Freedom of Information Act's exemption applying to confidential commercial information. *See U.S.C. § 552(b)(4).*

9.3.5 Actions to be Taken if Disturbance is Detected

If monitoring shows strong evidence of disturbance take from Phase I, PCW and USFWS will consider additional conservation measures and experimental ACPs to reduce effects using the adaptive management process described in section 8.7. Alternatively, USFWS may require additional compensatory mitigation to offset the estimated decreases in productivity to the extent necessary to meet the statutory requirement to preserve eagles. PCW has instituted numerous conservation measures, including conservation easements and prey base enhancements, that USFWS may consider in determining whether additional compensatory mitigation for disturbance is required. *See Section 8.1*. Further, PCW has identified additional conservation measures such as carcass removal, habitat improvements or modification, and lead abatement that also have the potential to provide a conservation benefit and uplift for eagles and that may be appropriate compensatory mitigation for disturbance take. *See Section 8.5.4*.

9.4 Eagle Use Monitoring

PCW has conducted extensive eagle use monitoring for Phase I, as described in chapter 5.0 of this Phase I ECP. The ECP Guidance states that the purpose of eagle use monitoring is to provide comparative information on post-construction eagle use. The robust post-construction fatality, disturbance and nest monitoring program for Phase I will enable a comprehensive comparison between pre- and post-construction eagle use. Post-construction avian point counts are not planned as part of PCW's post-construction monitoring.

9.5 Incidental Discoveries

All operation and maintenance personnel working on Phase I will be trained to identify eagle fatalities. Educational information concerning protection of eagles and identification of injured or dead eagles will be posted in the operation center. Instructions and procedures that personnel must follow in the event that an injured or dead eagle is discovered onsite shall be included with the educational information, including whom to notify and what actions must be taken.

Operations and maintenance personnel will not disturb any carcass, but will instead document the location of the eagle fatality and notify their supervisor as soon as possible. The supervisor will contact a qualified biologist to record the fatality following the procedures set forth in section 9.1.2. Upon notification, PCW's qualified biologist will also notify the USFWS OLE as soon as practicable, but no later than 24 hours following discovery, as set forth in section 9.1.2.

Any fatality discovered during times other than the formal eagle fatality surveys described in section 9.1 will be considered an incidental record. Incidental records will be provided to USFWS along with other post-construction monitoring results as described in section 9.1.6. Incidental observations that fall within the post-construction monitoring search areas will be replaced with a suitable surrogate such that it can be accounted for in post-construction fatality surveys to ensure that estimates of eagle fatality are not biased.

9.6 Disposition of Eagle Carcasses and Injured Eagles

PCW will notify the USFWS OLE of any eagle fatality or injury as soon as practicable, but no later than 24 hours following discovery. PCW will also report all discoveries to USFWS's migratory bird permit issuing office or as otherwise required in the ETPs. Eagle carcasses will not be moved until such notification occurs. If the necessary permits have been obtained (e.g., a Migratory Bird Special Purpose Utility Permit [SPUT] from the Migratory Bird Program), then following the collection of carcass-specific data, PCW (or other SPUT permit holder) will remove the carcass from the field to a secure location. Final disposition of eagle carcasses will be in accordance with ETP terms and conditions or USFWS direction.

If an injured eagle is encountered either during a survey or incidentally, PCW will notify USFWS. The location and time of the observation as well as the observed behavior and injury will be recorded. If directed by USFWS, a qualified biologist or other certified wildlife handler will attempt to capture the injured eagle unless such capture would cause additional injury or harm. Once the injured eagle has been captured, it will be transferred to an appropriately permitted rehabilitation center as directed by USFWS.

9.7 Adaptive Management for Post-Construction Monitoring

PCW and USFWS will review the Phase I post-construction monitoring program for effectiveness at least annually as described in section 8.7. The procedures, protocols, and/or schedule for post-construction monitoring may be modified by PCW and USFWS using the adaptive management process set forth in section 8.7 based on survey results, field experience, new scientific information, new technology or procedures, or other relevant information.

10.0 Wildlife Permits

In addition to the ETPs, PCW may need to obtain the following non-eagle permits related to avian and bat species from either USFWS or WGFD for Phase I:

- USFWS-issued permits:
    - Scientific Collection Permits
    - Migratory Bird Special Purpose Utility Permit. *See 50 C.F.R. §21.27.*

      A Special Purpose Utility Permit is necessary only if PCW plans to collect, transport, or possess dead migratory birds or parts or contract someone to conduct these activities on its behalf. More detailed information on the applicability of this permit and its requirements are set out in the Service's handout titled "What you should know about a Federal Migratory Bird Special Purpose Utility Permit" which can be accessed at: http://www.fws.gov/forms/3-200-81.pdf
- WGFD-issued permits:
    - Scientific collection permits for birds and bats
    - Greater sage-grouse scientific collection permit
    - Scientific collection permits for other species

The need for additional wildlife permits for Phase I, if any, will be identified as part of the adaptive management process. *See Section 8.7.*

USFWS will determine and provide ETP conditions as well as the conditions of any other permits issued by USFWS. State permit conditions will be determined and provided by WGFD.

11.0 Literature Cited

Allison, T.D. 2012. Eagles and Wind Energy: Identifying Research Priorities. A white paper of the American Wind and Wildlife Institute, Washington, D.C.

Armstrong, D.M., J.P. Fitzgerald, and C.A. Meaney. 2011. Mammals of Colorado. 2nd ed. Denver Museum of Nature and Science, University Press of Colorado, Boulder, CO.

Avery, M.L., and J.L. Cummings. 2004. Livestock Depredations by Black Vultures and Golden Eagles. USDA National Wildlife Research Center - Staff Publications. Paper 76. Available online at: http://digitalcommons.unl.edu/icwdm_usdanwrc/76. Accessed February 2014.

Avian Power Line Interaction Committee (APLIC). 2012. Reducing avian collisions with power lines: the state of the art in 2012. Edison Electric Institute and APLIC. Washington, D.C.

———. 2006. Suggested practices for avian protection on power lines: the state of the art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, D.C. and Sacramento, CA, USA.

———. 2005. Avian protection plan guidelines. Edison Electric Institute's Avian Power Line Interaction Committee (APLIC) and U.S. Fish and Wildlife Service. Washington, D.C.

Barclay, D. 2011. A historical assessment of Overland Trail Segments from the Sulphur Springs Stage Station to the North Platte River, Carbon County, Wyoming. Unpublished. Golden, CO.

Bates, J.W., and M.O. Moretti. 1994. Golden eagle (*Aquila chrysaetos*) population ecology in eastern Utah. Great Basin Naturalist 54(3):248-255.

Beecham J. J., M. N. Kochert 1975. Breeding biology of the golden eagle in southwestern Idaho. Wilson Bulletin 87:506–513.

Biggins, D.E., B.J. Miller, L.R. Hanebury, B. Oakleaf, A.H. Farmer, R. Crete, and A. Dood. 1993. A technique for evaluating black-footed ferret habitat. Pp. 73–88. *in* J.L. Oldemeyer, D.E. Biggins, B.J. Miller, and R. Crete *eds*. Management of prairie dog complexes for the reintroduction of the black-footed ferret: Washington, D.C., U.S. Fish and Wildlife Service, Biological Report 13.

Boeker, E. L. 1974. Status of golden eagle surveys in the western states. Wildlife Society Bulletin 2:46–49.

Brooks, M. L.; C. M. D'Antonio, D. M. Richardson, J. B. Grace, J. E. Keeley, J.M. DiTomaso, R. J. Hobbs, M. Pellant, and D. Pyke. 2004. Effects of invasive alien plants on fire regimes. BioScience. 54(7):677-688.

Bureau of Land Management (BLM). 2014a. Environmental Assessment for Infrastructure Components: Phase I Haul Road and Facilities, West Sinclair Rail Facility, and Road Rock Quarry, for the Chokecherry and Sierra Madre Wind Energy Project. U.S. Department of the Interior, Bureau of Land Management, High Desert District, Rawlins Field Office, Rawlins, WY. December.

———. 2014b. Decision Record for E Environmental Assessment for Infrastructure Components: Phase I Haul Road and Facilities, West Sinclair Rail Facility, and Road Rock Quarry, for the Chokecherry and Sierra Madre Wind Energy Project. U.S. Department of the Interior, Bureau of Land Management, High Desert District, Rawlins Field Office, Rawlins, WY. December.

———. 2014c. Letter from Dennis J. Carpenter to The Overland Trail Cattle Company LLC. January.

———. 2013a. Environmental Assessment North Platte River Recreation Area Management Plan. U.S. Department of the Interior, Bureau of Land Management, High Desert District, Rawlins Field Office, Rawlins, WY. September.

———. 2013b. Record of Decision Mohave County Wind Farm Project. U.S. Department of the Interior, Bureau of Land Management, Kingman Field Office. June.

———. 2012a. Record of Decision for the Chokecherry and Sierra Madre Wind Energy Project and Approved Visual Resource Management Plan Amendment on Public Lands Administered by the Bureau of Land Management Rawlins Field Office, Carbon County, Wyoming. U.S. Department of the Interior, Bureau of Land Management, High Desert District, Rawlins Field Office, Rawlins, Wyoming. October.

———. 2012b. Chokecherry and Sierra Madre Wind Energy Project Final Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management, High Desert District, Rawlins Field Office, Rawlins, Wyoming. June.

———. 2011a. Instruction Memorandum No. 2012-043: Greater Sage-Grouse Interim Management Policies and Procedures. Bureau of Land Management, U.S. Department of the Interior, Washington, D.C. December.

———. 2011b. Chokecherry and Sierra Madre Wind Energy Project Draft Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management, High Desert District, Rawlins Field Office, Rawlins, WY. July

———. 2008a. Record of Decision and Approved Rawlins Resource Management Plan. December.

———. 2008b. Instruction Memorandum No. 2009-043: Wind Energy Development Policy. Bureau of Land Management, U.S. Department of the Interior, Washington, D.C. December.

———. 2004. Biological Assessment for the Draft Resource Management Plan and Draft Environmental Impact Statement. December.

Callicott, J. B., L. B. Crowder, and K. Mumford. 1999. Current normative concepts in conservation. Conservation Biology 13:22-35.

Chamberlain, D. E., M. R. Rehfisch, A. D. Fox, M. Desholm, and S. J. Anthony. 2006. The effect of avoidance rates on bird mortality predictions made by wind turbine collision risk models. Ibis 148:198-202.

Chapman, S.S., S.A. Bryce, J.M. Omernik, D.G. Despain, J. ZumBerge, and M. Conrad. 2004. Ecoregions of Wyoming . GIS shapefile. Available online at: http://www.epa.gov/wed/pages/ecoregions/wy_eco.htm. Accessed February 2014.

Clark, T.W., and M.R. Stromberg. 1987. Mammals in Wyoming. University Press of Kansas, Lawrence, Kansas.

Cochrane, J.F., E. Lonsdorf, T.D. Allison, and C.A. Sanders-Reed. 2015 in Press. Modeling with uncertain science: estimating mitigation credits from abating lead poisoning in golden eagles. Ecological Applications.http://dx.doi.org/10.1890/14-0996.1

Cooke, L.A., and S.R. Swiecki. 1992. Structure of a white-tailed prairie dog burrow. Great Basin Naturalist 52: 288-289.

Craig E. H., T. H. Craig, L. R. Powers 1986. Habitat use by wintering golden eagles and Rough-legged Hawks in southeastern Idaho. Journal of Raptor Research. 20:69–71.

Craig, T. H., J. W. Connelly, E. H. Craig, and T. L. Parker. 1990. Lead concentrations in Golden and Bald eagles. Wilson Bulletin 102:130-133.

Craig, T. H., E. H. Craig, and L. R. Powers. 1984. Recent changes in eagle and buteo densities in southeastern Idaho. Murrelet 65:91-93.

Crawford, J. A., R.A. Olson, N. E. West, J. C. Mosley, M. A. Schroeder, T. D. Whitson, R. F. Miller, M. A. Gregg, and C. S. Boyd. 2004. Ecology and management of sage-grouse and sage-grouse habitat. Journal of Range Management 57:374-377

Dennison, P.E., S.C. Brewer, J.D. Arnold, and M.A. Moritz. 2014. Large wildfire trends in the western United States, 1984–2011, Geophys. Res. Lett., 41, 2928–2933, *doi:*10.1002/2014GL059576.

Detect, Inc. 2013. MERLIN™ Avian Radar Survey for the Chokecherry and Sierra Madre Wind Energy Project Graphical Data Report for November, 2011 – March, 2013. August 1.

———. 2012. MERLIN™ Avian Radar Survey for the Power Company of Wyoming Graphical Data Report for March – November, 2011. April 6.

Erickson, W.P., K. Kronner, and B. Gritski. 2003. Nine Canyon Wind Power Project Avian and Bat Monitoring Report, September 2002–August 2003. Technical report submitted to Energy Northwest and the Nine Canyon Technical Advisory Committee. Cheyenne, Wyoming: WEST, Inc., and Pendleton, Oregon: Northwest Wildlife Consultants, Inc.

Franson, J. C., L. Sileo, and N. J. Thomas. 2002. Causes of eagle deaths. National Biological Survey, National Wildlife Health center, Madison, WI.

Fullman, M. B. 2014. The Eagle Has Landed (and that's the problem). Saratoga Sun, Vol 127, No. 24. Available online: http://www.saratogasun.com/story/2014/01/15/opinion/the-eagle-has-landed-and-thats-the-problem/1840.html. Accessed May 2015.

Good, R. E., R. M. Nielson, H. H. Sawyer, and L. L. McDonald. 2007. A Population Estimate for golden eagles in the Western United States. Journal of Wildlife Management 71:395–402.

Gross, J. E., L. C. Stoddart, and F. H. Wagner. 1974. Demographic analysis of a northern Utah jackrabbit population. Wildlife Monograph 40.

Harness, R. E. and K. R. Wilson. 2001. Electric-utility structures associated with raptor electrocutions in rural areas. Wildlife Society Bulletin 29:621-623.

Hull, C. L. and S. Muir. 2010. Search areas for monitoring bird and bat carcasses at wind farms using a Monte-Carlo model. *Australian Journal of Environmental Management* 17:77–87.

Hunt, G. 2002. Golden eagles in a perilous landscape: predicting the effects of mitigation for wind turbine blade strike mortality. California Energy Commission Report P500-02-043F. Sacramento, California, USA.

Huso, M.M.P. 2011. An estimator of wildlife fatality from observed carcasses. Environmetrics, 22:318–329.

Huso, M., N. Som, and L. Ladd. 2012. Fatality estimator user's guide. U.S. Geological Survey Data Series 729. Available online: http://pubs.usgs.gov/ds/729/pdf/ds729.pdf. Accessed February 2014.

Johnson, G., T. Rintz, and D. Strickland. 2008. Raptor Nest Surveys for Chokecherry and Sierra Madre Wind Resource Areas. Carbon County, Wyoming. Prepared by Western EcoSystems Technology, Inc. for ENSR, Golden, Colorado.

Keinath, D.A. 2004. Species assessment for white-tailed prairie dog (*Cynomys leucurus*) in Wyoming. Prepared for U.S. Department of the Interior, Bureau of Land Management, Wyoming State Office, Cheyenne, Wyoming. Wyoming Natural Diversity Database, University of Wyoming, Laramie, Wyoming.

Kochert, M. N. and K. Steenhof. 2002. Golden eagles in the U.S. and Canada: status, trends, and conservation challenges. Journal of Raptor Research 36:32-40.

Kochert M. N., K. Steenhof, L. B. Carpenter, and J. M. Marzluff. 1999. Effects of fire on golden eagle territory occupancy and reproductive success. Journal of Wildlife Management 63:773–780.

Kochert, M. N., K. Steenhof, C. L. Mcintyre, and E. H. Craig. 2002. Golden eagle (Aquila chrysaetos). The Birds of North America No. 684 (A. Poole, Ed.). The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York, USA. http://bna.birds.cornell.edu/bna/species/684.

Kramer, J. L. and P. T. Redig. 1997. Sixteen years of lead poisoning in eagles, 1980-95: an epizootiologic view. Journal of Raptor Research 31:327-332.

Krone, O. 2003. Two white-tailed sea eagles (*Haliaeetus albicilla*) collide with wind generators in northern Germany. Journal of Raptor Research 37:174-176.

Lafón, A. 2006. Installation of devices in water tanks to prevent drowning of wild animals. In Grasslands ecosystems, endangered species, and sustainable ranching in the Mexico–U.S. borderlands: Conference proceedings, USDA Forest Service Proceedings RMRS-P-40, 106–107.

Lehman, R.N. 2001. Raptor electrocution on power lines: current issues and outlook. Wildlife Society Bulletin. 29:804-813.

Lehman, R.N., P.L. Kennedy, and J.A. Savidge. 2007. The state of the art in raptor electrocution research: A global review. Biological Conservation 136:159-174.

Lehman, R.N., J.A. Savidge, P.L. Kennedy, and R.E. Harness. 2010. Raptor electrocution rates for a utility in the intermountain western United States. Journal of Wildlife Management 74:459–470.

Link, S. O., Keeler, C. W., Hill, R. W., and E. Hagen. 2006. Bromus tectorum cover mapping and fire risk. International Journal of Wildland Fire. 15:113- 119.

Lutmerding, Jo A., M. Rogosky, B. Peterjohn, J. McNicoll, and D. Bystrak. 2012. Summary of Raptor Encounter Records at the Bird Banding Lab. Journal of Raptor Research. 46 (1): 17-26.

McDonald, L.L., T.R. Stanley, D.L. Otis, D.E. Biggins, P.D. Stevens, J.L. Koprowski, and W. Ballard. 2011. Recommended methods for range-wide monitoring of prairie dogs in the United States: U.S. Geological Survey Scientific Investigations Report 2011–5063.

McIntyre, C.L., and L.G. Adams. 1999. Reproductive characteristics of migratory Golden Eagles in Denali National Park, Alaska. Condor 101:115-123.

Menkens, E. George, Jr., B.J. Miller, and S.H. Anderson. 1987. White-tailed prairie dog ecology in Wyoming. Great Plains Wildlife Damage Control Workshop Proceedings. Paper 83. Available online: http://digitalcommons.unl.edu/gpwdcwp/83. Accessed February 2014.

Miller, M. J. R., M. E. Wayland, and G. G. Bortolotti. 2002. Lead exposure and poisoning in diurnal raptors: a global perspective. In: Yosef, R. M., M. L Miller, and D. Pepler (Editors), Raptor in the New Millenium, Proceedings of the joint Meeting of the Raptor Research Foundation and The World Working Group on Birds of Prey and Owls, Eliat, Israel, 2-8 April 2000. International Birding and Research Centre, Eliat, pp. 224-245.

Millsap, B., T. Breen, E. McConnell, T. Steffer, L. Phillips, N. Douglass, and S. Taylor. 2004. Comparative fecundity and survival of bald eagles fledged from suburban and rural natal areas in Florida. Journal of Wildlife Management. 68(4): 1018-1031.

Morell, J.J. 2008. Estimated service life of wood poles. North American Wood Pole Council Technical Bulletin.

O'Gara, B.W. 1978. Sheep depredation by golden eagles in Montana. Proceedings of the 8th Vertebrate Pest Conference (1978). Paper 37. Available online at: http://digitalcommons.unl.edu/vpc8/37. Accessed February 2014.

Péron, G., J.E. Hines, J.D. Nichols, W.L. Kendall, K.A. Peters, and D.S. Mizrahi. 2013. Estimation of bird and bat mortality at wind-power farms with superpopulation models. Journal of Applied Ecology, 50: 902–911.

Péron, G. and J.E. Hines. 2014. fatalityCMR—Capture-recapture software to correct raw counts of wildlife fatalities using trial experiments for carcass detection probability and persistence time: U.S. Geological Survey Techniques and Methods 7–C11, 14 p., http://dx.doi.org/10.3133/tm7C11.

Phillips, R.L., J.L. Cummings, G. Notah, and C. Mullis. 1996. Golden eagle predation on domestic calves. Wildlife Society Bulletin 24(3): 468-470.

Power Company of Wyoming LLC (PCW). 2015a. Phase I Bird and Bat Conservation Strategy. *Under Development.*

———. 2015b. Phase I Wind Turbine Development Site-specific Plan of Development. January.

———. 2014a. The Overland Trail Ranch Chokecherry and Sierra Madre Wind Energy Project Conservation Plan and Landowner Agreement. July.

———. 2014b. Road Rock Quarry Site-specific Plan of Development. April.

———. 2014c. Phase I Haul Road and Facilities Site-Specific Plan of Development. April.

———. 2014d West Sinclair Rail Facility Site-Specific Plan of Development. April.

———. 2012. Chokecherry and Sierra Madre Wind Energy Project Eagle Conservation Plan. August.

Preston, C.R. 2011. Golden eagle nesting ecology in the Bighorn Basin: influence of landscape composition, energy development, and other human activity on golden eagle nesting distribution, success, productivity, and diet 2010-2013. 2011 Progress Report. Available online at: http://centerofthewest.org/wp-content/uploads/2012/09/Golden-Eagle-Progress-Report-16-December-2011.pdf. Accessed February 2014.

Reid, F.A. 2006. A Field Guide to Mammals of North America North of Mexico. 4th ed. The Peterson Field Guide Series. Houghton Mifflin Company, Boston, MA.

Reynolds, R.T., J.M. Scott, and R.A. Nussbaum. 1980. A variable circular-plot method for estimating bird numbers. Condor 82:309-313.

Rural Utility Service (RUS). 2013. 2011 statistical report: rural electric borrowers, United States Department of Agriculture Informational Publication 201-1.

Scheuhammer, A. M. and S. L Norris. 1996. The ecotoxicology of lead shot and lead fishing weights. Ecotoxicology 5:279-295.

Scott, T. A. 1985. Human impacts on the golden eagle population of San Diego County. Master's thesis, San Diego State Univ., San Diego, CA.

Shoenfeld, P. 2004. Suggestions regarding avian mortality extrapolation. Technical memo provided to FPL Energy. West Virginia Highlands Conservancy, Davis, West Virginia.

Smith, D.G., and J.R. Murphy. 1979. Breeding responses of raptors to jackrabbit density in the eastern Great Basin Desert of Utah. Raptor Res. 13:1-14.

Smith Environmental and Engineering (Smith). 2010. White-tailed prairie dog town inventory and assessment on the Bolton Ranch Black-Footed Complex in Carbon County, Wyoming. Draft Report. Prepared for Bureau of Land Management Rawlins Field Office. Smith Project NO. 2009-429. Smith Environmental and Engineering, Westminster, CO. September 17, 2010.

Steenhof, K., M.N. Kochert, and T.L. McDonald. 1997. Interactive effects of prey and weather on golden eagle reproduction. Journal of Animal Ecology 66:350-362.

Thompson, S. P., R. S. Johnstone, and C.D. Littlefield. 1982. Nesting history of golden eagles in Malheur-Harney Lakes Basin, southeastern Oregon. Journal of Raptor Research 16:116-122

U.S. Department of Interior. 1979. Snake River Birds of Prey Special Research Report to the Secretary of the Interior. U.S. Department of the Interior, Bureau of Land Management, Boise District, Boise, ID.

U.S. Fish and Wildlife Service (USFWS). 2014b. U.S. Fish and Wildlife Service Recommendations for Eagle Nests Referenced in EA1 and Site-Specific Plans of Development (SPODs 1, 2, 3, and 4) for the Chokecherry and Sierra Madre Wind Energy Project Phase 1. Department of the Interior, U.S. Fish and Wildlife Service, Wyoming Ecological Services Field Office and Region 6 Migratory Bird Management Office. August.

———. 2014. Final Environmental Assessment Shiloh IV Wind Project Eagle Conservation Plan. Available online at: https://www.fws.gov/cno/conservation/MigratoryBirds/ShiloIV-FONSI/Attachment1-FEA-ShilohIV-June2014.pdf. Accessed May 2015.

———. 2013c. Region 6 Recommendations for Avoidance and Minimization of Impacts to Golden Eagles at Wind Energy Facilities. Department of the Interior, U.S. Fish and Wildlife Service, Wyoming Ecological Services Field Office, Cheyenne, WY. April.

———. 2013b. Final outline and components of an eagle conservation plan (ECP) for wind development: recommendations from USFWS Region 6. Department of the Interior, U.S. Fish and Wildlife Service, Wyoming Ecological Services Field Office, Cheyenne, WY.

———. 2013a. Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy, Version 2. Department of the Interior, U.S. Fish and Wildlife Service, Division of Migratory Bird Management, Washington D.C. April.

———. 2013d. Summary Report: Peer Review of the Scientific Findings in the U.S. Fish and Wildlife Service Eagle Fatality Model and its Application to Wind Energy Development Projects. Department of the Interior, U.S. Fish and Wildlife Service, Region 6 Migratory Bird Management Office, Lakewood, CO. March.

———. 2012a. Land-Based Wind Energy Guidelines. Wind Turbine Guidelines Advisory Committee. Department of the Interior, U.S. Fish and Wildlife Service, Washington D.C. March.

———. 2011a. U.S. Fish and Wildlife Service Interim Guidance for Wind Energy Development in Wyoming. Department of the Interior, U.S. Fish and Wildlife Service, Wyoming Ecological Services Field Office, Cheyenne, WY.

———. 2011b. Draft Eagle Conservation Plan Guidance. Department of the Interior, U.S. Fish and Wildlife Service, Washington D.C. Available online at: http://www.fws.gov/windenergy/docs/ecp_draft_guidance_2_10_final_clean_omb.pdf. Accessed February 2014.

———. 2009. Final environmental assessment. Proposal to permit take provided under the Bald and Golden Eagle Protection Act. U.S. Fish and Wildlife Service, Division of Migratory Bird Management, Washington D.C.

Watson, J. 1997. The Golden Eagle. 1st ed. T and A. D. Poyser, London, U.K.

Watson, J. W., and R. W. Davies. 2009. Range use and contaminants of golden eagles in Washington. Progress Report. Washington Department of Fish and Wildlife, Olympia, Washington.

Whisenant, S. G. 1990. Changing fire frequencies on Idaho's Snake River Plains: ecological and management implications. In: McArthur, E. Durant; E. M. Romney, S. D Smith, and P. T. Tueller, compilers. Proceedings—symposium on cheatgrass invasion, shrub die-off, and other aspects of shrub biology and management; 1989 April 5-7; Las Vegas, NV. General Technical Report INT- 276. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station:4-10.

Young, D.P., W. P. Erickson, R.E. Good, M.D. Strickland, and G.D. Johnson. 2003. Avian and bat mortality associated with the initial phase of the Foote Creek Rim Windpower Project, Carbon County, Wyoming. Final Report prepared for Pacificorp, Inc., SeaWest Wind Power Inc, and Bureau of Land Management Rawlins District Office.

Zegers, D.A. 1984. *Spermophilus elegans*. Mammalian Species 214: 1-3.

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Appendix A

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
5353 Yellowstone Road, Suite 308A
Cheyenne, Wyoming 82009

APR 2 0 2011

In Reply Refer To:
ES-61411/WY11CPA0147

Memorandum

To: Field Manager, Bureau of Land Management, Rawlins Field Office, Rawlins, Wyoming

From: Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming

Janice McKee for

Subject: Avian Protection Plan Concurrence for the Sierra Madre-Chokecherry Wind Energy Project

Thank you for your letter of December 9, 2011, regarding the proposed Power Company of Wyoming's (PCW) Sierra Madre-Chokecherry Wind Energy Project (Project). The proposed Project is located south/southwest of the city of Rawlins, Carbon County, Wyoming. The Project is a proposed 2,000-MW electrical generating facility consisting of up to 1,000 2-MW wind turbines.

You have requested that the U.S. Fish and Wildlife Service (Service) determine if an Avian Protection Plan (APP) is appropriate for this Project to minimize the potential "take" of eagles. Our response to your request is based on the two-step process identified in the Bureau of Land Management's (Bureau) Instruction Memorandum No. 2010-156 (IM-2010-156), which is:

1) The Service determines that developing an APP is an appropriate option for this Project to avoid and minimize the potential for golden eagle take; therefore, the Bureau's Authorized Officer may issue a Record of Decision approving the project; and

2) The Bureau's Authorized Officer shall not authorize a Notice to Proceed for this Project until the Service has evaluated the APP and determines that it is adequate.

Following the two-step process, we have determined that developing an APP is an appropriate option to avoid and minimize the potential take of eagles (based on the Bureau's IM-2010-156), and migratory birds and bats based on PCW's commitment to meeting the following criteria:

a) Three years of surveys evaluating eagle, migratory bird and bat use of the Project area, as per Service guidance, conducted prior to Project construction; and

b) Turbine numbers and layout are adjusted to provide effective buffers for eagle and other raptor nest sites as well as areas with high bird and bat utilization, as evidenced by the survey data.

To avoid and minimize impacts to migratory bird species protected by the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703, as well as eagles protected under the Bald and Golden Eagle Protection Act (Eagle Act), 16 U.S.C. 668, the APP will need to address all migratory bird species. The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior. While the MBTA has no provision for allowing unauthorized take, the Service realizes that some birds may be killed even if all reasonable measures to protect them are used. The Service's Office of Law Enforcement (OLE) carries out its mission to protect migratory birds through investigations and enforcement, as well as by fostering relationships with individuals, companies, and industries that have taken effective steps to minimize their impacts on migratory birds, and by encouraging others to enact such programs. It is not possible to absolve individuals, companies, or agencies from liability even if they implement avian mortality avoidance or similar conservation measures. However, the OLE focuses its resources on investigating individuals and companies that take migratory birds without regard for their actions or without following an agreement to avoid take.

We advise the Bureau's Authorized Officer to not authorize a "Notice to Proceed" until the completed APP is delivered to the Service for evaluation and the Service determines the APP is adequate as documented in formal correspondence. The Service's determination as to the adequacy of the APP will depend upon the quality of the survey results used to develop the APP, how survey information was used to design a project layout that minimizes impacts, and how conservation measures will be applied during construction and operation.

We suggest that a programmatic APP, containing conservative conservation measures (e.g., no turbines within 4 miles of a golden eagle nest), be developed initially to provide guidance in lieu of area-specific information. This APP should be incorporated into the Project's Environmental Impact Statement (EIS). Any subsequent Project phases that rely upon an Environmental Assessment, which tiers to the EIS, will also form the basis for an individual Plan of Development (POD) APP. We expect that site-specific PODs will have higher levels of information about bird use, and their APP can be tailored to each specific area. We caution that it may not be reasonable to expect that the entire Project area can be developed (e.g., some Project areas may not be suitable for construction and should remain undeveloped).

The Service appreciates the Bureau's efforts to conserve golden eagles, other migratory birds, and bats in Wyoming. If you have questions regarding this letter or the MBTA and the Eagle Act, please contact Travis Sanderson of my staff at the letterhead address or phone (307) 328-4333.

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BLM, RECO Wildlife Biologist, Rawlins, WY (C. Morton)
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Appendix B

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Avian and Bat Monitoring Protocols
for the
Chokecherry and Sierra Madre Wind Energy Project

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Review of Agency Recommendations

The following protocols have been developed in accordance with the following agency recommendations:

U.S. Fish and Wildlife Service (USFWS)
Wind Turbine Guidelines Advisory Committee *Recommendations on Developing Effective Measures to Mitigate Impacts to Wildlife and Their Habitats Related to Land-Based Wind Energy Facilities* (USFWS 2010)
USFWS Draft Land-Based Wind Energy Guidelines (USFWS 2011a)
Draft Eagle Conservation Plan Guidance (USFWS 2011b)

Wyoming Department of Game and Fish (WGFD)
Wildlife Protection Recommendations for Wind Energy Development in Wyoming (WGFD 2010)

Bureau of Land Management (BLM)
Rawlins Field Office *Wildlife Survey Protocols for Wind Energy Development*,

Generally, UFWS survey recommendations (USFWS 2010, 2011a, and 2011b) include using standard sampling methods to determine avian use of a project area, fatality risk in a project area, the presence of sensitive species and other species of interest, and to provide a baseline for assessing displacement effects and habitat loss. USFWS recommends that sampling frequency, type, and duration be sufficient to account for variability of avian use between and within sampling periods. When more precise estimates of density are required for a special status species, other methods, including radar or nocturnal surveys have been recommended when risks for collision are expected.

Similarly, the Bureau of Land Management (BLM) Rawlins Field Office Wildlife Survey Protocols for Wind Energy Development recommends that surveys be sufficient to detect temporal and spatial use patterns within the project area. Special emphasis is placed on surveys for raptors and sensitive avian species. BLM survey protocols recommend weekly, 20-minute point counts to record avian use of a project area. Survey times are recommended to be varied weekly to ensure that avian use during daylight hours is adequately documented. In addition to weekly surveys, marine radar is recommended to better define avian foraging, dispersal, and migration paths.

Wyoming Game and Fish Department's (WGFD) Wildlife Protections Recommendations for Wind Energy Development in Wyoming recommend sufficient numbers of weekly point count surveys during spring and fall migration periods following similar protocols as specific by BLM with survey periods of twenty minutes at each point. WGFD recommends that four surveys be conducted during winter months to capture overwintering avian species. For raptor species, WGFD recommends nest surveys and weekly day-long surveys during spring and fall migration periods.

Review of Existing Data

In compliance with its obligations under the National Environmental Policy Act of 1969 (NEPA), BLM is preparing an environmental impact statement (EIS) analyzing the potential impacts of the Chokecherry and Sierra Madre Wind Energy Project (Project) on lands and resources within the Project area. Between June 2008 and June 2009, avian use data were collected for much of the Project area as part of the BLM NEPA process [Johnson et al. 2008]. Data were collected using standard point count methods at 19 locations in all months except January and February when much of the Project area was inaccessible due to adverse weather conditions. All sites except for three were visited 31 times during the survey period.

WEST, Inc. (WEST) conducted avian point surveys of the Project area between June 26, 2008 and June 15, 2009. A portion of these data are analyzed in WEST's report, "*Baseline Avian Use Studies for the Chokecherry and Sierra Madre Wind Resource Areas, Carbon County, Wyoming: Final Summer and Fall Interim Report, June 26-October 14, 2008*" (Johnson et al. 2008). WEST also prepared a report summarizing bat surveys conducted between July 13 through October 13, 2008 titled, "*Bat Surveys for the Chokecherry and Sierra Madre Wind Resource Areas, Carbon County, Wyoming: Final Report*" (Solick et al. 2008). SWCA has completed additional analyses of all data collected in 2008 and 2009 to determine compliance with various agency monitoring recommendations.

Data collected during the 2008 and 2009 surveys are sufficient to provide estimates of avian use of the Project area as well as to provide initial estimates of the frequency of each species at rotor-swept heights. Horned lark (*Eremophila alpestris*) was predominantly the most common avian species detected in the 2008 and 2009 surveys, having over 800 individual detections. The next most common species were the common raven (*Corvus corax*) with less than 200 detections, and vesper sparrow (*Pooecetes gramineus*) with less than 150 detections. Golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis),* and common raven were most commonly observed within the rotary height of the turbines.

Data collected during 2008 and 2009 comply with the agency wind energy survey recommendations described in the previous section and serve as one year of suggested pre-construction monitoring data. Data collected for purposes of NEPA compliance provide estimates of collision and fatality risk and enable determination of avian use of the Project area, the presence of sensitive species and other species of interest, as well as providing a baseline for assessing displacement effects and habitat loss.

Project-Specific Protocols

To supplement the 2008-2009 dataset and to better identify concentrated avian use areas for development of a Project-specific Avian Protection Plan (APP) and an Eagle Conservation Plan (ECP), an intensive one-year survey will be used to better identify avian use areas in the Project area. Protocols have been developed following the various agency recommendations discussed above and in coordination with local USFS, BLM, and WGFD biologists. The protocols are consistent with agency recommendations and will provide more detailed site-specific use data than the protocols individually recommended by any of the agencies.

A combination of avian radar, raptor count stations, standard grid sampling, and point count surveys will be used to determine avian use across the Project area with emphasis on large raptors including golden eagles. Avian radar technology has been identified by the BLM and USFWS as a desired method to map areas of high avian use. The sampling design will follow recommendations made by the USFWS, BLM, and WGFD by combining radar surveys with standard point count and breeding bird methodologies. The radar technology will also enable better identification of bat use areas and relative densities of bats in the Project area.

A DeTect Merlin Avian Radar System will be used to map avian use across the Project area. The DeTect Merlin radar system is a trailer-mounted system with a 200-watt horizontal solid-state S-band radar and a 10–kilowatt (kW) vertically operating X-band open array radar. The horizontal radar has a range of 2 to 5 miles in a 360-degree pattern around the unit. The vertical radar has a 24-degree beam width and detects flight paths 0.75 to 2.00 miles above the unit.

The avian radar system requires weekly maintenance and fueling and cannot be moved over extremely rough terrain on a regular basis. Additionally, the system will not differentiate between large raptors such as golden eagles and other large birds including geese, other large raptors, and possibly even ravens and; therefore, will be used in conjunction with field surveys to validate radar recorded data. However, the radar system, when coupled with point count verification of avian use, will allow for accurate horizontal and vertical mapping of avian use in the Project area. The radar system will also enable mapping of high use areas for bat species.

A combination of raptor and point surveys and breeding bird grid surveys will be conducted in concert with the radar survey. This design will provide intensive survey information regarding avian use patterns within the radar survey perimeter for each season. Raptor count stations, point counts, and breeding bird surveys will be used to validate the radar data and provide estimates of species-specific use patterns. Raptor stations and point count surveys will record the location, flight path, approximate height, and time of use for any individual observed from the count location. Raptor count locations will be surveyed for 8-12 hours per day during periods with the highest likelihood for detection of migrating birds and/or large raptors. Standard 20-minute point counts will be completed at each raptor count location. Timing of point count surveys at each location will be varied to determine patterns of avian use during daylight hours.

In addition to the raptor, point count, and radar surveys, breeding bird surveys will be completed at 15 locations across the Project area. Breeding bird surveys will be conducted following the grid monitoring protocols published by the Rocky Mountain Bird Observatory (RMBO) (Hanni et al. 2010). Grid survey locations will be randomly selected using a generalized random tessellation stratified design to ensure a spatially balanced design stratified by major vegetation and habitat types in the Project area. Data collected as part of the grid monitoring efforts will also be used to validate radar data and better determine avian species use. As part of the breeding bird surveys, waterfowl and water bird use surveys will be conducted three times annually (springs, summer, and fall) to identify migrating and resident species.

Locations for placement of the radar and for conducting point count surveys (Figure 1) and breeding bird surveys were determined using a four-tiered approach:

- Tier 1 – Survey areas should determine avian use within the Project area.

- Tier 2 – Survey areas should overlap possible foraging areas for large raptors (winter range areas, prairie dog towns, waterfowl use areas, etc.).
- Tier 3 – Survey areas should be in locations to allow for detection of avian movement into and out of the Project area.
- Tier 4 – Survey areas should capture variability in habitat and topography.

Locations of radar placement were refined following attendance at DeTect's radar training courses and during coordination with DeTect's radar placement specialists. Figure 1 reflects the revised radar locations. Final placement of the radar unit and final point locations for survey will be determine in early spring 2011 following radar unit delivery.

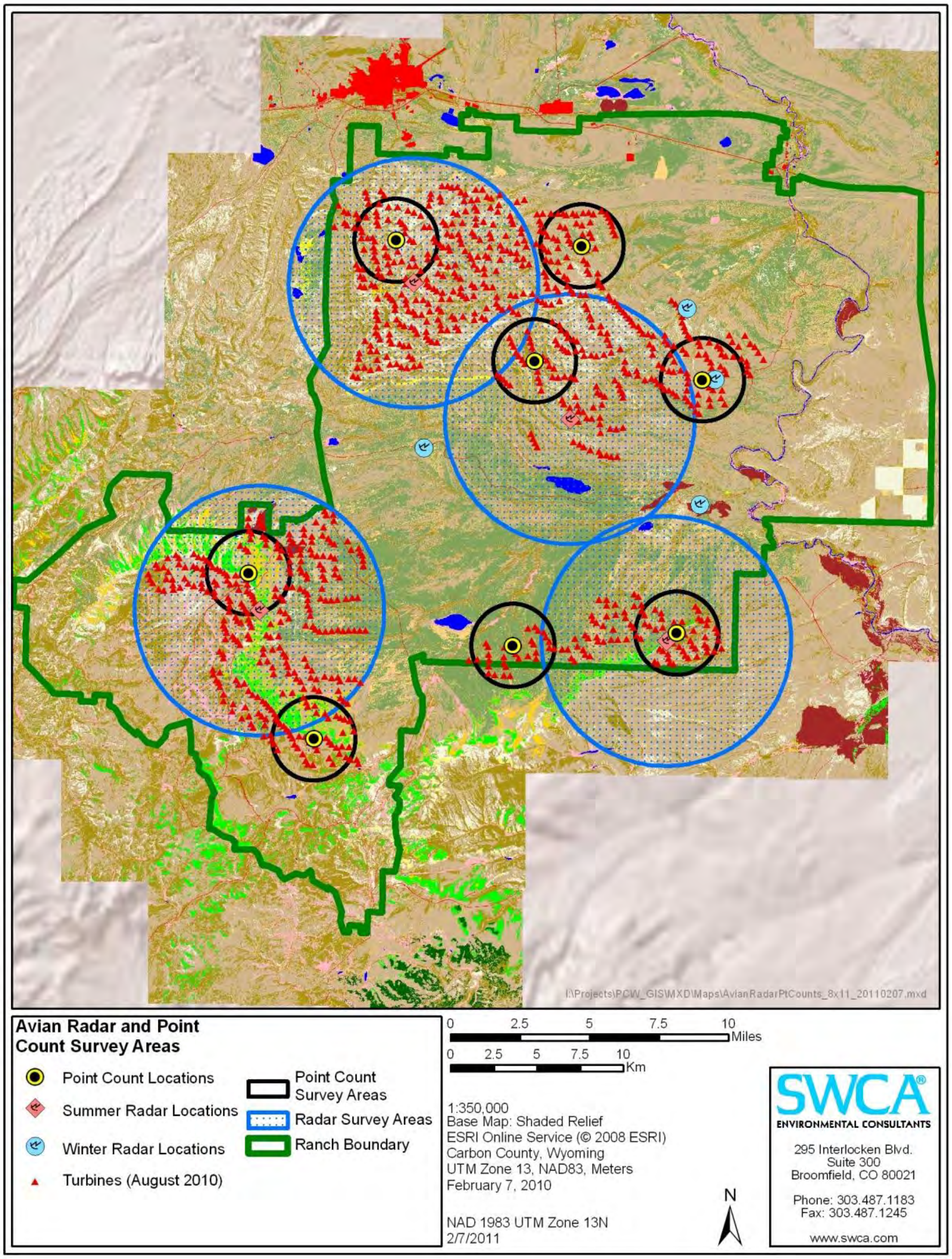

Figure 1. Approximation of area surveyed using avian radar and traditional point count methodologies with respect to possible wind turbine locations. Spring, summer, and fall radar installation locations are the center point of the large blue circles. Proposed point count locations are the center points of the small black circles. Potential winter radar locations are the four blue points. Final locations for survey will be determined in coordination with BLM, WGFD, and USFWS.

The radar unit will be placed at five locations within the Project area (Figure 1). Point counts will be completed at nine additional locations to map avian use patterns where radar coverage is not possible. Eight of these point counts will be completed at permanent sampling locations. The ninth point count location will be completed at the radar site to validate the data being collected by the radar unit. During winter months, the radar will be placed in a location that has high probability of access on a weekly basis. Much of the project area is covered in snow and large drifts during winter; therefore, radar placement in winter will likely be near the Bolton Ranch headquarters, south of I-80 near the North Platte River, on the Bolton Road east of Teton Reservoir, or on the north side of the Chokecherry project area (Figure 1). Winter point count survey locations will also be adjusted as needed to account for winter weather conditions, access issues, and safety concerns.

Based on a four mile radius for radar surveys and a one mile radius for point count surveys, approximately 90-93% of the turbine locations, depending on winter radar placement, will be directly surveyed. It is likely that this percentage is higher than 90-93% for large raptors including bald and golden eagles as many of the point count locations have visibility of several miles and recent radar advancements may allow for detection of large raptors out to 5+ miles. Point count locations outside of the radar survey perimeters have been placed to allow for detection of raptors moving into the Project area and between radar surveyed zones.

Helicopter flights will be completed in mid-April or early May to document eagle nesting activity as well as nesting activity of other raptors that are incidentally observed. Aerial nest activity surveys will be completed in accordance with the recent draft eagle guidance (USFWS 2011b). Following identification of active eagle nests, follow-up productivity surveys will be completed from the ground above/below the nest to determine nesting and fledging success.

The protocols and schedule outlined below will be followed for monitoring and mapping avian and bat use across the Project area using the marine radar system, point counts, and breeding bird surveys.

1. Winter 2010/2011 – Radar construction, programming, and training. The Draft APP/ECP will be delivered to USFWS, BLM, and WGFD for review in late winter/early spring. Among other descriptive sections, the preliminary plan will contain the detailed sampling protocols, preliminary mitigation and avoidance measures, and detailed adaptive management protocols. Monthly reconnaissance surveys will be completed to document eagle use of the Project area during winter months and to help determine best locations for winter 2011/2012 deployment of the radar system.

2. Spring and Early Summer 2011 – Radar surveys will begin in the southern portion of the Project area. The radar system will be moved once during the spring migration period to capture as much data as possible during this period. During the migration period, weekly migratory bird counts and raptor use surveys will be conducted at the eight point counts identified in Figure 1 as well as at the point where the radar system is placed. Breeding bird surveys will be completed at 15 locations across the Project area. Surveys for waterfowl and other waterbirds will be conducted once during the spring migration at Kindt, Rasmussen, Sage Creek, and Teton reservoirs. Analysis of the radar data will be

used to identify areas with high avian and bat use. The following schedule will be used for spring and early summer 2011 surveys:

a. March 15 – May 15, 2011: Radar system will be initialized and debugged prior to main migratory period. Initial installation will occur at the southeastern-most radar survey location identified on Figure 1. This survey location will detect migrating birds in areas adjacent to the Platte River corridor and along the ridgeline north of the Jack Creek road. Weekly point count locations will be completed at the eight point count locations identified in Figure 1 as well as at the radar location.

b. May 15–July 31, 2011: Radar system will be moved to the northeastern survey location (Figure 1). This survey location will detect migrating birds adjacent to and along the Bolten Rim as well as in the basin below the Bolten Rim. Migratory use and raptor soaring locations within and adjacent to the ridgelines in this portion of Chokecherry will also be surveyed using the radar system. Between May 15 and June 30, weekly point surveys will be conducted at the eight locations identified on Figure 1 as well as at the radar location. During the month of July, the point count locations will be visited twice instead of every week in compliance with BLM and WGFD recommendations. Additionally, this time is between migratory periods and typically bird movements are lower because of nesting activities. A point count will be conducted weekly at the radar installation location during this period during routine maintenance activities.

c. May 25–June 30, 2011: Breeding bird surveys will be completed once at each of 15 locations across the Project area to determine relative abundance, species richness, and habitat use patterns. Breeding bird surveys will follow RMBO grid survey protocols (Hanni et al. 2010). Bird flight patterns will be documented to better define risks of wind development activities. All raptors as well as their flight paths and heights will be recorded at all breeding bird locations regardless of whether the raptor falls within the grid survey area.

d. May 1, 2011: An agency meeting will be scheduled to discuss preliminary analyses of radar data from early spring migration to allow for more informed use of the radar and survey data that will be used in the APP/ECP.

3. Late Summer – Fall 2011: The radar system will be moved once during the fall migration period to capture as much data as possible during this period. During the migration period, weekly migratory bird counts and raptor use surveys will be conducted at the eight point counts identified in Figure 1 as well as at the point where the radar system is placed. Waterfowl and wading bird surveys will be conducted once during late summer to detect nesting activity and once during fall migration at Kindt, Rasmussen, Sage Creek, and Teton reservoirs. Analysis of the radar data collected during spring and early summer will be completed to evaluate bird and bat use and to identify appropriate mitigation measures that could be implemented. The following schedule will be used for late summer and fall 2011 surveys:

a. August 1: A revised APP/ECP will be delivered to the agencies for review and approval. The revised APPECP will contain the mitigation measures that will be applied to remove or minimize risks to avian species. The revised APP/ECP will also identify the adaptive management process that will be followed to update the APP/ECP and apply additional site-specific mitigation measures as additional data are obtained prior to, during and after construction. An interim report of radar data trends and observations will also be provided with the revised APP/ECP.

b. August 1– September 30, 2011: Radar system will be installed at the western radar location in the Chokecherry project area radar survey location identified on Figure 1. This survey location will detect migrating birds in the western portion of Chokecherry as well as along the rim of Chokecherry and the basin between Chokecherry and Atlantic Rim. During the month of August, the point count locations will be visited twice instead of every week. A point count will be conducted weekly at the radar installation location during August as part of routine maintenance activities. During September, weekly point count locations will be completed at the eight point count locations identified in Figure 1 as well as at the radar location.

c. October 1–November 15, 2011: Radar system will be moved to a location along the rim of Miller Hill in the southwestern portion of the project area (Figure 1). This survey location will detect birds in the Miller Hill area and below the Miller Hill rim in the Sage Creek Basin. Weekly point count surveys will be conducted at the eight locations identified on Figure 1 as well as at the radar location.

4. Winter 2011/2012 (November 16, 2011–March 30, 2012) – A final APP/ECP will be delivered to the agencies for review. The final APP/ECP will identify the avoidance, minimization, and mitigation measures to reduce threats to eagles and other avian species. The radar system will be deployed in a suitable location to ensure weekly maintenance is possible during winter months. Weekly bird observations will be recorded during routine maintenance activities at the radar location. Weather permitting, monthly counts will be conducted at the point count locations in Figure 1.

5. Spring 2012 – PCW and the agencies will initiate the adaptive management process identified and approved in the final APP to incorporate site-specific mitigation and avoidance measures into final project designs and the Final Environmental Impact Statement and Record of Decision. A final report documenting the results of the radar and point count efforts will be provided at least two weeks prior to the initiation of the adaptive management process to ensure adequate review time prior to discussions.

LITERATURE CITED

Detmers, R., D.A. Buehler, J.G. Bartlett, and N.A. Klaus. 1999. Influence of point count length and repeated visits on habitat model performance. Journal of Wildlife Management 63:815-823.

Gerrodette, T. 1987. A power analysis for detecting trends. Ecology 68:1364–1372.

Hester, S.G. and M.B. Grenier. 2005. A conservation plan for bats in Wyoming. Wyoming Game and Fish Department, Nongame Program, Lander, WY.

Johnson, G., T. Rintz, M.D. Strickland, and K. Bay. 2008. Baseline avian use studies for the Chokecherry and Sierra Madre Wind Resource Areas, Carbon County, Wyoming: final summer and fall interim report, June 26-October 14, 2008. Submitted to ENSR, Golden, CO by Western Ecosystems Technology, Inc., Cheyenne, Wyoming.

Reynolds, R.T., J.M. Scott, and R.A. Nussbaum. 1980. A Variable Circular-Plot Method for Estimating Bird Numbers. Condor 82:309-313.

Solick, D., Johnson, G., T. Rintz, and M.D. Strickland. 2008. Bat surveys for the Chokecherry and Sierra Madre Wind Resource Areas, Carbon County, Wyoming. Submitted to ENSR, Golden, CO by Western Ecosystems Technology, Inc., Cheyenne, Wyoming.

U.S. Fish and Wildlife Service [USFWS]. 2010. Recommendations on developing effective measures to mitigate impacts to wildlife and their habitats related to land-based wind energy facilities. Submitted to the Secretary of the Interior by the Wind Turbine Guidelines Advisory Committee.

USFWS. 2011a. Draft Land-Based Wind Energy Guidelines, Recommendations on measures to avoid, minimize, and compensate for effects to fish, wildlife, and their habitats

USFWS. 2011b. Draft eagle conservation plan guidance. January 2011.

Wyoming Game and Fish Department [WGFD]. 2010. Wildlife protection recommendations for wind development in Wyoming. Commission approved version (4-23-2010). 70pp.

2012 – 2013 800-meter Raptor Survey Protocols

Chokecherry and Sierra Madre Wind Energy Project

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August 31, 2012

Introduction

The Power Company of Wyoming LLC (PCW) recently initiated revisions to the methodologies currently used to survey for raptors at the Chokecherry and Sierra Madre Wind Energy Project (Project). Based on conversations with U.S. Fish and Wildlife Service (Service) personnel, and in an effort to collect data that are appropriate for use in the Service's model that predicts the potential fatality rate of eagles for wind energy projects (hereafter, the Service's model), raptor survey protocols were revised for the fall 2012 season and for future raptor survey efforts. These survey methodology revisions are fully compliant with the recommendations for raptor surveys set forth by the Service in their Draft Eagle Conservation Plan Guidance (Draft ECP Guidance), the Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices (Technical Appendices; as received from Kevin Kritz, Service Region 6, on August 4, 2012), and the Land-Based Wind Energy Guidelines, while still maintaining expansive coverage of the Project site.

Year Two and Year Three 4,000-meter-radius long-watch raptor surveys were fully compliant with the recommendations set forth by the Service's Draft ECP Guidance (Service 2011) and Land-Based Wind Energy Guidelines (Service 2012a), the Bureau of Land Management's (BLM's) Wildlife Survey Protocols for Wind Energy Development (BLM 2008), and the Wyoming Game and Fish Department's (WGFD's) Wildlife Protection Recommendations for Wind Energy Development (WGFD 2010). These surveys were successful in identifying concentrated raptor use areas across the Project that could be used to design avoidance areas in order to minimize avian impacts. Additionally, 4,000-meter data were instructive in showing the Project site is not a strong migratory corridor for raptors, and the flight paths digitized from these data were used to identify high eagle-use areas as recommended by the Service's Technical Appendices (Service 2012b).

Because the Service's model requires data from 800-meter point count survey efforts, the 4,000-meter data were truncated to include only those observations that occurred within 800 meters (Figure 1). However, due to the 4,000-meter raptor count locations being placed on promenades, ridgelines, and in areas where there was an expectation of high raptor use, estimates of use, and therefore risk calculations that were developed for use across the entire Project site, were overstated due to many of these data being collected in identified high-use areas. Because use estimates were being driven upwards for the Project by many of the data being collected in high-use areas, unrealistic projections of eagle risk were being generated by the Service's model. This in part facilitated the revision to survey protocols.

800-meter Raptor Survey Protocols

The revised raptor count protocols follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices (Service 2012b), and are also in accordance with the aforementioned guidance documents produced by the Service, BLM, and WGFD. PCW also sought consultation with Dr. Joshua Millspaugh (Professor of Wildlife Management, University of Missouri) to ensure the development of a rigorous sampling design that would result in the collection of data appropriate for the analysis methods and fatality model currently being used by the Service.

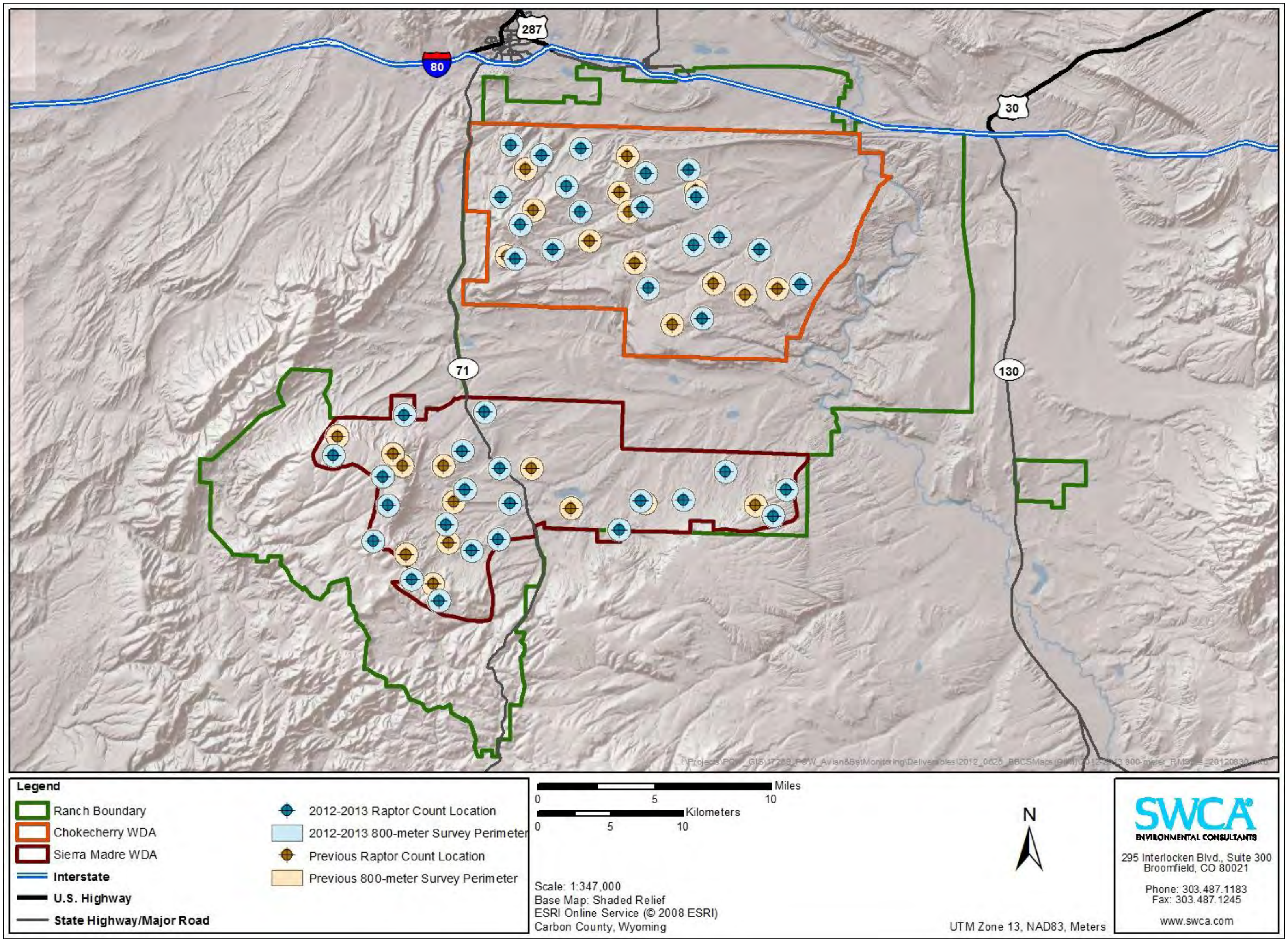


Figure 1. All 800-meter raptor count locations and survey perimeters on the Project site.

Based upon agency guidance and logistical considerations, the revised protocols were designed to include 40, 800-meter raptor count locations throughout areas of the Project site where turbine development was likely (Figure 1). Locations were selected using a spatially balanced random selection process with the number of 800-meter raptor count locations per area determined by the relative turbine density in the different areas of the Project. Raptor count locations were selected such that no overlap occurs between survey locations or with the avoidance areas that PCW has committed to as part of the Project Eagle Conservation Plan (ECP). Once the initial 800-meter raptor count locations were selected, some minimal micrositing of the locations was conducted to ensure full visibility of the survey areas and safe and consistent accessibility on the part of field personnel. Coordinates for each of the final 800-meter raptor survey locations are listed in Table 1. Landmarks and lathe stakes were located within each survey location perimeter to provide distance references for field personnel completing survey efforts. When the 800-meter radius survey areas of the new 40 point count locations are combined with the 800-meter radius survey areas of the Year Two and Year Three sites, 34.7% of the probable development areas are covered by raptor count surveys, which is greater than the 30% recommendation made by the Service (Service 2012b).

Table 1. Names and Coordinates for 2012 – 2013 800-meter Raptor Count Locations.

Location	Easting	Northing
CB1	326414	4597515
CB2	321985	4595451
CB3	323462	4597428
CB4	329306	4599449
CC1	316611	4621251
CC2	315166	4616447
CC3	318351	4619090
CC4	314539	4621971
CC5	317418	4614741
CC6	319335	4621702
CC7	313825	4618366
CC8	314807	4614119
CC9	319294	4617332
CMD1	334482	4612363
CMD2	331648	4614732
HB1	323818	4620014
HB2	326781	4620243
MH1	302291	4600564
MH2	305677	4599125
MH3	307684	4592030

Location	Easting	Northing
MH4	305024	4594675
MH5	309573	4590571
MH6	306043	4597131
PG1	313663	4594801
PG2	311358	4598224
PG3	307172	4603361
PG4	314434	4597259
PG5	313730	4599682
PG6	312721	4603547
PG7	310058	4595825
PG8	311832	4594006
PG9	311187	4600886
SCR1	333505	4598194
SCR2	332597	4596408
SR1	323560	4617658
SR2	327318	4618336
UH1	328912	4615606
UH2	327099	4615081
UI1	323987	4612091
UI2	327702	4610001

Surveys will be conducted at each raptor count location for two hours per guidance in the Technical Appendices (Service 2012b). Two avian technicians will each survey two locations a day for a total of 20 locations per week. Each location will be surveyed bi-weekly. A schedule for all 40 raptor count locations was designed to provide survey coverage across all daylight hours for each of the 40 sites. The schedule was also designed such that the four raptor count surveys conducted on any given day are separated temporally and spatially to provide independence of any observations that are made.

Avian technicians are equipped with binoculars, spotting scopes, laser rangefinders, and aerial maps to assist with accurate detection and documentation of all raptors observed within the 800-meter survey area. Each aerial map is displayed with relevant landforms occurring in the area, locations of lathe stakes, and concentric rings at each 200-meter interval to facilitate accurate distance estimation (Attachment 1). Each raptor flight path is recorded by technicians on the provided aerial maps. Additional data collected include species, number of individuals per observation, age, sex, behavior, bearing to bird, distance to bird, heading of bird, altitude of bird, the beginning and ending time for each observation, and hourly weather data (Attachment 2).

At present, the 800-meter raptor counts are scheduled to continue bi-weekly at each location through the fall migration period (November 15). Surveys are tentatively slated to occur once per month at each location during the winter season (December 2012 through March 2013) due to accessibility and safety concerns. The end of winter surveys in March 2013 will complete three full years of data collection for the Project. Consultations are ongoing with Service personnel to determine the scope of potential survey efforts beyond March 2013.

References

Bureau of Land Management (BLM). 2008. Wildlife Survey Protocols for Wind Energy Development.

U.S. Fish and Wildlife Service (Service). 2011. Draft Eagle Conservation Plan Guidance. Available online at http://www.fws.gov/windenergy/. Accessed December 2011.

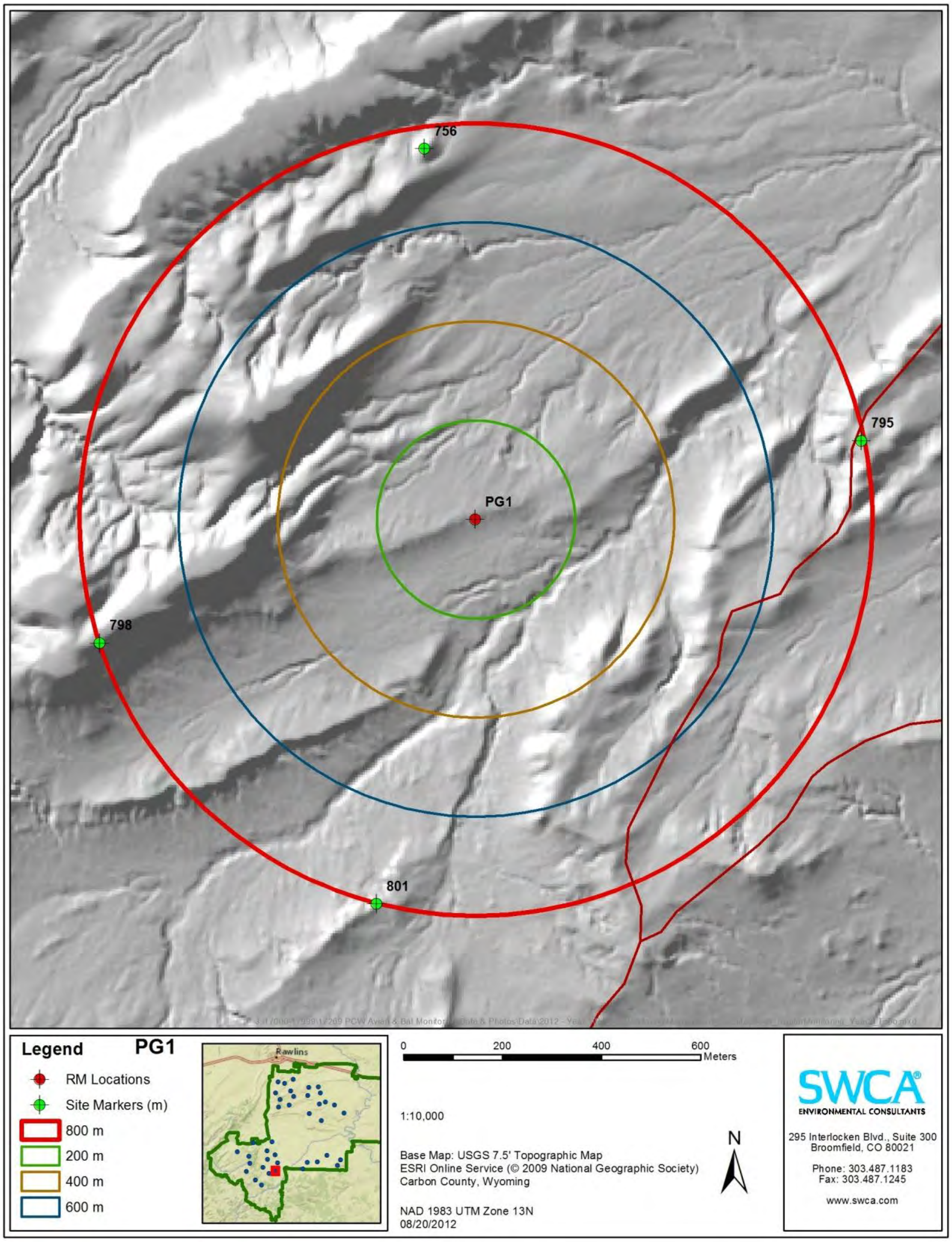
———. 2012a. Land Based Wind Energy Guidelines. Wind Turbine Guidelines Advisory Committee. U.S. Fish and Wildlife Service, Department of the Interior, Washington D.C. Available online at http://www.fws.gov/windenergy/docs/WEG_final.pdf. Accessed August 2012.

———. 2012b. Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices. Received from Kevin Kritz, Service Region 6, on August 4, 2012.

Wyoming Game and Fish Department (WGFD). 2010. Wildlife Protection Recommendations for Wind Energy Development in Wyoming. Wyoming Game and Fish Commission Approved November 17, 2010. Wyoming Game and Fish Department, Cheyenne, WY.

ATTACHMENT 1

Example Aerial Map Used to Map Flight Paths during 800-meter Raptor Count Surveys



Aerial map example.

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ATTACHMENT 2

Data Sheets Used to Collect Data during 800-meter Raptor Count Surveys

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PCW 2011 Raptor Survey

Field Observer: ______________________

Survey Location: ____________

Start time: ____________

End time: ____________

Date: ________________

Page: ____ **of** _____

Target #	Obs #	Species	# Birds	Age	Sex	Behav	Bearing to Bird (°)	Distance to Bird (m)	Angle of Bird (°)	Heading of Bird	0-30	30-150	150+	Time Begin	Time End

PCW 2011 Raptor Survey Notes

Field Observer: ______________________________ **Survey Pt:** ____

Date: ______________ **Page:** _____ of _____

Other species and Notes:

Weather Conditions

Time	Sky	Wind Dir	Wind Spd	Temp (°F)

Incidental Species Observations

Revised 2012-2013 800-meter Raptor Survey Protocols

Chokecherry and Sierra Madre Wind Energy Project

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November 2012

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The Power Company of Wyoming (PCW) recently initiated revisions to the methodologies currently used to survey for raptors at their Chokecherry and Sierra Madre Wind Energy Project (Project). Based on conversations with U.S. Fish and Wildlife Service (Service) personnel, and in an effort to collect data that are appropriate for use in the Service's model that predicts the potential fatality rate of eagles for wind energy projects (hereafter, the Service's model), raptor survey protocols were revised for the fall 2012 season and for future raptor survey efforts. On August 31, 2012, PCW provided the Service with a revised protocol for conducting eagle and raptor surveys at 40 800-meter point count survey sites throughout the Project. PCW began surveying the 40 locations at the beginning of the autumn 2012 survey season and it is anticipated that those survey efforts will continue through October 2012 at which time the revised protocols discussed in this document will be initiated. On September 28, 2012, the Service issued a letter recommending slight modifications to the August 31, 2012 protocols. This revised protocol addresses the comments made by the Service and specific responses to each comment made are provided in Attachment 1.

These survey methodology revisions are fully consistent with the recommendations for raptor surveys set forth by the Service in their Draft Eagle Conservation Plan Guidance (Draft ECP Guidance), the Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices (Technical Appendices; as received from Kevin Kritz, Service Region 6, on August 4, 2012), and the Land-Based Wind Energy Guidelines, while still maintaining expansive coverage of the Project Site.

Year Two and Year Three long-watch raptor surveys were fully consistent with the recommendations set forth by the Service's Draft ECP Guidance (Service 2011) and Land-Based Wind Energy Guidelines (Service 2012a), the Bureau of Land Management's (BLM's) Wildlife Survey Protocols for Wind Energy Development (BLM 2008), and the Wyoming Game and Fish Department's (WGFD's) Wildlife Protection Recommendations for Wind Energy Development (WGFD 2010). These surveys were very successful in identifying concentrated raptor use areas across the Project that could be used to design avoidance areas to minimize avian impacts. Additionally, long-watch survey data were instructive in showing the Project Site is not a strong migratory corridor for raptors, and the flight paths digitized from these data were used to identify high eagle use areas as recommended by the Service's Technical Appendices (Service 2012b).

The revised raptor count protocols follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices (Service 2012b), and are also in accordance with the aforementioned guidance documents produced by the Service, BLM, and WGFD. PCW also sought consultation with Dr. Joshua Millspaugh (Professor of Wildlife Management, University of Missouri) to ensure the development of a rigorous sampling design that would result in the collection of data appropriate for the analysis methods and fatality model currently being used by the Service.

Based upon agency guidance and logistical considerations, the revised protocols were designed to include 60, 800-meter raptor count survey sites throughout the Chokecherry and Sierra Madre Wind Development Areas (WDAs) where turbine development is likely (Figures 1 and 2). Most of the 60 survey sites are identical to the original 40 sites identified in the August 31, 2012 protocols. However, some of those 40 sites were shifted slightly to

accommodate the placement of the additional 20 survey sites and ensure that no overlap occurs between samples. Seven of the new sites correspond to raptor monitoring locations that were used in 2011 and spring 2012 survey efforts (RM2, RM7, RM9, RM10, RM12, RM14, and RM15). Efforts were made to resample as many of the previous sampling sites as possible. However, because of PCW's Project re-design efforts identified in the Project Eagle Conservation Plan (ECP), many of the previous sampling locations are outside or on the very edge of the current development area and could not be included without violating the spatially balanced design that is critical to these protocols.

A spatially balanced sampling design was used to capture the variability in habitat conditions, terrain features, and turbine numbers and densities. Minimum convex polygons (MCPs) were placed around each of 10 discrete potential development areas that are separated by Turbine No-Build areas, topography, or other factors (Figures 1 and 2). MCPs were evaluated for differences in habitat characteristics, forage potential, and topography. While differences in habitat characteristics, forage potential, and topography occur among the 10 MCPs, within each MCP, these factors are similar and additional stratification beyond the MCP level was not necessary.

Using the "Create Spatially Balanced Points" tool in ArcGIS Geostatistical Analyst, 250 spatially balanced locations were generated within the MCPs. Using the spatially balanced points, survey sites were selected sequentially in a manner that was consistent with the recommendations made by the Service while ensuring that no overlap occurs between survey areas. Total number of sampling sites per MCP was based on the relative surface area and number of turbines in the MCP. Two primary selection criteria were used to select sampling sites. First, no overlap of sampling areas was permitted (sites had to be separated by more than 1,650 meters). Second, because of logistical considerations, sampling sites were required to be reasonably accessible from the existing road network and in a safe location. If a potential sampling location violated either of the selection criteria it was dropped and the next point was evaluated. Tables 1 and 2 provide the locations of each sampling site in the WDAs as well as information specific to the MCPs and sampling sites.

The first 36 survey sites that were selected correspond to locations that were identified in the August 31, 2012 protocols. These were sequentially selected using the spatially balanced points that were generated as part of the process described above while controlling for site overlap and logistical considerations for survey. Of the remaining 24 sites, 4 correspond with the original 40 sites with locations slightly shifted to avoid overlap with new sites, 7 correspond with the long-watch raptor monitoring sites that were surveyed in 2011 and spring/summer 2012, 3 were selected outside of the current probable turbine footprint, and 10 were selected using the remaining spatially balanced points. Some minimal micrositing of the new locations is anticipated to ensure maximum visibility of the survey areas as well as safe and consistent accessibility on the part of field personnel.

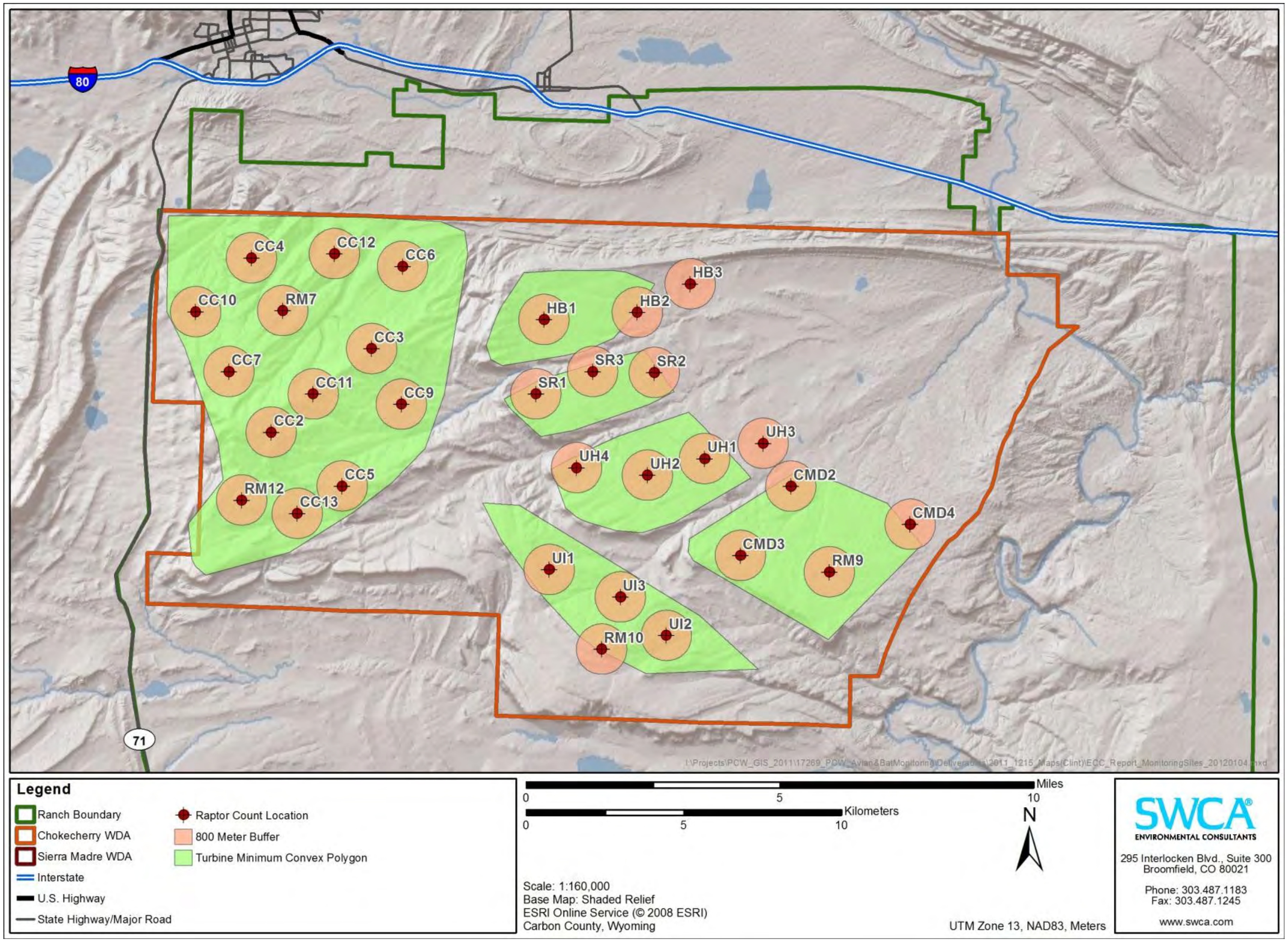

Figure 1. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Chokecherry.

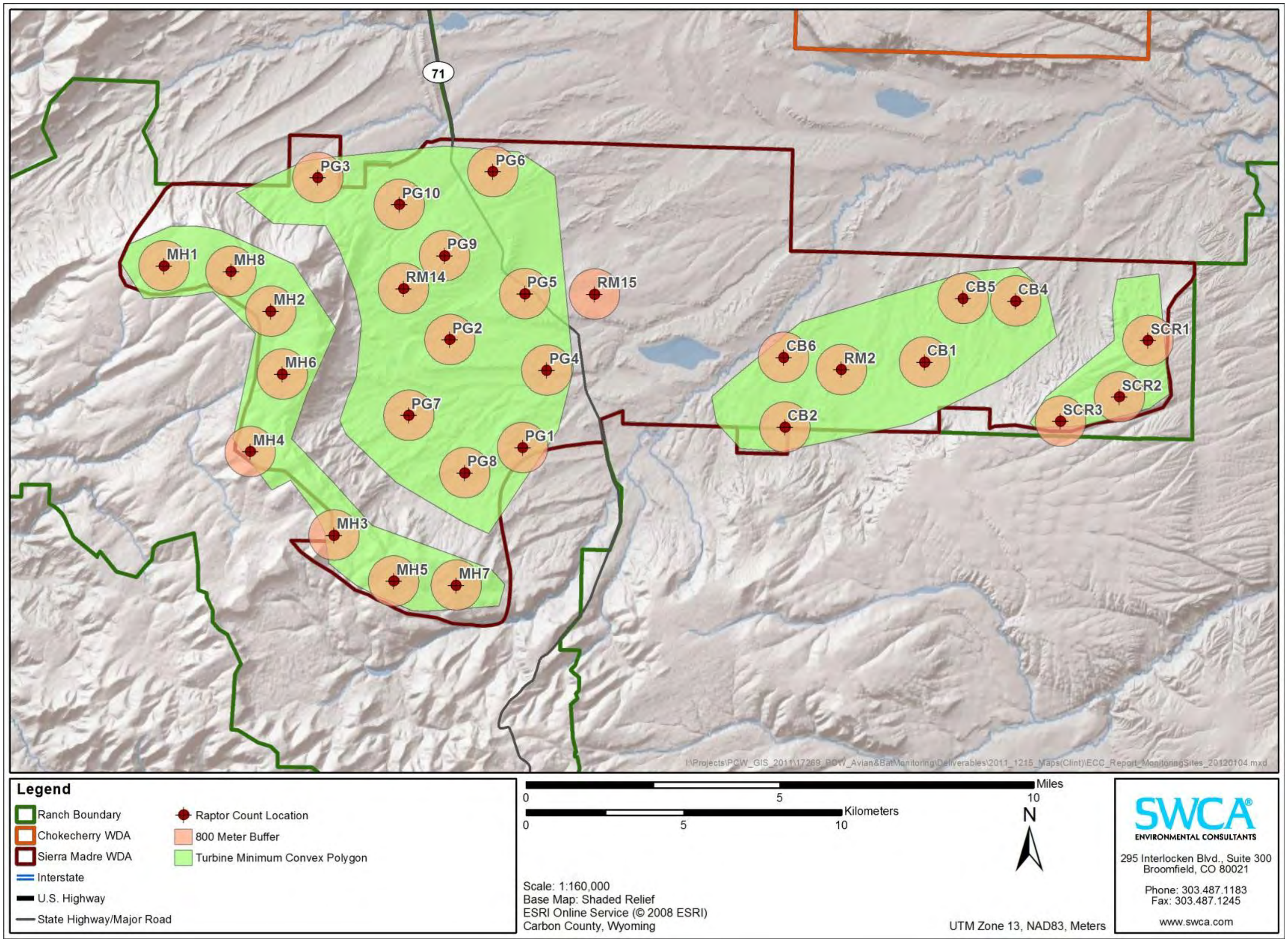

Figure 2. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Sierra Madre.

Table 1. Fall 2012-2013 Avian Monitoring Survey Locations for the Chokecherry WDA.

WDA	MCP	Site Name	Survey Site Status	Easting*	Northing*
Chokecherry	Chokecherry	CC2	Original Fall 2012 Site	315166	4616447
		CC3	Original Fall 2012 Site	318351	4619090
		CC4	Original Fall 2012 Site	314539	4621971
		CC5	Original Fall 2012 Site	317418	4614741
		CC6	Original Fall 2012 Site	319335	4621702
		CC7	Original Fall 2012 Site	313825	4618366
		CC9	Original Fall 2012 Site	319294	4617332
		CC10	New 2012 Survey Site	312770	4620262
		CC11	New 2012 Survey Site	316501	4617656
		CC12	New 2012 Survey Site, original CC1 site shifted north to eliminate overlap with RM7	317170	4622100
		CC13	New 2012 Survey Site, original CC8 site shifted southeast to eliminate overlap with RM12	315993	4613871
		RM7	2011-2012 Long-watch Site	315531	4620298
		RM12	2011-2012 Long-watch Site	314228	4614294
	Coal Mine Draw	CMD2	Original Fall 2012 Site	331648	4614732
		CMD3	New 2012 Survey Site	330049	4612535
		CMD4	New 2012 Survey Site, original CMD1 site shifted east to eliminate overlap with RM9	335437	4613524
		RM9	2011-2012 Long-watch Site	332870	4612018
	Hogback South	HB1	Original Fall 2012 Site	323818	4620014
		HB2	Original Fall 2012 Site	326781	4620243
		HB3	New 2012 Survey Site	328457	4621145
	Smith Rim	SR1	Original Fall 2012 Site	323560	4617658
		SR2	Original Fall 2012 Site	327318	4618336
		SR3	New 2012 Survey Site	325362	4618367
	Upper Hugus	UH1	Original Fall 2012 Site	328912	4615606
		UH2	Original Fall 2012 Site	327099	4615081
		UH3	New 2012 Survey Site	330772	4616091
		UH4	New 2012 Survey Site	324853	4615321
	Upper Iron Springs	UI1	Original Fall 2012 Site	323987	4612091
		UI2	Original Fall 2012 Site	327702	4610001
		UI3	New 2012 Survey Site	326242	4611221
		RM10	2011-2012 Long-watch Site	325646	4609568

*UTM Zone 13, NAD83, Meters

Table 2. Fall 2012-2013 Avian Monitoring Survey Locations for the Sierra Madre WDA.

WDA	MCP	Site Name	Survey Site Status	Easting*	Northing*
Sierra Madre	Central Basin	CB1	Original Fall 2012 Site	326414	4597515
		CB2	Original Fall 2012 Site	321986	4595452
		CB4	Original Fall 2012 Site	329306	4599449
		CB5	New 2012 Survey Site	327638	4599529
		CB6	New 2012 Survey Site, original CB3 site shifted west to eliminate overlap with RM2	321942	4597660
		RM2	2011-2012 Long-watch Site	323776	4597273
	Miller Hill	MH1	Original Fall 2012 Site	302291	4600564
		MH2	Original Fall 2012 Site	305677	4599125
		MH3	Original Fall 2012 Site	307684	4592030
		MH4	Original Fall 2012 Site	305024	4594675
		MH5	Original Fall 2012 Site	309573	4590571
		MH6	Original Fall 2012 Site	306043	4597131
		MH7	New 2012 Survey Site	311561	4590443
		MH8	New 2012 Survey Site	304412	4600385
	Pine Grove	PG1	Original Fall 2012 Site	313663	4594801
		PG2	Original Fall 2012 Site	311358	4598224
		PG3	Original Fall 2012 Site	307172	4603361
		PG4	Original Fall 2012 Site	314434	4597259
		PG5	Original Fall 2012 Site	313730	4599682
		PG6	Original Fall 2012 Site	312721	4603547
		PG7	Original Fall 2012 Site	310058	4595825
		PG8	Original Fall 2012 Site	311832	4594006
		PG9	Original Fall 2012 Site	311187	4600886
		PG10	New 2012 Survey Site	309753	4602508
		RM14	2011-2012 Long-watch Site	309884	4599843
		RM15	2011-2012 Long-watch Site	315948	4599668
	Sage Creek Rim	SCR1	Original Fall 2012 Site	333505	4598194
		SCR2	Original Fall 2012 Site	332596	4596407
		SCR3	New 2012 Survey Site	330727	4595638

*UTM Zone 13, NAD83, Meters

Landmarks will be identified and visible stakes will be placed around each survey location perimeter to provide distance references for field personnel completing survey efforts. The 800-meter radius survey areas of the new 60 point count locations provide coverage for approximately 35% of the probable turbine locations, which is greater than the 30% recommendation made by the Service (Service 2012b). Additionally, 46.7% of the raptor monitoring sites that were surveyed in 2011 will be resurveyed as part of the 60 point counts. Resurvey of 50% of all previous survey sites was not possible because many fall outside of the current project layout in Turbine No-Build areas and use of those sites would violate the spatially balanced study design in addition to sampling areas that are already known as high use areas for eagles and other raptors. Additionally, several sites that were only surveyed in spring/summer 2012 do not have a full year of data and would not be appropriate for comparison with ongoing and future data collection efforts. However, many of the 60 new survey sites overlap with areas previously surveyed as part of 2011 and 2012 raptor monitoring efforts. When these areas are included, 50.3% of the area surveyed as part of previous raptor monitoring efforts is within the perimeter of the 60 new point count survey sites.

Surveys will be conducted at each site for one hour per guidance in the ECP Technical Appendices (Service 2012b). Three avian technicians will each survey two locations per day for a total of 6 locations per day and 60 locations in a 10 day period. Each location will be surveyed twice per month. A schedule for all 60 raptor count locations was designed to provide survey coverage across all daylight hours for each of the 60 sites. The schedule was also designed such that the six raptor count surveys conducted on any given day are separated temporally and spatially to ensure independence of any observations that are made.

Avian technicians will be equipped with binoculars, spotting scopes, laser rangefinders, and aerial maps to assist with accurate detection and documentation of all raptors observed within the 800-meter survey area. Each aerial map is displayed with relevant landforms occurring in the area, locations of stakes, and concentric rings at each 200-meter interval to facilitate accurate distance estimation (Attachment 2). Each raptor flight path is recorded by technicians on the provided aerial maps. Additional data collected include species, number of individuals per observation, age, sex, behavior, bearing to bird, distance to bird, heading of bird, altitude of bird, the beginning and ending time for each observation, interactions with other birds, and hourly weather data among other variables (Attachment 3).

Surveys at the 60 800-meter raptor counts will begin in November 2012 and are scheduled to continue bi-weekly at each location through August of 2013. Surveys during winter months will be completed on the same schedule as the remainder of the year and efforts will be made to survey at least 50% of all locations twice per month during winter. However, winter surveys are subject to cancellation or delay based on weather conditions and safety of the field technicians.

REFERENCES

Bureau of Land Management (BLM). 2008. Wildlife Survey Protocols for Wind Energy Development.

U.S. Fish and Wildlife Service (Service). 2011. Draft Eagle Conservation Plan Guidance. Available online at http://www.fws.gov/windenergy/. Accessed December 2011.

———. 2012a. Land Based Wind Energy Guidelines. Wind Turbine Guidelines Advisory Committee. U.S. Fish and Wildlife Service, Department of the Interior, Washington D.C. Available online at http://www.fws.gov/windenergy/docs/WEG_final.pdf. Accessed August 2012.

———. 2012b. Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices. Received from Kevin Kritz, Service Region 6, on August 4, 2012.

Wyoming Game and Fish Department (WGFD). 2010. Wildlife Protection Recommendations for Wind Energy Development in Wyoming. Wyoming Game and Fish Commission Approved November 17, 2010. Wyoming Game and Fish Department, Cheyenne, WY.

ATTACHMENT 1

Response to Survey Recommendations Made in the Service's September 28, 2012 Letter

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The following recommendations were made by the Service in the September 28, 2012 letter to Garry Miller (PCW) regarding Eagle Use Sampling Considerations and Recommendations for the proposed Chokecherry-Sierra Madre Wind Energy Development Project. A response is provided to document how each recommendation has been incorporated into the revised 800-meter point count survey protocols. Recommendations are presented in italics below.

1. *We recommend focusing sampling efforts within the most recently proposed project footprint in order to quantify eagle use in areas where turbines are planned for location. By collecting eagle and raptor use data in areas of likely development, we believe it will be easier to obtain a more reliable estimate of risk to eagles in these areas, from which more informed, site-specific, predictions can be made.*

   Response: The revised protocols and placement of the 60 point count sites are based on the most recent proposed Project footprint and probable turbine locations. The most recent Project footprint reflects PCW's commitment to the Turbine No-Build areas identified in the Project ECP.

2. *Although we recommend concentrating sampling effort within the project footprint as stated above, we believe it also would be prudent to establish additional sample points outside of the currently proposed footprint in areas of potential development. Adding points in areas of possible alternative turbine layouts will provide data to assess the impact of those alternatives, which may be necessary if survey results identify areas of high eagle use within areas currently proposed for development. Without eagle use data outside of the proposed footprint, it would be difficult to show that the relocation of turbines outside of the currently proposed project footprint would avoid and minimize impacts to eagles. Without these data, the only likely alternatives would be a reduction in the total number of turbines, or a reduction in the spacing between turbines in areas where avian and raptors surveys were conducted.*

   Response: Three of the 60 point count survey sites (RM15, HB3, and UH3) are placed outside of the most current probable turbine locations. Several additional locations (e.g., CMD2, HB2, RM10, SR2) have a substantial portion of their survey areas that fall outside of the current probable turbine locations. Each of these sites provides survey coverage in areas of the Project Site where turbines could be located if the current probable turbine location footprint changes.

3. *We recommend resampling at least fifty percent of the raptor point counts from previous years: this will help distinguish between apparent changes in documented eagle use caused by different point locations and associated differences in detectability, versus actual changes in habitat use. This is an important consideration, because the number of eagles and their location on the landscape is likely to vary across years (e.g., not every nest is active every year), making it difficult to account for inter-annual variability, which might lead to inaccurate conclusions about the risk of eagle fatalities. For example, observing fewer eagles at a second set of survey points could be misinterpreted as an area of lower eagle use, when in fact the number of eagles and eagle use across the landscape decreased due to other factors. In this*

example, the use (and hence risk) might have been the same for all survey points, but sampling different points across years would lead to the erroneous conclusion. Resampling some points across years can reduce this uncertainty by creating an index or allow for scaling of observations across years.

Response: Nearly 50% (46.7%) of the raptor monitoring sites that were surveyed in 2011 will be resurveyed as part of the 60 point counts. Resurvey of 50% of previous survey sites is not possible because many fall outside of the current project layout in Turbine No-Build areas. Additionally, several sites that were only surveyed in spring/summer 2012 do not have a full year of data and would not be appropriate for comparison with ongoing and future data collection efforts. Many of the 60 new survey sites overlap with areas previously surveyed as part of 2012 raptor monitoring efforts. When those areas are included, 50.3% of the area surveyed as part of 2012 raptor monitoring efforts is within the perimeter of the 60 new point count survey sites.

4. *Previous long-watch raptor surveys were based on an unlimited radius, and analysis of data from these surveys suggests that the detectability of eagles dropped off after 600 to 800 meters. We recommend using a distance of no more than 800 meters for point counts intended to collect data on eagles and other large raptors. This recommendation is found in our draft Eagle Conservation Plan Guidance (Service 2012, Appendix C, p. 18) and in other literature (e.g., Strickland et al. 2011). While it is acceptable to collect data on eagles and other raptors beyond 800 meters (e.g., location, flight height, flight path)—since they may be useful to identify travel corridors and areas of eagle use—the collection of this information should not distract surveyors from collecting data within the 800-meter point count. In addition, because only those data collected within 800 meters will be used in the models to predict eagle fatalities, data collected at distances more than 800 meters should be separated from data collected within 800 meters.*

   Response: Previous long-watch raptor surveys recorded any eagle observed to help identify high use areas per the protocols developed collaboratively between the Service, BLM, and PCW. The analysis of detectability of eagles presented in the Service's comments does not consider that the reason eagle use was higher within 800 meters of previously sampled sites is because those sites were placed on ridgelines and terrain features known to attract or concentrate eagle use, making the likelihood of observing an eagle within 800 meters of a survey site higher than if the point was placed randomly in the landscape where varying terrain features may or may not occur. The implementation of the previous surveys was extremely successful and resulted in the development of Turbine No-Build areas that will avoid impacts to eagles and other avian species in the majority of the high use areas that were identified. To be consistent with with the Service's Draft ECP Guidance, the Service's eagle risk model, and the recommendation made above, all surveys will be conducted using a distance of 800-meters.

5. *Based on recommendations in the draft Eagle Conservation Plan Guidance, the sampling goal should provide a "minimal spatial coverage of at least 30% of the project footprint" (i.e., the total area sampled in any given year should be thirty percent of the total project footprint) (Service 2012, Appendix C, p. 1 8). We recognize that even this level of effort will not provide specific information for seventy percent of the project area; however, it may be assumed that the information is representative of the remaining project area, provided the sample points are appropriately located (e.g., stratified and spatially balanced). To achieve the desired goal of at least 30 percent coverage of the Chokecherry Sierra Madre Proposed Project footprint, we calculate up to 70 survey points are needed, depending on how the project footprint is portrayed.*

   Response: Using the conceptual turbine footprint that PCW provided to the Service, 35% of all turbine locations fall within the 800-meter survey perimeters of the 60 point count sites. As stated above, the entirety of 3 sites and substantial portions of 3 others fall outside of the probable Project footprint in areas where turbines could be placed. These provide adequate coverage of areas outside of the current probable turbine footprint. When combined with the 800-meter radius surveyed areas from previous survey events (2011 and spring/summer 2012), 42% of probable turbine locations are included within the perimeter of 800-meter point count sites.

6. *We recommend sample locations be stratified by features of the landscape that may influence eagle and raptor activity, such as distinct geographic/topographic elements (e.g., escarpments), vegetation (if appropriate), and concentrated prey base. Doing so will allocate sampling points across the project in proportion to their occurrence on the landscape. A common sampling design in use today is the generalized random tessellation stratified sampling design (GRTS). We remain concerned that there is insufficient information about eagle habitat use associated with important eagle use areas including: active nests; concentrated prey base including grouse leks, prairie dog colonies, and reservoirs; as well as topographic features such as Miller Hill. Therefore, we recommend that some sample points be located near these important eagle use areas. Doing so would help with identifying additional avoidance areas or alleviating concerns for increased risk associated with these areas.*

   Response: The spatially balanced design that is discussed in the revised protocols above is reflective of the variability in habitat conditions, terrain features, and turbine numbers and densities. The revised protocols describe the methods used to select sites and the sampling strata and selection criteria that were used to place sites. The 60 sampling sites described in the revised protocols provide coverage in areas that provide some level of foraging, contain sage-grouse leks, and have variable topography that could influence eagle and raptor behavior. Site placement near active eagle nests is difficult because most nests have been avoided and are within the Turbine No-Build areas along the Bolten Rim or North Platte River corridor and, as seen in the data previously collected for the Project, active nests locations change each year.

7. *Based on recommendations in the Service's Eagle Conservation Plan Guidance, count periods should be one to two hours long (Service 2012, Appendix C, p. 18). If longer survey periods are used (e.g., four to six hours), the surveys should be divided into smaller units such as one or two hour blocks (or the actual time of eagle observations recorded), so that the influence of time of day can be evaluated (e.g., in relation to when turbines are inactive).*

   Response: Surveys will be conducted at each site for one hour per guidance in the ECP Technical Appendices (Service 2012b). As stated in the revised protocols, the survey methods follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices to the Draft ECP Guidance, and are consistent with other guidance documents produced by the Service, BLM, and WGFD.

8. *We recommend the protocol include a representative distribution of sampling events across all daylight hours across all point locations and seasons. Collecting data "evenly" across time and space should reduce any potential bias associated with locations, seasons, and time of day. This may also make it possible to evaluate how time of day influences eagle use of the site or when eagles are more likely to use specific topographic features. In addition, surveys should include multiple sampling events in each season per point.*

   Response: As stated in the revised protocols, the survey methods follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices to the Draft ECP Guidance, and are consistent with other guidance documents produced by the Service, BLM, and WGFD. The sampling schedule will provide survey coverage across all daylight hours for each of the 60 sites. The schedule also makes certain that the six raptor count surveys conducted on any given day are separated temporally and spatially to ensure independence of any observations that are made.

9. *We recommend locating survey sampling points at least 800 meters (0.5 mile) from active eagle and ferruginous hawk nests to limit disturbance. It may be possible to reduce this distance if topographic features create a visual barrier between observers and the nest.*

   Response: Should an eagle or ferruginous hawk nest become active within 800 meters of a survey site, PCW will coordinate with the Service and BLM to evaluate the most appropriate methods to take to ensure that survey activities do not disrupt nesting. With PCW's Turbine No-Build areas and Project re-design efforts, most eagle and raptor nests in the Project Site have been avoided by 800 meters or more. However, some survey sites are located within 800 meters of historically active nests. As stated above, sampling locations have been selected in a spatially balanced, stratified manner using methods recommended by the Service. Maintaining the sites that are located within 800 meters of historically active nests is necessary to maintain this spatially balanced design. Since Project survey efforts began in 2008, no active ferruginous hawk nests have been identified.

10. *We recommend data collection include identification of eagle species and their flight minutes within the 800-meter point count. Additional data collection could include, but should not necessarily be limited to (in relative order of importance): age and sex (if possible), flight path, flight behavior (e.g., soaring, kiting), activity (e.g., territory defense, foraging), interactions with other birds, flight height, obvious prey items, time observed outside of the 800-meter point count, and time perched. It is acceptable to record detections beyond 800-meters as these can provide additional information about eagle and raptor use of the project area. However, collecting data beyond 800-meters should not detract from observations made within the 800-meter point count.*

    Response: Only those observations occurring within 800 meters of the survey sites will be recorded. As described in the protocols and illustrated on the data collection forms in Attachment 3, data collection efforts will provide all of the information recommended by the Service.

11. *We recommend collecting data on all raptors to the extent feasible; however, collecting data on other raptors should not preclude the collection of data on eagles.*

    Response: Data on all raptors and other species of interest will be collected in a manner identical as that used for eagles unless those efforts interfere with data collection for eagles.

12. *Based on eagle use data collected between April of 2011 and April of 2012, eagle activity relative to sampling effort appears to be higher in the winter and summer periods (Table 1). Higher eagle activity in the summer likely corresponds to the time during which adults are actively feeding young and when young are learning to fly. Higher eagle activity in the winter may be related to the presence of migrant eagles, or could be due to the location of survey points. Because data were not collected following the above recommendations during the summer of 2012, we recommend the collection of eagle and raptor use data continue through the 2013 nesting season (at least through August of 2013) to evaluate this potential season of higher use.*

    Response: Data will be collected through August of 2013. Our interpretation of eagle use in winter and summer periods differs from the Service's interpretation. The Service's interpretation assumes that each minute of eagle use is independent and evenly distributed across the landscape. Based on the survey data, it is clear that most of the eagle minutes recorded across all seasons are not independent and that the simple statistic of flight minutes per survey minute does not consider that observations are not independent in space or time and therefore mischaracterizes seasonal use and risk. As an example, 72 of the 141 minutes (51%) of winter use observed in the Project Site occurred at two sites on two days. On December 8, 2011, 35 eagle flight minutes were recorded at RM11 and on March 9, 2012 37 minutes of eagle use were recorded at RM14. On both days, field technicians wrote on datasheets that the use was associated with 2-3 individuals who were using the area for a long period of time. If the three eagles at RM14 had not been observed on March 9, no winter use would

have been observed within 800 meters of that sampling site. Similarly, if the use at RM11 would not have been observed on December 8, only 3 minutes of eagle use over would have been observed at that site during winter months and use would have been decreased by 95%. The observed activity on December 8 and March 9 is indicative of short duration, concentrated use by a few individuals rather than of high eagle use of the Project throughout the entire winter period. The data also indicate that for most of the Project Site there is no risk or very low risk to eagles during winter. Summer data are very similar to winter data. During summer 2011, only 71 eagle minutes were recorded. Nearly 60% of these minutes were associated with only 3 observations of individual circle soaring birds at RM14 and RM5. This indicates that the high use the Service cites is not from adults feeding young or young learning to fly. Rather, the behavior observed indicates that this is localized use by individual birds utilizing thermals created by warm summer temperatures.

13. *In several locations, the document states that it was "fully compliant" with recommendations by the U.S. Fish and Wildlife Service (Service). First, it is important to understand that the draft Eagle Conservation Plan Guidance is voluntary; consequently we prefer to use the term "consistent with" rather than "compliant with" when describing recommendations found within the Eagle Conservation Plan Guidance. Second, we do not believe that the protocol provided by PCW is, in fact, consistent with the Eagle Conservation Plan Guidance for numerous reasons, one key reason being that the limited number of 800-meter survey points do not provide the recommended minimum 30 percent coverage of the project footprint. Additionally, we do not believe it is scientifically justifiable to combine survey points from multiple years in order to meet the minimum recommended standard of 30 percent coverage: the minimum 30 percent coverage should occur within each individual year.*

    Response: The recommended changes have been made. The term "compliant" has been changed to "consistent". As stated above, 35% of the probable turbine locations will be surveyed using the revised protocols.

14. *The document makes a definitive statement about "unrealistic projections" concerning eagle risk. This statement is based on several assumptions, including that previous survey efforts correctly identified areas of high eagle use. One of the reasons for increasing the spatial coverage in 2012-2013 is to increase our confidence in understanding eagle and raptor use across the Project area. Because substantial uncertainty exists as a result of the limited amount of spatial and temporal survey coverage used to document impacts and relative risk to eagles, the Service believes our projections concerning risk to eagles are realistic and clearly demonstrate the need for increased coverage. In addition, our letter of August 10, 2012, identified numerous areas of potential high eagle use that are not currently included in the avoidance areas, such as the golden eagle nest in the southwest corner of Sierra Madre. Our letter also identified the presence of high density prey base, proximity of sage grouse leks and other habitat features that are used by eagles. Because these habitat features (and others) are not included in the proposed avoidance areas, the projections of risk and high eagle fatalities identified by the Service are possible.*

Response: The comments made above have been addressed in the revised protocols, the prey-base report submitted to the Service, and the Project ECP. We concur that within the context of the Service's eagle fatality model, the revised protocols will help address uncertainties.

15. *The data sheet attached to the protocol provided by PCW does not appear to have a means of recording flight path in data. It should be clear how flight path data will be collected on the existing data sheet, or additional datasheets should be included if there is more than one.*

    Response: Attachment 2 contains an example figure that is used to record flight paths for eagles and other raptors. Additionally, multiple rows of data are recorded for each eagle observed which results in multiple spatial points per individual bird. Fitting a line between each point for each observed eagle provides another mechanism to create flight paths. The methods used to collect data are described in the revised protocols.

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ATTACHMENT 2

Example Aerial Map Used to Map Flight Paths during 800-meter Raptor Count Surveys

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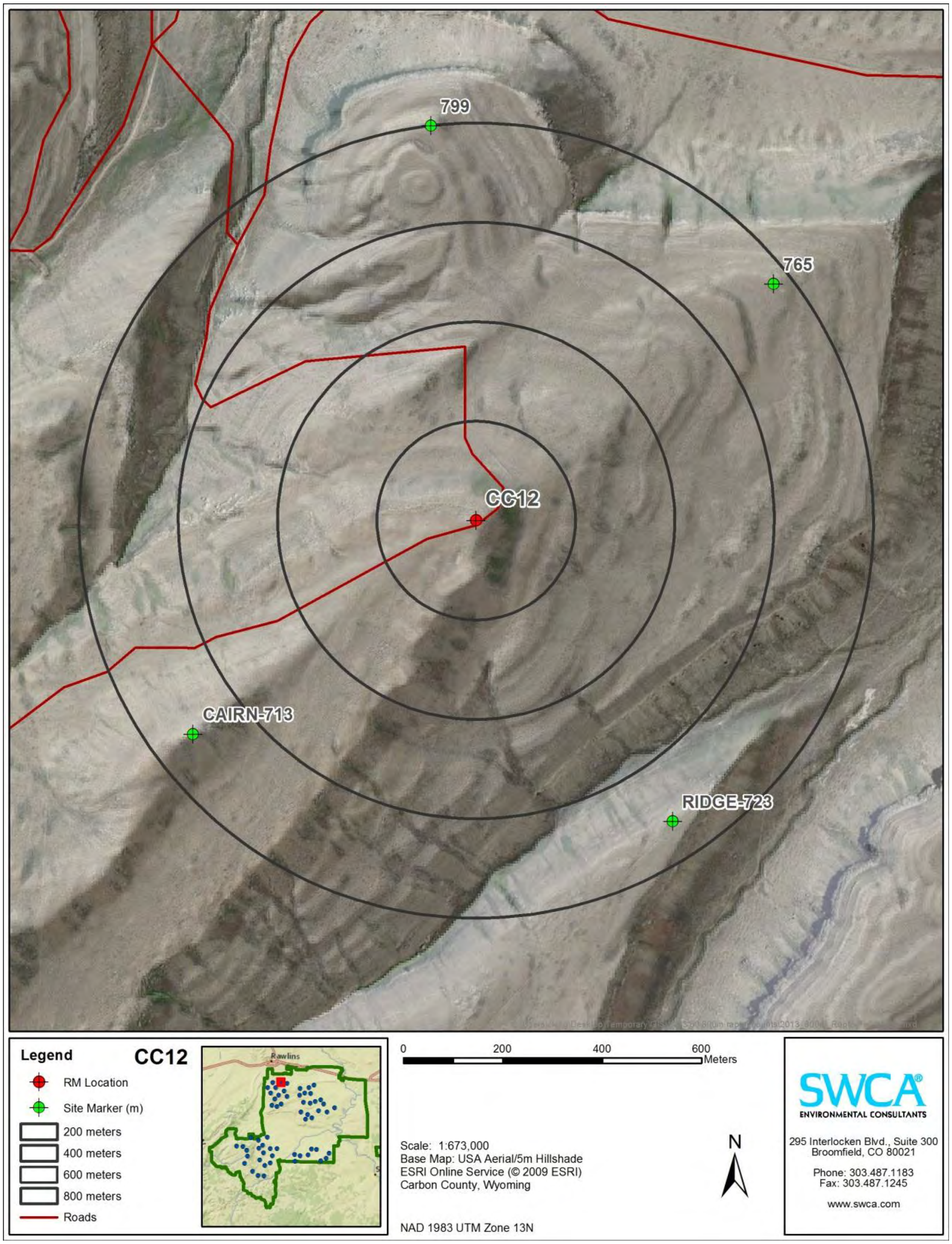

Aerial map example. Numbers next to site markers indicate distance from raptor monitoring location to the site marker location. Concentric rings around raptor monitoring location indicate 200-meter distance intervals to aid in estimation of distance. Other features on the landscape (roads, rock cairns, etc.) are also noted on each map to aid in distance and location estimation.

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ATTACHMENT 3

Data Sheets Used to Collect Data during 800-meter Raptor Count Surveys

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PCW 2012-2013 Raptor Survey

Field Observer: ______________________ **Survey Location:** ____________

Start time: ____________

End time: ____________

Date: ________________

Page: ____ **of** _____

Target #	Obs #	Species	# Birds	Age	Sex	Behav	Bearing to Bird (°)	Distance to Bird (m)	Angle of Bird (°)	Heading of Bird	0-30	30-150	150+	Time Begin	Time End

PCW 2012-2013 Raptor Survey Notes

Field Observer: ______________________________ **Survey Pt:** ____

Date: ________________ **Page:** _____ of _____

Other species and Notes.

Weather Conditions

Time	Sky	Wind Dir	Wind Spd	Temp (°F)

Incidental Species Observations
for eagles and raptors note distance and bearing

Appendix C

Avian Baseline Studies for the Chokecherry-Sierra Madre Wind Resource Area Carbon County, Wyoming

Final Report
June 26, 2008 – June 16, 2009

Prepared for:

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September 8, 2009

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EXECUTIVE SUMMARY

The Power Company of Wyoming has proposed a wind-energy facility in Carbon County, Wyoming, capable of producing 2,000 megawatts of energy with 1,000 wind turbines. To assist with preparing an Environmental Impact Statement for the proposed facility, AECOM contracted Western Ecosystems Technology, Inc. to conduct surveys and monitor wildlife resources in the Chokecherry-Sierra Madre Wind Resource Area to estimate the impacts of project construction and operations on wildlife. The following document contains results for fixed-point bird use surveys and incidental wildlife observations.

The principal objectives of the study were to (1) provide site specific bird use data that would be useful in evaluating potential impacts from the proposed wind-energy facility; (2) provide information that could be used in project planning and design of the facility to minimize impacts to birds; and (3) recommend further studies or potential mitigation measures, if warranted.

The proposed wind-energy facility is composed primarily (77%) of scrub-scrub habitat dominated by big sagebrush. The remaining areas are covered by grassland (19.3%), evergreen forest (1.4%) deciduous forest (0.7%), and emergent wetlands (0.6%), with smaller patches of open water, developed space, barren habitat, mixed forest, woody wetlands, and pastures.

The study used fixed-point bird use surveys to estimate the seasonal, spatial, and temporal use of the study area by birds, particularly raptors. Fixed-point surveys were conducted from June 26, 2008 through June 16, 2009 at nineteen points established throughout the Chokecherry-Sierra Madre Wind Resource Area. A total of 433 20-minute fixed-point surveys were completed and 50 bird species were identified.

A total of 2,005 individual bird observations within 1,301 separate groups were recorded during the fixed-point surveys. The most abundant large bird species recorded was the common raven (175 observations) and the most abundant small bird species was horned lark (805). A total of 230 individual raptors were recorded within the Chokecherry-Sierra Madre Wind Resource Area, representing 12 species. The most abundant raptor observed was golden eagle (69 observations).

Use by waterbirds and shorebirds was relatively low (0.10 and 0.01 birds/plot/20-minute survey, respectively) and these bird types were only observed during the spring season. Raptor use was highest during the fall (0.62 birds/plot/20-min survey) and lowest during the winter (0.17). Vultures were only recorded during the fall and spring (0.01 birds/plot/20-minute survey for both seasons). Upland gamebird use, limited to greater sage-grouse, ranged from 0.09 birds/plot/20-minute survey in the winter to zero in the summer. Large corvids had the highest use in the fall (0.73 birds/plot/20-minute survey) and the lowest use in the winter (0.34). Passerine use ranged from 0.02 birds/plot/20-minute survey in winter to 5.00 in spring; however, the focus for small birds was within a 100 meter viewshed and passerine use is not directly comparable to the other bird types, which were recorded out to 800 m.

During the study, 311 single or groups of large birds totaling 467 individuals were observed flying during fixed-point bird use surveys. For all large bird species combined, 67.0% of birds were observed flying below the likely zone of risk, 29.3% were within the zone of risk, and 3.6%

were observed flying above the zone of risk for typical turbines that could be used in the Chokecherry-Sierra Madre Wind Resource Area. Bird types with at least 20 individuals observed flying most often observed flying within the turbine zone of risk were raptors (30.4%) and large corvids (24.8%). A total of 1,046 passerines and other small birds in 596 groups were recorded flying within 100 meters of the survey plots in the proposed wind resource area, with 99.8% flying below the zone of risk, 0.2% within the zone of risk, and none observed above the zone of risk.

For large bird species with at least 25 separate groups of flying birds, golden eagles were observed most often within the zone of risk (45.0%) based on initial observations. Based on the use (measure of abundance) of the study area by each species and the flight characteristics observed for that species, the common raven had the highest probability of turbine exposure, with an exposure index of 0.09. The raptor species with the highest exposure index was the golden eagle, which was ranked second of all species at 0.06. All other raptor species had an exposure index of 0.02 or less. For passerines and other small birds, the species with the highest exposure index was horned lark, though its exposure index was less than 0.01.

Levels of bird use varied within the study area by point. For all large bird species combined, use was highest at point 12, with 3.18 birds/20-minute survey. The higher mean use at point 12 was due mostly to high use by large corvids at this point (2.50 birds/20-minute survey). Use at the other points ranged from 0.32 to 2.55 birds/20-minute survey for large bird species. Waterbird use was highest at point 16, with 0.67 birds/20-minute survey, and mean shorebird use was only recorded at point 17, with 0.17 birds/20-minute survey. Raptor use was highest at point four (0.93 birds/20-minute survey), and ranged from 0.10 to 0.83 birds/20-minute survey at other points. Vultures were only seen at points six and eleven (0.03 and 0.04 birds/20-minute survey, respectively) and upland gamebird use was highest at point 13 (0.14 birds/20-minute survey). Passerine use, limited to birds observed within 100 meters of the survey point, was highest at point 13, with 5.10 birds/20-minute survey, and ranged from 1.81 to 4.70 at the other points.

No obvious flyways or concentration areas were observed. No strong association with topographic features within the study area was noted for raptors or other large birds. Although some differences in bird use were detected among survey points, the differences are not large enough to suggest that any portions of the Chokecherry-Sierra Madre Wind Resource Area should be avoided when siting turbines due to very high bird use.

The objective of incidental wildlife observations was to provide a record of wildlife seen outside of the standardized surveys. There were 12 bird species observed incidentally, totaling 270 individuals within 157 separate groups during the study. The most abundant large bird species recorded incidentally were greater sage-grouse (123 individuals), golden eagle (52 observations), and northern harrier (38 observations). Three bird species were only observed incidentally and were not observed during fixed-point surveys. Four mammal species totaling 3,083 individuals in 304 groups were also observed incidentally at the CSMWRA. The most commonly recorded mammal species was pronghorn antelope with 2,879 observations in 285 groups.

Based on fixed-point bird use data collected for the Chokecherry-Sierra Madre Wind Resource Area, mean annual raptor use was 0.46 raptors/plot/20-minute survey. The annual rate was low relative to raptor use at 36 other wind-energy facilities that implemented similar protocols to the present study and had data for three or four different seasons. Mean raptor use in the Chokecherry-Sierra Madre Wind Resource Area was low compared to the other wind resource areas, ranking twenty-second among the 36 studies.

A regression analysis of raptor use and mortality for 13 new-generation wind-energy facilities, where similar methods were used to estimate raptor use and mortality, found that there was a significant correlation between use and mortality ($R^2 = 69.9\%$; Figure 8). Using this regression to predict raptor collision mortality at the CSMWRA, based on an adjusted mean raptor use of 0.46 raptors/plot/20-min survey, yields an estimated fatality rate of 0.04 fatalities/MW/year, or four raptor fatalities per year for each 100-MW of wind-energy development, which would equate to an estimate of 80 raptors per year for a 2,000-MW development. A 90% prediction interval around this estimate is zero to 0.30 fatalities/MW/year. Based on species composition of the most common raptor fatalities at other western wind-energy facilities and species composition of raptors observed at the Chokecherry-Sierra Madre Wind Resource Area during the surveys, the majority of the fatalities of diurnal raptors will likely consist of red-tailed hawk, American kestrel and golden eagle. Based on the seasonal use estimates, it is expected that risk to raptors would be unequal across seasons, with the lowest risk in the winter, and highest risk during the fall. However, the winter use estimates were only based on three surveys that were completed prior to the area becoming inaccessible due to snow. Therefore, winter use as based on these three surveys may not be representative of actual use throughout the entire winter, but is the best data available for predicting winter use of the study area by raptors.

Some species considered to be sensitive or of conservation concern were observed within the Chokecherry-Sierra Madre Wind Resource Area. During all surveys and incidental observations, one petitioned species, the greater sage-grouse, was recorded within the proposed wind resource area. Furthermore, 10 other bird species and one mammal species classified by the Wyoming Game and Fish Department as Native Species Status 2, 3, or 4 were also recorded during fixed-point bird use surveys or as incidental wildlife observations. A total of 538 individual birds in 293 groups, representing 11 sensitive bird species, and five white-tailed prairie dogs in one group were recorded. This is a tally that in some cases may represent repeated observations of the same individual. Some potential exists for wind turbines to displace these species within the study area. Research concerning displacement impacts of wind-energy facilities is limited, but some show the potential for small scale displacement of 180 meters (591 feet) or less for small birds, while impacts to densities of small birds at larger scales have not been shown.

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INTRODUCTION

The Power Company of Wyoming has proposed a wind-energy facility in Carbon County, Wyoming (Figures 1 and 2), capable of producing 2,000 megawatts (MW) of energy with 1,000 wind turbines. To assist with preparing an Environmental Impact Statement for the proposed facility, AECOM contracted Western Ecosystems Technology, Inc. to conduct surveys and monitor wildlife resources in the Chokecherry-Sierra Madre Wind Resource Area (CSMWRA) to estimate the impacts of project construction and operations on wildlife.

The principal objectives of the study were to (1) provide site specific bird use data that would be useful in evaluating potential impacts from the proposed wind-energy facility; (2) provide information that could be used in project planning and design of the facility to minimize impacts to birds; and (3) recommend further studies or potential mitigation measures, if warranted. The protocols for the baseline studies are similar to those used at other wind-energy facilities across the nation, and follow the guidance of the National Wind Coordinating Collaborative (Anderson et al. 1999). The protocols have been developed based on WEST's experience studying wildlife at proposed wind-energy facilities throughout the US; and were designed to help predict potential impacts to bird species (particularly raptors).

Baseline surveys, conducted from June 26, 2008 through June 16, 2009 at the CSMWRA, included fixed-point bird use surveys and incidental observations. Sensitive species of wildlife observed during either the fixed-point surveys or observed incidentally were also recorded. In addition to site-specific data, this report presents existing information and results of studies conducted at other wind-energy facilities. The ability to estimate potential bird mortality at the proposed CSMWRA is greatly enhanced by operational monitoring data collected at existing wind-energy facilities. For several wind-energy facilities, standardized data on fixed-point surveys were collected in association with standardized post-construction (operational) monitoring, allowing comparisons of bird use with bird mortality. Where possible, comparisons with regional and local studies were made.

STUDY AREA

The proposed CSMWRA is located in Carbon County (Figure 1) approximately four miles (6.4 kilometers [km]) south of Rawlins, Wyoming, within T 16 N – T 18N, R 88 W – R 89W and T 19 N – T21N, R 85 W – R 88W. The CSMWRA is comprised of two portions, the Chokecherry Wind Resource Area (WRA) to the north and the Sierra Madre WRA to the south. Approximately 77% of the study area is covered by scrub-scrub habitat, which is dominated primarily by big sagebrush (*Artemisia tridentata*). The remaining areas are covered by grassland (19.3%), evergreen forest (1.4%) deciduous forest (0.7%), and emergent wetlands (0.6%), with smaller patches of open water, developed space, barren habitat, mixed forest, woody wetlands, and pastures (Table 1; Figure 3).

Topography in the Chokecherry WRA is rolling hills throughout much of the Chokecherry WRA, with topography becoming more varied in the southern portion (Figure 2). A distinct rim with a steep cliff face dominates the southern boundary of the Chokecherry WRA. The general land practice is cattle grazing.

The Sierra Madre WRA is dominated by sagebrush steppe with pockets of quaking aspen (*Populus tremuloides*). Topography in the Sierra Madre WRA ranges from gently rolling plains in the northern portion to rolling hills in the southern portion (Figure 2). The escarpment of Miller Hill dominates the northern boundary of the Sierra Madre WRA. Drainages in the southern portion are dominated by willow (*Salix* spp.) and the general land practice is also cattle grazing.

METHODS

Fixed-Point Bird Use Surveys

Fixed-point bird use surveys were used to estimate the seasonal, spatial, and temporal use of the study area by birds, particularly raptors, defined here as kites, accipiters, buteos, harriers, eagles, falcons, and owls. Fixed-point surveys (variable circular plots) were conducted using methods described by Reynolds et al. (1980). The points were selected to survey representative habitats and topography of the study area, while providing relatively even coverage. All birds seen during each 20-minute (min) fixed-point survey were recorded.

Bird Use Survey Plots
At the start of the study, 16 points were selected to achieve relatively even coverage of the study area and survey representative habitats and topography within the study area. Due to snow conditions which prevented access to much of the study area, three additional points were added north of the Sierra Madre WRA in the spring, for a total of 19 points (Figure 4). Each survey plot was a variable circular plot, and all birds seen during each survey were recorded. Using this method, all birds that are seen or heard are recorded and later analysis can truncate observations to set distances (Reynolds et al. 1980).

Bird Survey Methods
All species of birds observed during fixed-point surveys were recorded. Observations of large birds beyond 800 m (2,625 feet [ft]) were recorded, but were not included in the statistical analyses; for small birds observations beyond a 100-m (328 ft) radius were excluded. A unique observation number was assigned to each observation.

The date, start and end time of the survey period, and weather information such as temperature, wind speed, wind direction, and cloud cover were recorded for each survey. Species or best possible identification, number of individuals, sex and age class (if possible), distance from plot center when first observed, closest distance, altitude above ground, activity (behavior), and habitat(s) were recorded for each observation. The behavior of each bird observed, and the vegetation type in which or over which the bird occurred, were recorded based on the point of first observation. Approximate flight height and flight direction at first observation were recorded to the nearest 5-m (16-ft) interval. Other information recorded included whether or not the observation was auditory only and in which of the two 10-min intervals of the 20-min survey it was first observed.

Locations of raptors, other large birds, and species of concern seen during fixed-point bird use surveys were recorded on field maps by observation number. Flight paths and perch locations were digitized using ArcGIS 9.3. Any comments were recorded in the comments section of the data sheet. Any wildlife observations were recorded on the incidental datasheets.

Observation Schedule
Sampling intensity was designed to document bird use and behavior by habitat and season within the study area. Fixed-point surveys were conducted from June 26, 2008, through June 16, 2009. Surveys were conducted approximately once a week during spring (March 16 to May 31) and fall (September 1 to November 15), once every two weeks during summer (June 1 to August 31), and three times during the winter (November 16 to December 31). Only three surveys were completed in winter before snow conditions made the area inaccessible. Surveys were conducted during daylight hours and survey periods were varied to approximately cover all daylight hours during a season. To the extent practical, each point was surveyed about the same number of times each season. The three additional points (points 17, 18, and 19) were added during spring surveys because winter snows made much of the CCWRA inaccessible. The purpose of surveying at these three points was to capture south to north migration through the study area.

Incidental Wildlife Observations

Incidental wildlife observations provided a record of wildlife seen outside of the standardized surveys. All raptors, unusual or unique birds, sensitive species, mammals, reptiles, and amphibians were recorded in a similar fashion to standardized surveys. The observation number, date, time, species, number of individuals, sex/age class, distance from observer, activity, height above ground (for bird species), habitat, and, in the case of sensitive species, the Universal Transverse Mercator (UTM) location was recorded with a global positioning system (GPS) unit.

Statistical Analysis

Quality Assurance and Quality Control
Quality assurance and quality control (QA/QC) measures were implemented at all stages of the study, including in the field, during data entry and analysis, and report writing. Following field surveys, observers were responsible for inspecting data forms for completeness, accuracy, and legibility. A sample of records from an electronic database was compared to the raw data forms and any errors detected were corrected. Irregular codes or data suspected as questionable were discussed with the observer and/or project manager. Errors, omissions, or problems identified in later stages of analysis were traced back to the raw data forms, and appropriate changes in all steps were made.

Data Compilation and Storage
A Microsoft® ACCESS database was used to store, organize, and retrieve survey data. Data were keyed into the electronic database using a pre-defined format to facilitate subsequent QA/QC and

data analysis. All data forms, field notebooks, and electronic data files were retained for reference.

Fixed-Point Bird Use Surveys

Bird Diversity and Species Richness

Bird diversity was illustrated by the total number of unique species observed. Species lists, with the number of observations and the number of groups, were generated by season, including all observations of birds detected regardless of their distance from the observer. Species richness was calculated as the mean number of species observed per survey (i.e., number of species/plot/20-min survey). Bird diversity and species richness were compared between seasons for fixed-point bird use surveys.

Bird Use, Composition, and Frequency of Occurrence

For the standardized fixed-point bird use estimates, only observations of large birds detected within the 800-m radius plot were used; small bird observations were limited to 100 m. Estimates of mean bird use (i.e., number of birds/plot/20-min survey) were used to compare differences between bird types, seasons, and other wind-energy facilities. Two different viewsheds were utilized when calculating the various statistics such as species richness, use, percent composition, percent frequency, and exposure index; a circle with a radius of 800 m for large birds and 100 m for small birds.

The frequency of occurrence was calculated as the percent of surveys in which a particular species or bird type was observed. Percent composition was calculated as the proportion of the overall mean use for a particular species or bird type. Frequency of occurrence and percent composition provide relative estimates of species exposure to the proposed wind-energy facility. For example, a species may have high use estimates for an area based on just a few observations of large groups; however, the frequency of occurrence will indicate that the species occurs during very few of the surveys and therefore, the species may be less likely affected by the wind energy development.

Bird Flight Height and Behavior

To calculate potential risk to bird species, the first flight height recorded was used to estimate the percentages of birds flying within the likely "zone of risk" (ZOR) for collision with turbine blades of 35 m to 130 m (114 – 427 ft) above ground level (AGL), which is the blade height of typical turbines that could be used at the CSMWRA.

Bird Exposure Index

A relative index of collision exposure (R) was calculated for bird species observed during the fixed-point bird use surveys using the following formula:

$$R = A^*P_f^*P_t$$

Where A equals mean relative use for species *i* (large bird observations within 800 m of the observer or 100 m for small birds) averaged across all surveys, P_f equals the proportion of all observations of species *i* where activity was recorded as flying (an index to the approximate percentage of time species *i* spends flying during the daylight period), and P_t equals the proportion of all initial flight height observations of species *i* within the likely ZOR.

This index is only based on initial flight height observations and relative abundance (defined as the use estimate) and does not account for other possible collision risk factors such as foraging or courtship behavior.

Spatial Use

Data were analyzed by comparing use among plots. Mapped flight paths were qualitatively compared to study area features such as topographic features. The objective of mapping observed bird locations and flight paths was to look for areas of concentrated use by raptors and other large birds and/or consistent flight patterns within the study area. This information can be useful in turbine layout design or adjustments of individual turbines for micro-siting.

RESULTS

Fifty-three bird species and four mammal species were identified during surveys completed at the CSMWRA. Results of the fixed-point surveys and incidental wildlife observations, and the specific numbers of unique species for each survey type, are discussed in the sections below.

Fixed-Point Bird Use Surveys

Bird Diversity and Species Richness

A total of 433 20-minute fixed-point surveys were conducted at the CSMWRA (Table 2). Fifty unique species were observed over the course of all fixed-point bird use surveys. More unique species were observed during the spring (36 species) and summer (32) than in the fall (25) and winter (six). Mean use was 0.63 birds/plot/20-min survey for large bird species and 1.19 birds/100-m plot/20-min survey for small bird species (Table 2). The mean number of species per plot per survey for large birds was higher in the fall (0.81 species/800-m plot/20-min survey) compared to spring (0.61), summer (0.60), and winter (0.40). For small birds, the mean number of species per plot per survey was higher in the summer (2.05 species/100-m plot/20-min survey) and spring (1.62), compared to the fall (0.43) and winter (0.02; Table 2).

A total of 2,005 individual bird observations within 1,301 separate groups were recorded during the fixed-point surveys (Table 3). One species, horned lark (*Eremophila alpestris*), composed 40.1% of all bird observations. All other species comprised less than 10% of the total observations. The most abundant large bird species recorded was the common raven (*Corvus corax;* 175 observations). A total of 230 individual raptors were recorded within the CSMWRA, representing 12 species (Table 3). The most abundant raptor observed was golden eagle (*Aquila chrysaetos*; 69 observations).

Bird Use, Composition, and Frequency of Occurrence by Season

Mean bird use, percent composition, and frequency of occurrence by season were calculated (Tables 4a and 4b). The highest overall large bird use occurred in the fall (1.37 birds/plot/20-min survey), followed by the summer (1.08), spring (0.98), and winter (0.60; Table 4a). For all small birds, use was highest in the spring (5.00 birds/plot/20-min survey), followed by the summer (4.18), fall (1.57), and winter (0.02; Table 4b).

Waterbirds

Waterbirds were only observed during the spring season (Table 4a), with a mean use of 0.10 birds/plot/20-min survey. Waterbirds accounted for 10.5% of all bird use during the spring and the frequency of occurrence was relatively low (1.4% of spring surveys; Table 4a). The only waterbird species observed were American white pelican (*Pelecanus erythrorhyncos*) and great blue heron (*Ardea herodias*).

Shorebirds

Shorebirds were also only observed during the spring season (Table 4a), with a use of 0.01 birds/plot/20-min survey. Shorebirds accounted for less than 1% of overall bird composition during the spring, and were recorded during less than 1% of spring surveys (Table 4a). The only shorebird species observed was killdeer (*Charadrius vociferous*).

Raptors

Raptor use was highest in the fall (0.62 birds/plot/20-min survey), followed by summer (0.58), spring (0.35) and winter (0.17; Table 4a). Higher use in the summer and spring was primarily due to high use of the area by American kestrels (*Falco sparverius*; 0.18 and 0.12 birds/plot/20-min survey, respectively). Higher use in the fall and winter was primarily due to use of the area by golden eagles (0.25 and 0.14 birds/plot/20-min survey, respectively). Raptors comprised 53.1% of overall bird use during the summer, 45.2% during the fall, 36.1% during the spring, and 27.9% during the winter. Raptors were observed during 37.2% of summer surveys, 36.8% of fall surveys, 28.6% of spring surveys, and 16.7% of winter surveys (Table 4a).

Vultures

Vultures, limited to turkey vulture (*Cathartes aura*), were only recorded during the fall and spring (0.01 birds/plot/20-min survey for both seasons; Table 4a). Vultures accounted for less than 1% of overall bird use and were recorded during less than 1% of all surveys during both seasons (Table 4a).

Upland Gamebirds

Upland gamebird use, limited to greater sage-grouse (*Centrocercus urophasianus*) was highest during the winter (0.09 birds/plot/20-min survey) compared to the spring (0.06), fall (0.01), and summer (0; Table 4a). Greater sage-grouse accounted for 15.1% of all bird use during the winter, 5.9% in the spring, and 1.1% in the fall. Greater sage-grouse were recorded during 5.8% of spring surveys, 4.9% winter surveys, and less than 1% of fall surveys (Table 4a).

Large Corvids

Large corvids, consisting of American crow (*Corvus brachyrhynchos*), black-billed magpie (*Pica pica*), and common raven, had the highest use in the fall (0.73 birds/plot/20-min survey), followed by spring (0.45), summer (0.44) and winter (0.34; Table 4a). Large corvids accounted for 57.0% of all bird use during the winter, 53.2% in the fall, 45.9% in the spring, and 40.5% in the summer. Large corvids were recorded during 29.7% of fall surveys, 20.5% of spring surveys, 16.0% of winter surveys, and 7.7% of summer surveys (Table 4a).

Passerines

A 100-m radius viewshed was used for small bird data analysis, therefore, results are not directly comparable to the other large bird types, which were recorded out to 800 m. Passerine use was highest in spring (4.97 birds/plot/20-min survey), compared to summer (4.04), winter (1.57), and fall (0.02; Table 4b). Horned lark had the highest use by any one species in all seasons (spring 3.38 birds/plot/20-min survey; summer 1.83; fall 1.15; winter 0.02). Passerines were observed during more than 80% of the surveys in the summer and spring, 29.4% of fall surveys, and only 2.1% of winter surveys (Table 4b). After horned lark (805 observations; Table 3), the most common small passerine species recorded were: vesper sparrow (*Pooecetes gramineus*; 121), Brewer's sparrow (*Euphagus cyanocephalus*: 80), western meadowlark (*Sturnella neglecta*; 69), and sage thrasher (*Oreoscoptes montanus*; 65).

Bird Flight Height and Behavior

Flight height characteristics were estimated for both bird types and bird species (Tables 5 and 6). During the study, 311 single large birds or groups totaling 467 individuals were observed flying within the 800-m radius plot (Table 5). Overall, 29.3% of large birds observed flying were recorded within the ZOR for collision with turbine blades (35 to 135 m AGL), 67.0% were below the ZOR, and 3.6% were flying above the ZOR (Table 5). More than half (61.8%) of flying raptors were observed below the ZOR, 30.4% were within the ZOR, and only 7.7% were above the ZOR. Waterbirds had the highest percentage of flying birds within the ZOR (100%), although this was only based on two groups totaling 16 individuals. Fifty percent of turkey vultures were observed flying within the ZOR, but this percentage was based on only two vultures observed flying. Raptors had the third highest percentage of birds within the ZOR, primarily due to 45.2% of eagle observations and 43.6% of buteo observations recorded at this height. Shorebirds, doves/pigeons, large corvids, and upland gamebirds were typically observed flying below the ZOR (Table 5). The majority of passerines within the 100-m plot were observed below the ZOR (99.8%), while 0.2% were recorded within the ZOR and none were recorded above the ZOR (Table 5).

Of all large bird species, five species had at least 25 groups observed flying; golden eagle was the most commonly observed species flying within the likely ZOR based on initial observations (45.0%; Table 6a). Three species were always seen flying within the likely ZOR based on initial; observations; however, these were based on only one or two observations. Of all passerine and small bird species, four species had at least 30 groups observed flying, with only one species, horned lark, recorded flying within the ZOR based on initial observations (Table 6b).

Bird Exposure Index

A relative exposure index was calculated for each bird species (Tables 6a and 6b). Common raven (0.09) and golden eagle (0.06) had exposure indices higher than any other species. All other raptor species had an exposure index of 0.02 or less (Table 6a). The passerine species with the highest exposure index was horned lark, with an index of less than 0.01 (Table 6b). All identified small birds had exposure indices of zero because they were not observed flying within the ZOR based on initial observations.

Spatial Use
For all large bird species combined, use was highest at point 12 (3.18 birds/20-min survey). Bird use at other points ranged from 0.32 to 2.55 birds/20-min survey (Figure 5). The high mean use estimate for point 12 was largely due to high use at this point by large corvids (2.50 birds/20-min survey), and use by large corvids at the remaining points ranged from zero to 1.05 birds/20-min survey. Waterbird use was highest at point 16, with 0.67 birds/20-min survey, and were only observed at one other point (point one; 0.07 birds/20-min survey). Mean shorebird use was only recorded at point 17, with 0.17 birds/20-min survey at this point. Raptor use was highest at point four (0.93 birds/20-min survey), and ranged from 0.10 to 0.83 birds/20-min survey at other points. Vultures were only seen at points six and eleven (0.03 and 0.04 birds/20-min survey, respectively). Upland gamebird use was highest at point 13 (0.14 birds/20-min survey), and ranged from zero to 0.09 bird/20-min survey at other points. Passerine use was highest at point 13 (5.10 birds/20-min survey), and ranged from 1.81 to 4.70 at other points (Figure 5).

Flight paths for waterbirds, waterfowl, shorebirds, raptors, and vultures were digitized and mapped (Figures 6a-f). No obvious flyways or concentration areas were observed for any species. The available data do not indicate that any portions of the study area warrant being excluded from development due to very high bird use.

Sensitive Species Observations
Ten sensitive bird species totaling 269 individuals in 215 groups were observed during fixed-point bird use surveys (Tables 3 and 7). As with all avian surveys, this is a tally that in some cases may represent repeated observations of the same individual. The greater sage-grouse has been petitioned for listing as a federal threatened species (ECOS 2009). A total of 28 greater sage-grouse were recorded during fixed-point bird use surveys within the CSMWRA (Table 7). The greater sage-grouse is also a Wyoming Native Species Status (NSS) 2 species. Nine other NSS2, NSS3, or NSS4 species (WGFD 2005; WYNDD 2009) were also recorded during fixed-point surveys. The most abundant sensitive species recorded during fixed-point surveys were Brewer's sparrow (80 observations), sage thrasher (65), and sage sparrow (*Amphispiza belli*; 59).

Incidental Wildlife Observations

There were 12 bird species observed incidentally, totaling 270 individuals within 157 separate groups during the study (Table 8). Four mammal species totaling 3,083 individuals in 304 groups were also observed incidentally at the CSMWRA.

Bird Observations
The most abundant bird species recorded as an incidental wildlife observation were greater sage-grouse (123 observations), golden eagle (52 observations), and northern harrier (*Circus cyaneus*; 38 observations). All other bird species recorded incidentally had less than 20 observations (Table 8). Three bird species, American goldfinch (*Carduelis tristis*), burrowing owl (*Athene cunicularia*), and snow bunting (*Plectrophenax nivalis*), were only observed incidentally and were not observed during fixed-point surveys.

Mammal Observations
The most commonly recorded mammal species in the CSMWRA was pronghorn antelope (*Antilocapra americana*) with 2,879 observations in 285 groups (Table 8). Three additional mammal species were also recorded incidentally: elk (*Cervus elephus*; 189 observations), mule deer (*Odocoileus hemionus*; 10), and white-tailed prairie dog (*Cynomys leucurus*; five).

Sensitive Species Observations
Six sensitive species totaling 146 individuals in 49 groups were recorded during incidental observations (Table 7; WGFD 2005; ECOS 2009; WYNDD 2009). A total of 123 greater sage-grouse in 29 groups were recorded incidentally within the CSMWRA. All other sensitive bird species, classified as NSS2, NSS3, or NSS4 species, had ten or fewer observations recorded. One sensitive mammal species, the white-tailed prairie dog (NSS4), was also observed incidentally, with a total of five individuals observed in one group.

DISCUSSION AND IMPACT ASSESSMENT

Bird Impacts

Direct Effects
The most probable direct impact to birds from wind-energy facilities is direct mortality or injury due to collisions with turbines or guy wires of meteorological (met) towers. Collisions may occur with resident birds foraging and flying within the study area or with migrant birds seasonally moving through the study area. Project construction could affect birds through loss of habitat, or potential fatalities from construction equipment. Impacts from the decommissioning of the facility are anticipated to be similar to construction in terms of noise, disturbance, and equipment. Potential mortality from construction equipment is expected to be very low. Equipment used in wind-energy facility construction generally moves at slow rates or is stationary for long periods (e.g., cranes). The risk of direct mortality to birds from construction is most likely potential destruction of a nest for ground- and shrub-nesting species during initial site clearing.

Substantial data on bird mortality at wind-energy facilities are available from studies in California and throughout the West and Midwest. Of 841 bird fatalities reported from California studies (>70% from the Altamont Pass facility in California), about 39% were diurnal raptors, about 19% were passerines (excluding house sparrows [*Passer domesticus*] and European starlings [*Sturnus vulgaris*]), and about 12% were owls. Non-protected birds, including house sparrows, European starlings, and rock pigeons (*Columba livia*) comprised about 15% of the fatalities. Other bird types generally made up less than 10% of the fatalities (Erickson et al. 2002b). During 12 fatality monitoring studies conducted outside of California, diurnal raptor fatalities comprised about 2% of the wind-energy facility-related fatalities and raptor mortality averaged 0.03 fatalities/turbine/year. Passerines (excluding house sparrows and European starlings) were the most common collision victims, comprising about 82% of the 225 fatalities documented. For all bird species combined, estimates of the number of bird fatalities per turbine per year from individual studies ranged from zero at the Searsburg wind-energy facility in Vermont (Kerlinger 1997) and the Algona facility in Iowa (Demastes and Trainer 2000), to 7.7 at the Buffalo Mountain facility in Tennessee (Nicholson 2003). Using mortality data from a 10-year period from wind-energy facilities throughout the entire United States, the average number of bird collision fatalities is 3.1 fatalities/MW/year, or 2.3 fatalities/turbine/year (NWCC 2004).

Raptor Use and Exposure Risk

The annual mean raptor use at the CSMWRA (0.46 raptors/plot/20-min survey) was compared with other wind-energy facilities that implemented similar protocols and had data for three or four seasons. Similar studies were conducted at 36 other wind-energy facilities. The annual mean raptor use at these wind-energy facilities ranged from 0.09 to 2.34 raptors/plot/20-min survey (Figure 7). Based on the results from these wind-energy facilities, a ranking of seasonal raptor mean use was developed as: low (0 – 0.5 raptors/plot/20-min survey); low to moderate (0.5 – 1.0); moderate (1.0 – 2.0); high (2.0 – 3.0); and very high (> 3.0). Under this ranking, mean raptor use (number of raptors divided by the number of 800-m plots and the total number of surveys) at the CSMWRA is considered to be low, with the CSMWRA ranking twenty-second when compared with the 36 other wind-energy facilities (Figure 7).

Although high numbers of raptor fatalities have been documented at some wind-energy facilities (e.g. Altamont Pass), a review of studies at wind-energy facilities across the United States reported that only 3.2% of casualties were raptors (Erickson et al. 2001a). Indeed, although raptors occur in most areas with the potential for wind-energy development, individual species appear to differ from one another in their susceptibility to collision (NRC 2007). Results from Altamont Pass in California suggest that mortality for some species is not necessarily related to abundance (Orloff and Flannery 1992). American kestrels, red-tailed hawks (*Buteo jamaicensis*), and golden eagles were killed more often than predicted based on abundance. Thus far, only three northern harrier fatalities at existing wind-energy facilities have been reported in publicly available documents, despite the fact they are commonly observed during point counts at these facilities (Erickson et al. 2001a; Whitfield and Madders 2006). Because northern harriers often forage close to the ground, risk of collision with turbine blades is considered low for this species. Relative use by American kestrels at the High Winds facility is almost six times the use by American kestrels at the Altamont Pass facility (Kerlinger 2005). It is likely that many factors, in addition to abundance, are important in predicting raptor mortality.

Exposure indices analysis may also provide insight into what species have a higher likelihood of turbine casualties. The index considers relative probability of exposure based on abundance, proportion of daily activity spent flying, and proportion of flight height of each species within the ZOR for turbines likely to be used at the wind-energy facility. For the CSMWRA, the raptor species with the highest exposure index was the golden eagle, which was ranked second of all species, at 0.06 (Table 6a). The relatively higher exposure index for golden eagle was due to flight height data showing that 45.0% of flying observations were within the ZOR based on initial observations. The exposure index analysis is based on observations of birds during the daylight period and does not take into consideration flight behavior (e.g., during foraging or courtship) or abundance of nocturnal migrants. It also does not take into consideration habitat selection, the ability to detect and avoid turbines, and other factors that may vary among species and influence likelihood for turbine collision. For these reasons, the actual risk for some species may be lower or higher than indicated by this index. Based on species composition of the most common raptor fatalities at other western wind-energy facilities and species composition of raptors observed at the Chokecherry-Sierra Madre Wind Resource Area during the surveys, the majority of the fatalities of diurnal raptors will likely consist of red-tailed hawk, American kestrel, and golden eagle. Based on the seasonal use estimates, it is expected that risk to raptors would be unequal across seasons, with the lowest risk in the winter and the highest risk during the fall. However, the winter use estimates were only based on three surveys that were completed prior to the area becoming inaccessible due to snow. Therefore, winter use as based on these three surveys may not be representative of actual use throughout the entire winter, but is the best data available for predicting winter use of the study area by raptors.

A regression analysis of raptor use and mortality for 13 new-generation wind-energy facilities, where similar methods were used to estimate raptor use and mortality, found that there was a significant correlation between use and mortality ($R^2 = 69.9\%$; Figure 8). Using this regression to predict raptor collision mortality at the CSMWRA, based on an adjusted mean raptor use of 0.46 raptors/plot/20-min survey, yields an estimated fatality rate of 0.04 fatalities/MW/year. A 90% prediction interval around this estimate is zero to 0.30 fatalities/MW/year. The estimate of 0.04 raptor fatalities/MW/year would equate to an estimate of 80 raptor fatalities per year for a 2,000-MW development. These fatalities would be spread over several species, seasons, and between resident and migrant birds. Nevertheless, this level of fatality might result in a measurable adverse effect on the demographics of the local population of golden eagles.

Non-Raptor Use and Exposure Risk

Most bird species in the US are protected by the Migratory Bird Treaty Act (MBTA 1918). Passerines (primarily perching birds) have been the most abundant bird fatality at wind energy facilities outside California (Erickson et al. 2001a, 2002b), often comprising more than 80% of the bird fatalities. Both migrant and resident passerine fatalities have been observed. Given that passerines made up a large proportion of the birds observed during the baseline study, passerines would be expected to make up the largest proportion of fatalities at the CSMWRA. Exposure indices, based on observations within 100 m, indicate that horned lark is the most likely passerine to be exposed to collision from wind turbines at the CSMWRA (Table 6b). Most non-raptors had relatively low exposure indices due to the majority of individuals flying below the likely zone of risk. Due to the low exposure risks at CSMWRA, it is unlikely that non-raptor populations will be adversely affected by direct mortality from the operation of the wind-energy facility.

Wind-energy facilities with year-round use by water dependent species have shown the highest mortality, although the levels of waterfowl/waterbird/shorebird mortality appear insignificant compared to the use of the facilities by these groups. Of 1,033 bird carcasses collected at US wind-energy facilities, waterbirds comprised about 2%, waterfowl comprised about 3%, and shorebirds comprised less than 1% (Erickson et al. 2002b). At the Klondike, Oregon wind-energy facility, only two Canada goose (*Branta canadensis*) fatalities were documented (Johnson et al. 2003) even though 43 groups totaling 4,845 individual Canada geese were observed during pre-construction surveys (Johnson et al. 2002a). The recently constructed Top of Iowa wind-energy facility is located in cropland between three Wildlife Management Areas (WMAs) with historically high bird use, including migrant and resident waterfowl. During a recent study, approximately one million goose-use days and 120,000 duck-use days were recorded in the WMAs during the fall and early winter, and no waterfowl fatalities were documented during concurrent and standardized wind-energy facility fatality studies (Jain 2005). Similar findings were observed at the Buffalo Ridge wind-energy facility in southwestern Minnesota, which is located in an area with relatively high waterfowl/waterbird use and some shorebird use. Snow geese (*Chen caerulescens*), Canada geese, and mallards (*Anas platyrhynchos*) were the most common waterfowl observed. Three of the 55 fatalities observed during the fatality monitoring studies were waterfowl, including two mallards and one blue-winged teal (*Anas discors*). Two American coots (*Fulica americana*), one grebe, and one shorebird fatality were also found (Johnson et al. 2002b). Based on available evidence, waterfowl, waterbirds and shorebirds do not seem especially vulnerable to turbine collisions and significant impacts are not likely.

<u>Sensitive Species Use and Exposure Risk</u>

No federally-listed threatened or endangered species were observed in the CSMWRA during fixed-point bird use surveys (Table 3) or incidentally (Table 8). Thirty-five groups totaling 151 greater sage-grouse were observed (Table 7). This species has been petitioned for listing under the Endangered Species Act (ESA 1973), with a determination expected in February 2010; the greater sage-grouse is also classified by the Wyoming Game and Fish Department (WGFD) as NSS2. Ten other bird species considered sensitive (NSS) by the WGFD were also observed within the CSMWRA. Wyoming sensitive species of most concern are those classified as NSS1 or NSS2. No NSS1 bird species were observed and the only NSS2 species observed was bald eagle (*Haliaeetus leucocephalus*), with a total of six individuals recorded (Table 7). Due to very low use of the CSMWRA by bald eagle, it is unlikely that significant collision mortality would occur. Of those species classified as NSS3 or NSS4, the most frequently observed bird species were Brewer's sparrow (80 individuals), sage thrasher (65), and sage sparrow (59). As with all of the avian surveys, these are tallies that in some cases represent repeated observations of the same individuals. Brewer's sparrows, sage thrashers, and sage sparrows were never observed flying within the turbine ZOR. Therefore, significant risk of collision mortality is not expected for these species. Use of the CSMWRA by the other sensitive species recorded was relatively low and no significant direct impacts are likely to occur.

Indirect Effects

The presence of wind turbines may alter the landscape so that wildlife use patterns are affected, displacing wildlife away from the project facilities and suitable habitat. Some studies from wind-energy facilities in Europe consider displacement effects to have a greater impact on birds than collision mortality (Gill et al. 1996). However, one study conducted in England to assess displacement of wintering farmland birds by wind turbines located in an agricultural landscape found that only common (ring-necked) pheasants (*Phasianus colchicus*) apparently avoided turbines. The other species/bird groups examined, including granivores, red-legged partridge (*Alectoris rufa*), Eurasian skylark (*Alauda arvensis*), and corvids, showed no displacement from wind turbines. In fact, Eurasian skylarks and corvids showed increased use of areas close to turbines, possibly due to increased food resources associated with disturbed areas (Devereux et al. 2008).

The greatest concern with displacement impacts for wind-energy facilities in the US has been where these facilities have been constructed in grassland or other native habitats (Leddy et al. 1999; Mabey and Paul 2007), While Crockford (1992) suggests that disturbance appears to impact feeding, resting, and migrating birds, rather than breeding birds, results from studies at the Stateline wind-energy facility in Washington and Oregon (Erickson et al. 2004) and the Buffalo Ridge wind-energy facility in Minnesota (Johnson et al. 2000a) suggest that breeding birds are also affected by wind-facility operations.

Raptor Displacement

In addition to possible direct effects on raptors within the study area (discussed above), indirect effects caused by disturbance-type impacts, such as construction activity near an active nest or primary foraging area, also have a potential impact on raptor species. Birds displaced from wind-energy facilities might move to areas with fewer disturbances, but with lower quality habitat, with an overall effect of reducing breeding success. Most studies on raptor displacement at wind-energy facilities, however, indicate effects to be negligible (Howell and Noone 1992; Johnson et al. 2000a, 2003; Madders and Whitfield 2006). Notable exceptions to this include a study in Scotland that described territorial golden eagles avoiding the entire wind-energy facility area, except when intercepting non-territorial birds (Walker et al. 2005). A study at the Buffalo Ridge wind-energy facility in Minnesota found evidence of northern harriers avoiding turbines on both a small scale (less than 100 m from turbines) and a larger scale in the year following construction (Johnson et al. 2000a). Two years following construction, however, no large-scale displacement of northern harriers was detected.

The only published report of avoidance of wind turbines by nesting raptors occurred at Buffalo Ridge, Minnesota, where raptor nest density on 101 square miles (mi^2; 262 km^2) of land surrounding a wind-energy facility was 5.94 nests/39 mi^2 (5.94 nests/101 km^2), yet no nests were present in the 12 mi^2 (31 km^2) facility itself, even though habitat was similar (Usgaard et al. 1997). However, this analysis assumes that raptor nests are uniformly distributed across the landscape, an unlikely event, and even though no nests were found, only two nests would be expected for an area 12 mi^2 in size if the nests were distributed uniformly. At a wind-energy facility in eastern Washington, based on extensive monitoring using helicopter flights and ground observations, raptors still nested in the study area at approximately the same levels after construction, and several nests were located within 0.5 miles (0.8 km) of turbines (Erickson et al. 2004). At the Foote Creek Rim Wind-Energy Facility in southern Wyoming, one pair of red-tailed hawks nested within 0.3 miles (0.5 km) of the turbine strings, and seven red-tailed hawk nests, one great horned owl (*Bubo virginianus*) nest, and one golden eagle nest were located within one mile (1.6 km) of the wind-energy facility successfully fledged young (Johnson et al. 2000b). The golden eagle pair successfully nested 0.5 mile from the facility for three different years after it became operational. A Swainson’s hawk also nested within 0.25 mile (0.4 km) of a turbine string at the Klondike I wind-energy facility in Oregon after the facility was operational (Johnson et al. 2003). These observations suggest that there will be limited nesting displacement of raptors at the CSMWRA, although the creation of a buffer surrounding known nests when siting turbines will further reduce any potential disturbance impact, and perhaps reduce the risk of collisions with turbines.

Displacement of Non-Raptor Bird Species

Studies concerning displacement of non-raptor species have concentrated on grassland passerines and waterfowl/waterbirds (Winkelman 1990; Larsen and Madsen 2000; Mabey and Paul 2007). Wind-energy facility construction appears to cause small-scale local displacement of grassland passerines and is likely due to the birds avoiding turbine noise and maintenance activities.

Construction also reduces habitat effectiveness because of the presence of access roads and large gravel pads surrounding turbines (Leddy 1996; Johnson et al. 2000a). Leddy et al. (1999) surveyed bird densities in Conservation Reserve Program (CRP) grasslands at the Buffalo Ridge wind-energy facility in Minnesota, and found mean densities of 10 grassland bird species were four times higher at areas located 180 m (591 feet) from turbines than they were at grasslands nearer turbines. Johnson et al. (2000a) found reduced use of habitat by seven of 22 grassland-breeding birds following construction of the Buffalo Ridge wind energy facility in Minnesota. Results from the Stateline wind-energy facility in Oregon and Washington (Erickson et al. 2004), and the Combine Hills wind-energy facility in Oregon (Young et al. 2005), suggest a relatively small impact of the wind-energy facilities on grassland nesting passerines. Transect surveys conducted prior to and after construction of the wind-energy facilities found that grassland passerine use was significantly reduced within approximately 50 m (164 feet) of turbine strings, but areas further away from turbine strings did not have reduced bird use.

Displacement effects of wind-energy facilities on waterfowl and shorebirds appear to be mixed. Studies from the Netherlands and Denmark suggest that densities of these types of species near turbines were lower compared to densities in similar habitats away from turbines (Winkelman 1990; Pedersen and Poulsen 1991). However, a study from a facility in England, found no effect of wind turbines on populations of cormorant (*Phalacrcorax xarbo*), purple sandpipers (*Calidris maritima*), eiders (*Somateria mollissima*), or gulls, although the cormorants were temporarily displaced during construction (Lawrence et al. 2007). At the Buffalo Ridge wind-energy facility in Minnesota, the abundance of several bird types, including shorebirds and waterfowl, were found to be significantly lower at survey plots with turbines than at reference plots without turbines (Johnson et al. 2000a). The report concluded that the area of reduced use was limited primarily to those areas within 100 m of the turbines. Disturbance tends to be greatest for migrating birds while feeding and resting (Crockford 1992; NRC 2007).

Much debate has occurred recently regarding the potential impacts of wind-energy facilities on prairie grouse, including greater sage-grouse. Under a set of voluntary guidelines, the US Fish and Wildlife Service (USFWS) has taken a precautionary approach and recommends wind turbines be placed at least five miles (eight km) from known prairie grouse lek locations (USFWS 2003). The USFWS argues that because prairie grouse evolved in habitats with little vertical structure, placement of tall man-made structures, such as wind turbines, in occupied prairie grouse habitat may result in a decrease in habitat suitability (USFWS 2004). While the potential exists for wind turbines to displace greater sage-grouse from occupied habitat, well-designed studies examining the potential impacts of wind turbines on prairie grouse are currently lacking. Ongoing research conducted by Kansas State University to examine response of greater prairie-chickens (*Tympanuchus cupido*) to wind-energy development in Kansas, and by WEST, Inc. to examine response of greater sage-grouse to wind-energy development in Wyoming, will help address the potential for impacts to prairie grouse.

CONCLUSIONS AND RECOMMENDATIONS

Based on data collected during this study, raptor and all bird use of the CSMWRA is generally similar to most WRAs evaluated throughout the western and midwestern US using similar methods. Based on the results of the studies to date, bird mortality at the CSMWRA would likely be similar or lower than that documented at other wind-energy facilities located in the western and Midwestern US, where bird collision mortality has been relatively low.

Currently, few published studies are available from the western US that compare bird use to bird mortality rates. Based on research conducted at wind-energy facilities throughout the US, raptor use at the CSMWRA is generally lower than levels recorded at other wind-energy facilities. Raptor fatality rates are expected to be within the range of fatality rates observed at other facilities where raptor use levels are lower. To date, no relationships have been observed between overall use by other bird types, and fatality rates of those bird types at wind-energy facilities. However, the flight characteristics and foraging habits of some species may result in increased exposure for these species at the CSMWRA. The surveys conducted for the proposed CSMWRA also do not address the impacts of the proposed facility to nocturnal migrants, such as passerines. To date, overall fatality rates for birds (including nocturnal migrants) at wind-energy facilities have been relatively low and consistent in the West. As more research is conducted at facilities in the West, more information regarding the potential direct impacts of wind-energy facilities to bird species will be obtained.

The proposed wind-energy facility is comprised of native habitats such as scrub-shrub and grasslands (Table 1, Figure 3). Several species considered to be sensitive were observed breeding within these habitats at the CSMWRA, and some potential exists for wind turbines to displace breeding birds. Research concerning displacement impacts to passerines, waterfowl, and waterbirds associated with wind-energy facilities is limited, but some studies show the potential for small scale (200 m [656 ft] or less) displacement, while impacts to densities of birds at larger scales have not been shown.

REFERENCES

Anderson, R., M. Morrison, K. Sinclair, and D. Strickland. 1999. Studying Wind Energy/Bird Interactions: A Guidance Document. Metrics and Methods for Determining or Monitoring Potential Impacts on Birds at Existing and Proposed Wind Energy Sites. Prepared for the Avian Subcommittee and National Wind Coordinating Committee (NWCC). December 1999. National Wind Coordinating Committee/RESOLVE. Washington, D.C. 87 pp. http://www.nationalwind.org/publications/wildlife/avian99/Avian_booklet.pdf

Cooper, B.A., R.J. Blaha, T.J. Mabee, and J.H. Plissner. 2004. A Radar Study of Nocturnal Bird Migration at the Proposed Cotterel Mountain Wind Energy Facility, Idaho, Fall 2003. Technical report prepared for Windland, Inc., Boise, Idaho, by ABR, Inc., Forest Grove, Oregon. January 2004.

Crockford, N.J. 1992. A Review of the Possible Impacts of Wind Farms on Birds and Other Wildlife. Joint Nature Conservancy Committee (JNCC) Report No. 27. JNCC. Peterborough, United Kingdom. 60 pp.

Demastes, J.W. and J.M. Trainer. 2000. Avian Risk, Fatality, and Disturbance at the IDWGP Wind Farm, Algona, Iowa. Final Report Submitted by the University of Northern Iowa, Cedar Falls, Iowa. 21 pp.

Devereux, C.L., M.J.H. Denny, and M.J. Whittingham. 2008. Minimal Effects of Wind Turbines on the Distribution of Wintering Farmland Birds. Journal of Applied Ecology Windfarms and Farmland Birds: 1365-2664.

Endangered Species Act (ESA). 1973. 16 United States Code § 1531-1544. December 28, 1973.

Environmental Conservation Online System (ECOS). 2009. US Fish and Wildlife Service (USFWS) Threatened and Endangered Species System (TESS). USFWS Endangered Species Program Homepage: http://www.fws.gov/endangered/ ECOS: http://ecos.fws.gov/tess_public

Erickson, W.P., D.P. Young, Jr., G. Johnson, J. Jeffrey, K. Bay, R. Good, and H. Sawyer. 2003a. Wildlife Baseline Study for the Wild Horse Wind Project. Summary of Results from 2002-2003 Wildlife Surveys May 10, 2002- May 22, 2003. Draft report prepared for Zilkha Renewable Energy, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. November 2003.

Erickson, W.P., J. Jeffrey, D.P. Young, Jr., K. Bay, R. Good, K. Sernka, and K. Kronner. 2003b. Wildlife Baseline Study for the Kittitas Valley Wind Project: Summary of Results from 2002 Wildlife Surveys. Final Report February 2002– November 2002. Prepared for Zilkha Renewable Energy, Portland, Oregon, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and Northwest Wildlife Consultants, Inc. (NWC), Pendleton, Oregon. January 2003.

Erickson, W.P., J. Jeffrey, K. Kronner, and K. Bay. 2004. Stateline Wind Project Wildlife Monitoring Final Report: July 2001 - December 2003. Technical report for and peer-reviewed by FPL Energy, Stateline Technical Advisory Committee, and the Oregon Energy Facility Siting Council, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and Walla Walla, Washington, and Northwest Wildlife Consultants (NWC), Pendleton, Oregon. December 2004. http://www.west-inc.com

Erickson, W.P., J. Jeffrey, and V.K. Poulton. 2008. Avian and Bat Monitoring: Year 1 Report. Puget Sound Energy Wild Horse Wind Project, Kittitas County, Washington. Prepared for Puget Sound Energy, Ellensburg, Washington, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. January 2008.

Erickson, W.P., G.D. Johnson, K. Bay, and K. Kronner. 2002a. Ecological Baseline Study for the Zintel Canyon Wind Project. Final Report April 2001 – June 2002. Technical report prepared for Energy Northwest. Prepared for Energy Northwest by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and Northwest Wildlife Consultants, Inc. (NWC), Pendleton, Oregon. June 2002.

Erickson, W.P., G.D. Johnson, D.P. Young, Jr., D. Strickland, R. Good, M. Bourassa, K. Bay, and K. Sernka. 2002b. Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments. Technical report prepared for Bonneville Power Administration, Portland, Oregon by WEST, Inc., Cheyenne, Wyoming. December 2002. http://www.bpa.gov/Power/pgc/wind/Avian_and_Bat_Study_12-2002.pdf

Erickson, W.P., G.D. Johnson, M.D. Strickland, D.P. Young, Jr., K.J. Sernka, and R.E. Good. 2001a. Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Bird Collision Mortality in the United States. National Wind Coordinating Committee (NWCC) Publication and Resource Document. Prepared for the NWCC by WEST, Inc., Cheyenne, Wyoming. August 2001. http://www.nationalwind.org/publications/default.htm and http://www.west-inc.com

Erickson, W.P., E. Lack, M. Bourassa, K. Sernka, and K. Kronner. 2001b. Wildlife Baseline Study for the Nine Canyon Wind Project, Final Report May 2000-October 2001 Technical report prepared for Energy Northwest, Richland, Washington.

Gill, J.P., M. Townsley, and G.P. Mudge. 1996. Review of the Impacts of Wind Farms and Other Aerial Structures Upon Birds. Scottish Natural Heritage Review No. 21. Scottish Natural Heritage. Battleby, United Kingdom.

Howell, J.A. and J. Noone. 1992. Examination of Avian Use and Mortality at a U.S. Windpower Wind Energy Development Site, Montezuma Hills, Solano County, California. Final Report to Solano County Department of Environmental Management, Fairfield, California. 41pp.

Jain, A. 2005. Bird and Bat Behavior and Mortality at a Northern Iowa Windfarm. M.S. Thesis. Iowa State University, Ames, Iowa.

Jeffrey, J.D., W.P. Erickson, K.J. Bay, V.K. Poulton, W.L. Tidhar, and J.E. Baker. 2008. Wildlife Baseline Studies for the Golden Hills Wind Resource Area, Sherman County, Oregon. Final Report May 2006 – October 2007. Prepared for BP Alternative Energy North America Inc., Houston, Texas, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming.

Johnson, G.D. 2004. Analysis of Potential Wildlife and Habitat Impacts from the Klondike II Project, Sherman County, Oregon. Technical report prepared by WEST, Inc., for CH2M HILL and PPM Energy.

Johnson, G.D. and W.P. Erickson. 2004. Analysis of Potential Wildlife/Wind Plant Interactions, Bighorn Site, Klickitat County, Washington. Prepared for CH2M HILL, Portland, Oregon by WEST, Inc., Cheyenne, Wyoming. August 2004.

Johnson, G.D., W.P. Erickson, K. Bay, and K. Kronner. 2002a. Baseline Ecological Studies for the Klondike Wind Project, Sherman County, Oregon. Final report prepared for Northwestern Wind Power, Goldendale, Washington, by Western EcoSystems Technology, Inc. (WEST) Cheyenne, Wyoming, and Northwest Wildlife Consultants, Inc. (NWC), Pendleton, Oregon. May 29, 2002.

Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, and D.A. Shepherd. 2000a. Avian Monitoring Studies at the Buffalo Ridge Wind Resource Area, Minnesota: Results of a 4-Year Study. Final report prepared for Northern States Power Company, Minneapolis, Minnesota, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. September 22, 2000. 212 pp. http://www.west-inc.com

Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, D.A. Shepherd, and S.A. Sarappo. 2002b. Collision Mortality of Local and Migrant Birds at a Large-Scale Wind-Power Development on Buffalo Ridge, Minnesota. Wildlife Society Bulletin 30(3): 879-887.

Johnson, G.D., W.P. Erickson, and J. White. 2003. Avian and Bat Mortality During the First Year of Operation at the Klondike Phase I Wind Project, Sherman County, Oregon. March 2003. Technical report prepared for Northwestern Wind Power, Goldendale, Washington, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. http://www.west-inc.com

Johnson, G.D., J. Jeffrey, J. Baker, and K. Bay. 2007. Baseline Avian Studies for the Windy Flats Wind Energy Project, Klickitat County, Washington. Prepared for Windy Point Partners, LLC., by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. May 29, 2007.

Johnson, G.D., D.P. Young, W.P. Erickson, C.E. Derby, M.D. Strickland, and R.E. Good. 2000b. Wildlife Monitoring Studies, SeaWest Windpower Plant, Carbon County, Wyoming, 1995-1999. Final report prepared for SeaWest Energy Corporation, San Diego, California, and the Bureau of Land Management, Rawlins, Wyoming, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. August 9, 2000. http://www.west-inc.com and http://www.west-inc.com/reports/fcr_final_baseline.pdf

Kerlinger, P. 1997. A Study of Avian Fatalities at the Green Mountain Power Corporation's Searsburg, Vermont Windpower Facility - 1997. Prepared for Vermont Department of Public Service, Green Mountain Power Corporation, National Renewable Energy Laboratory and Vermont Environmental Research Associates. 12 pp.

Kerlinger, P. 2005. Summary of Bird Studies and Collision Rates at Wind Power Projects. Rebuttal testimony of Paul Kerlinger for the East Haven Windfarm. February 9, 2005. http://easthavenwindfarm.com/filing/feb/ehwf-pk-reb1.pdf

Kerlinger, P., L. Culp, and R. Curry. 2005. Post-Construction Avian Monitoring Study for the High Winds Wind Power Project, Solano County, California. Year One Report. Prepared for High Winds, LLC and FPL Energy.

Kerlinger, P., R. Curry, L. Culp, A. Jain, C. Wilkerson, B. Fischer, and A. Hasch. 2006. Post-Construction Avian and Bat Fatality Monitoring for the High Winds Wind Power Project, Solano County, California: Two Year Report. Prepared for High Winds LLC, FPL Energy by Curry and Kerlinger, LLC. April 2006.

Kronner, K., B. Gritski, and S. Downes. 2008. Big Horn Wind Power Project Wildlife Fatality Monitoring Study: 2006−2007. Final report prepared for PPM Energy and the Big Horn Wind Project Technical Advisory Committee by Northwest Wildlife Consultants, Inc. (NWC), Mid-Columbia Field Office, Goldendale, Washington. June 1, 2008.

Larsen, J.K. and J. Madsen. 2000. Effects of Wind Turbines and Other Physical Elements on Field Utilization by Pink-Footed Geese (*Anser brachyrhynchus*): A Landscape Perspective. Landscape Ecology 15: 755-764.

Lawrence, E.S., S. Painter, and B. Little. 2007. Responses of Birds to the Windfarm at Blyth Harbour, Northumberland, UK. *In*: Birds and Windfarms: Risk Assessment and Mitigation. M. J. de Lucas, G. F. E. Janss, and M. Ferrer, eds. Quercus, Madrid, Spain. Pp. 47-69.

Leddy, K.L. 1996. Effects of Wind Turbines on Nongame Birds in Conservation Reserve Program Grasslands in Southwestern Minnesota. M.S. Thesis. South Dakota State University, Brookings. 61 pp.

Leddy, K.L., K.F. Higgins, and D.E. Naugle. 1999. Effects of Wind Turbines on Upland Nesting Birds in Conservation Reserve Program Grasslands. Wilson Bulletin 111(1): 100-104.

Mabey, S. and E. Paul. 2007. Impact of Wind Energy and Related Human Activities on Grassland and Shrub-Steppe Birds. A Critical Literature Review Prepared for the National Wind Coordinating Committee (NWCC) and The Ornithological Council. 183 pp. http://www.nationalwind.org/pdf/IMPACTOFWINDENERGYANDRELATEDHUMANACTIVITIESONGRASSLANDANDSHRUB-STEPPEBIRDS.pdf

Madders, M. and D.P. Whitfield. 2006. Upland Raptors and the Assessment of Wind Farm Impacts. Ibis 148: 43-56.

Migratory Bird Treaty Act (MBTA). 1918. 16 United States Code § 703-712. July 13, 1918.

National Research Council (NRC). 2007. Environmental Impacts of Wind-Energy Projects. National Academies Press. Washington, D.C. www.nap.edu

National Wind Coordinating Committee (NWCC). 2004. Wind Turbine Interactions with Birds and Bats: A Summary of Research Results and Remaining Questions. Fact Sheet. 2nd Edition. November 2004. http://www.nationalwind.org/publications/default.htm

Nicholson, C.P. 2003. Buffalo Mountain Windfarm Bird and Bat Mortality Monitoring Report: October 2001 - September 2002. Tennessee Valley Authority, Knoxville, Tennessee. February 2003.

Northwest Wildlife Consultants, Inc. (NWC) and Western Ecosystems Technology, Inc. (WEST). 2004. Ecological Baseline Studies for the Roosevelt Wind Project, Klickitat County, Washington. Final Report. Prepared by NWC, Pendleton, Oregon, and WEST, Inc., Cheyenne, Wyoming. September 2004.

Northwest Wildlife Consultants, Inc. (NWC) and Western Ecosystems Technology, Inc. (WEST). 2005a. Ecological Baseline Studies and Wildlife Impact Assessment for the White Creek Wind Power Project, Klickitat County, Washington. Prepared for Last Mile Electric Cooperative, Goldendale, Washington, by Northwest Wildlife Consultants, Inc., Goldendale, Washington, and Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. January 12, 2005.

Northwest Wildlife Consultants, Inc. (NWC) and Western Ecosystems Technology, Inc. (WEST). 2005b. Wildlife Baseline Study for the Leaning Juniper Wind Power Project, Gilliam County, Oregon. Prepared for PPM Energy, Portland, Oregon and CH2M HILL, Portland, Oregon by NWC, Pendleton, Oregon, and WEST, Inc., Cheyenne, Wyoming. November 3, 2005.

Northwest Wildlife Consultants, Inc. (NWC) and Western EcoSystems Technology, Inc. (WEST). 2007. Avian and Bat Monitoring Report for the Klondike II Wind Power Project. Sherman County, Oregon. Prepared for PPM Energy, Portland, Oregon. Managed and conducted by NWC, Pendleton, Oregon. Analysis conducted by WEST, Cheyenne, Wyoming. July 17, 2007.

Orloff, S. and A. Flannery. 1992. Wind Turbine Effects on Avian Activity, Habitat Use, and Mortality in Altamont Pass and Solano County Wind Resource Areas, 1989-1991. Final Report P700-92-001 to Alameda, Contra Costa, and Solano Counties, and the California Energy Commission, Sacramento, California, by Biosystems Analysis, Inc., Tiburon, California. March 1992.

Pedersen, M.B. and E. Poulsen. 1991. Impact of a 90m/2mw Wind Turbine on Birds - Avian Responses to the Implementation of the Tjaereborg Wind Turbine at the Danish Wadden Sea. Dansek Vildundersogelser 47: 1-44. Miljoministeriet & Danmarks Miljoundersogelser.

Reynolds, R.T., J.M. Scott, and R.A. Nussbaum. 1980. A Variable Circular-Plot Method for Estimating Bird Numbers. Condor 82(3): 309-313.

URS Corporation, Western EcoSystems Technology, Inc. (WEST), and Northwest Wildlife Consultants, Inc. (NWC). 2001. Avian Baseline Study for the Stateline Project. Prepared for FPL Energy Vansycle, LLC, Juno Beach, Florida.

US Fish and Wildlife Service (USFWS). 2003. Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines. May 13, 2003. USFWS. Washington, D.C. http://www.fws.gov/habitatconservation/wind.pdf

US Fish and Wildlife Service (USFWS). 2004. Prairie Grouse Leks and Wind Turbines: US Fish and Wildlife Service Justification for a 5-Mile Buffer from Leks; Additional Grassland Songbird Recommendations. An unpublished briefing paper.

US Geological Survey (USGS) National Land Cover Database (NLCD). 2001. Land Use/Land Cover NLCD Data. USGS Headquarters, USGS National Center. Reston, Virginia.

Usgaard, R.E., D.E. Naugle, R.G. Osborn, and K.F. Higgins. 1997. Effects of Wind Turbines on Nesting Raptors at Buffalo Ridge in Southwestern Minnesota. Proceedings of the South Dakota Academy of Science 76: 113-117.

Walker, D., M. McGrady, A. McCluskie, M. Madders, and D.R.A. McLeod. 2005. Resident Golden Eagle Ranging Behaviour Before and After Construction of a Windfarm in Argyll. Scottish Birds 25: 24-40. http://www.natural-research.org/projects/documents/SB25-EAGLESDOC.pdf

Western Ecosystems Technology, Inc. (WEST). 2005a. Ecological Baseline Study at the Elkhorn Wind Power Project. Exhibit A. Final report prepared for Zilkha Renewable Energy, LLC., Portland, Oregon, by WEST, Cheyenne, Wyoming. June 2005.

Western EcoSystems Technology, Inc. (WEST). 2005b. Ecological Baseline Study for the Proposed Reardon Wind Project, Lincoln County, Washington. Draft Final Report. Prepared for Energy Northwest, Richland, Washington, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. June 2005.

Western EcoSystems Technology, Inc. (WEST). 2005c. Wildlife and Habitat Baseline Study for the Proposed Biglow Canyon Wind Power Project, Sherman County, Oregon. March 2004 - August 2005. Prepared for Orion Energy LLC., Oakland, California. October, 2005. WEST. Cheyenne, Wyoming.

Western EcoSystems Technology, Inc. (WEST). 2006a. Diablo Winds Wildlife Monitoring Progress Report, March 2005 - February 2006. Technical report submitted to FPL Energy and Alameda County California. WEST. Cheyenne, Wyoming.

Western EcoSystems Technology, Inc. (WEST). 2006b. Wildlife Baseline Study for the North Valley County Wind Project: Summary of Results from 2006 Wildlife Surveys. Prepared for POWER Engineers, Boise, Idaho, and Wind Hunter, LLC., Grapevine, Texas. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. December 8, 2006.

Western EcoSystems Technology, Inc. (WEST). 2007. Wildlife and Habitat Baseline Study for the Vantage Wind Power Project, Kittitas County, Washington. Draft report prepared for Invenergy by Western EcoSystems Technology, Inc. (WEST), Cheyenne Wyoming and Walla Walla, Washington. June 2007.

Western EcoSystems Technology, Inc. (WEST) and Colorado Plateau Research Station (CPRS). 2006. Avian Studies for the Proposed Sunshine Wind Park, Coconino County, Arizona. Prepared for Sunshine Arizona Wind Energy, LLC., Flagstaff, Arizona, by WEST, Cheyenne, Wyoming, and the CPRS, Northern Arizona University, Flagstaff, Arizona. May 2006.

Western EcoSystems Technology, Inc. (WEST), EDAW, Inc., and Bloom Biological, Inc. 2007. Baseline Avian Use and Risk Assessment for the Homestead Wind Energy Project, Kern County, California. 2005 – 2006. Prepared for Horizon Wind Energy by Western EcoSystems Technology, Inc. (WEST), EDAW, Inc., San Diego, California, and Bloom Biological, Inc., Santa Anna, California. April 19, 2007.

Whitfield, D.P. and M. Madders. 2006. A Review of the Impacts of Wind Farms on Hen Harriers *Circus cyaneus* and an Estimation of Collision Avoidance Rates. Natural Research Information Note 1 (revised). Natural Research Ltd., Banchory, United Kingdom.

Winkelman, E. 1990. Impact of the Wind Park near Urk, Netherlands, on Birds: Bird Collision Victims and Disturbance of Wintering Fowl. International Ornithological Congress 20: 402-403.

Woodward-Clyde International-Americas, (WCIA) and Western EcoSystems Technology, Inc. (WEST). 1997. Avian Baseline Study for the Vansycle Ridge Project - Vansycle Ridge, Oregon and Wildlife Mortality Studies, Vansycle Wind Project, Washington. Prepared for Esi Vansycle Partners, L.P., North Palm Beach, Florida.

Wyoming Game and Fish Department (WGFD). 2005. Avian Species of Special Concern in Wyoming. WGFD Nongame Species of Special Concern (SSC)-Native Status Species (NSS). January 2005. WGFD. Cheyenne, Wyoming. http://gf.state.wy.us/wildlife/nongame/SpeciesofSpecialConcern/index.asp

Wyoming Natural Diversity Database (WYNND). 2009. Codes and Definitions. Last updated January 22, 2009. Homepage: http://uwadmnweb.uwyo.edu/wyndd/ Codes and Definitions: http://uwadmnweb.uwyo.edu/wyndd/infoprint.asp?p=2656

Young, D.P. Jr., W.P. Erickson, K. Bay, J. Jeffrey, E.G. Lack, R.E. Good, and H.H. Sawyer. 2003a. Baseline Avian Studies for the Proposed Hopkins Ridge Wind Project, Columbia County, Washington. Final Report, March 2002 - March 2003. Prepared for RES North America, LLC., Portland, Oregon, by Western EcoSystems Technology, Inc.(WEST), Cheyenne, Wyoming. April 30, 2003.

Young, D.P. Jr., W.P. Erickson, K. Bay, J. Jeffrey, E.G. Lack, and H.H. Sawyer. 2003b. Baseline Avian Studies for the Proposed Desert Claim Wind Power Project, Kittitas County, Washington. Final Report. Prepared for Desert Claim Wind Power, LLC, Ellensburg, Washington, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. July 2003.

Young, D.P. Jr., W.P. Erickson, J. Jeffrey, K. Bay, and M. Bourassa. 2005. Eurus Combine Hills Turbine Ranch. Phase 1 Post Construction Wildlife Monitoring Final Report February 2004 February 2005. Technical report for Eurus Energy America Corporation and the Combine Hills Technical Advisory Committee, Umatilla County, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and Northwest Wildlife Consultants, Inc. (NWC), Pendleton, Oregon.

Young, D.P. Jr., W.P. Erickson, J. Jeffrey, K. Bay, R.E. Good, and E.G. Lack. 2003c. Avian and Sensitive Species Baseline Study Plan and Final Report. Eurus Combine Hills Turbine Ranch, Umatilla County, Oregon. Technical report prepared for Eurus Energy America Corporation, San Diego, California and Aeropower Services, Inc., Portland, Oregon, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. March 10, 2003.

Young, D.P. Jr., W.P. Erickson, J. Jeffrey, and V.K. Poulton. 2007a. Puget Sound Energy, Hopkins Ridge Wind Project Phase 1, Post-Construction Avian and Bat Monitoring, First Annual Report, January - December 2006. Technical report prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, for Puget Sound Energy.

Young, D.P. Jr., G.D. Johnson, V.K. Poulton, and K. Bay. 2007b. Ecological Baseline Studies for the Hatchet Ridge Wind Energy Project, Shasta County, California. Prepared for Hatchet Ridge Wind, LLC, Portland, Oregon by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. August 31, 2007. http://www.co.shasta.ca.us/Departments/Resourcemgmt/drm/Hatchet%20Ridge/DEIR/App_C-1.pdf

Young, D.P. Jr., V.K. Poulton, and K. Bay. 2007c. Ecological Baseline Studies Report. Proposed Dry Lake Wind Project, Navajo County, Arizona. Prepared for PPM Energy, Portland, Oregon, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. July 1, 2007.

Table 1. The land cover types, coverage, and composition within the Chokecherry-Sierra Madre Wind Resource Area.

Habitat	Acres	% Composition
Scrub-Shrub	171,092.00	76.9
Grassland	42,948.20	19.3
Evergreen Forest	3,067.66	1.4
Deciduous Forest	1,607.75	0.7
Emergent Wetlands	1,222.09	0.6
Barren	948.87	0.4
Woody Wetlands	386.59	0.2
Developed, Open Space	385.12	0.2
Open Water	383.29	0.2
Pasture/Hay	332.81	0.2
Developed, Low Intensity	154.4	0.1
Mixed Forest	44.33	<0.1
Developed, Medium Intensity	25.25	<0.1
Developed, High Intensity	4.88	<0.1
Total	**222,603.24**	**100**

Data from the National Landcover Database (USGS NLCD 2001).

Table 2. Summary of species richness (species/plot[a]/20-min survey), and sample size by season and overall during the fixed-point bird use surveys at the Chokecherry-Sierra Madre Wind Resource Area, June 26, 2008 – June 16, 2009.

Season	Number of Visits	# Surveys Conducted	# Unique Species	Species Richness	
				Large Birds	Small Birds
Summer	9	142	32	0.60	2.05
Fall	9	142	25	0.81	0.43
Winter	3	31	6	0.40	0.02
Spring	10	118	36	0.61	1.62
Overall	**31**	**433**	**50**	**0.63**	**1.19**

[a] 800-m radius for large birds and 100-m radius for small birds.

Table 3. Total number of individuals and groups for each bird type and species[a], by season and overall, during the fixed-point bird use surveys at the Chokecherry-Sierra Madre Wind Resource Area[a] , June 26, 2008 – June 16, 2009.

		Summer		Fall		Winter		Spring		Total	
Species/Type	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Waterbirds		**0**	**0**	**0**	**0**	**0**	**0**	**2**	**16**	**2**	**16**
American white pelican	*Pelecanus erythrorhyncos*	0	0	0	0	0	0	1	14	1	14
great blue heron	*Ardea herodias*	0	0	0	0	0	0	1	2	1	2
Shorebirds		**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**1**
killdeer	*Charadrius vociferus*	0	0	0	0	0	0	1	1	1	1
Raptors		**77**	**86**	**80**	**88**	**3**	**3**	**51**	**53**	**211**	**230**
Accipiters		*0*	*0*	*5*	*5*	*0*	*0*	*1*	*1*	*6*	*6*
Cooper's hawk	*Accipiter cooperii*	0	0	2	2	0	0	0	0	2	2
sharp-shinned hawk	*Accipter striatus*	0	0	1	1	0	0	1	1	2	2
unidentified accipiter		0	0	2	2	0	0	0	0	2	2
Buteos		*23*	*26*	*20*	*21*	*1*	*1*	*11*	*12*	*55*	*60*
ferruginous hawk	*Buteo regalis*	1	1	2	2	1	1	1	1	5	5
red-tailed hawk	*Buteo jamaicensis*	14	16	6	6	0	0	7	8	27	30
rough-legged hawk	*Buteo lagopus*	0	0	9	9	0	0	2	2	11	11
Swainson's hawk	*Buteo swainsoni*	7	8	0	0	0	0	1	1	8	9
unidentified buteo		1	1	3	4	0	0	0	0	4	5
Northern Harrier		*15*	*15*	*19*	*22*	*0*	*0*	*5*	*5*	*39*	*42*
northern harrier	*Circus cyaneus*	15	15	19	22	0	0	5	5	39	42
Eagles		*17*	*19*	*33*	*37*	*2*	*2*	*13*	*14*	*65*	*72*
bald eagle	*Haliaeetus leucocephalus*	0	0	0	0	0	0	2	2	2	2
golden eagle	*Aquila chrysaetos*	17	19	32	36	2	2	11	12	62	69
unidentified eagle		0	0	1	1	0	0	0	0	1	1
Falcons		*22*	*26*	*3*	*3*	*0*	*0*	*20*	*20*	*45*	*49*
American kestrel	*Falco sparverius*	21	25	2	2	0	0	16	16	39	43
prairie falcon	*Falco mexicanus*	1	1	1	1	0	0	4	4	6	6
Other Raptors		*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*1*	*1*
osprey	*Pandion haliaetus*	0	0	0	0	0	0	1	1	1	1

Table 3. Total number of individuals and groups for each bird type and species[a], by season and overall, during the fixed-point bird use surveys at the Chokecherry-Sierra Madre Wind Resource Area[a] , June 26, 2008 – June 16, 2009.

		Summer		Fall		Winter		Spring		Total	
Species/Type	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Vultures		**0**	**0**	**1**	**1**	**0**	**0**	**1**	**1**	**2**	**2**
turkey vulture	*Cathartes aura*	0	0	1	1	0	0	1	1	2	2
Upland Gamebirds		**0**	**0**	**1**	**2**	**3**	**24**	**2**	**2**	**6**	**28**
greater sage grouse	*Centrocercus urophasianus*	0	0	1	2	3	24	2	2	6	28
Doves/Pigeons		**8**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**10**
mourning dove	*Zenaida macroura*	8	10	0	0	0	0	0	0	8	10
Large Corvids		**14**	**65**	**62**	**105**	**9**	**15**	**30**	**60**	**115**	**245**
American crow	*Corvus brachyrhynchos*	4	49	0	0	0	0	2	16	6	65
black-billed magpie	*Pica pica*	0	0	2	3	2	2	0	0	4	5
common raven	*Corvus corax*	10	16	60	102	7	13	28	44	105	175
Passerines		**467**	**600**	**95**	**255**	**2**	**4**	**379**	**588**	**943**	**1,447**
American robin	*Turdus migratorius*	1	1	0	0	0	0	0	0	1	1
barn swallow	*Hirundo rustica*	0	0	0	0	0	0	2	2	2	2
Brewer's blackbird	*Euphagus cyanocephalus*	8	9	0	0	0	0	2	26	10	35
Brewer's sparrow	*Spizella breweri*	51	57	5	5	0	0	14	18	70	80
Clark's nutcracker	*Nucifraga columbiana*	1	1	0	0	0	0	0	0	1	1
cliff swallow	*Petrochelidon pyrrhonota*	0	0	0	0	0	0	1	1	1	1
grasshopper sparrow	*Ammodramus savannarum*	0	0	0	0	0	0	4	4	4	4
green-tailed towhee	*Pipilo chlorurus*	1	1	0	0	0	0	0	0	1	1
horned lark	*Eremophila alpestris*	177	264	48	172	1	1	224	368	450	805
house wren	*Troglodytes aedon*	8	13	3	3	0	0	0	0	11	16
lark bunting	*Calamospiza melanocorys*	3	3	0	0	0	0	1	12	4	15
lark sparrow	*Chondestes grammacus*	0	0	2	2	0	0	0	0	2	2
Lincoln's sparrow	*Melospiza lincolnii*	0	0	0	0	0	0	2	2	2	2
loggerhead shrike	*Lanius ludovicianus*	2	2	0	0	0	0	2	2	4	4
mountain bluebird	*Sialia currucoides*	3	4	4	16	0	0	7	14	14	34
rock wren	*Salpinctes obsoletus*	7	7	0	0	0	0	4	6	11	13
sage sparrow	*Amphispiza belli*	7	7	0	0	0	0	48	52	55	59

Table 3. Total number of individuals and groups for each bird type and species[a], by season and overall, during the fixed-point bird use surveys at the Chokecherry-Sierra Madre Wind Resource Area[a] , June 26, 2008 – June 16, 2009.

		Summer		**Fall**		**Winter**		**Spring**		**Total**	
Species/Type	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
sage thrasher	*Oreoscoptes montanus*	52	55	2	2	0	0	6	8	60	65
Say's phoebe	*Sayornis saya*	1	1	0	0	0	0	1	1	2	2
song sparrow	*Melospiza melodia*	0	0	2	3	0	0	0	0	2	3
Townsend's solitaire	*Myadestes townsendi*	0	0	1	1	0	0	0	0	1	1
tree swallow	*Tachycineta bicolor*	3	3	0	0	0	0	0	0	3	3
unidentified blackbird		0	0	1	4	0	0	0	0	1	4
unidentified passerine		28	43	16	30	1	3	1	6	46	82
unidentified sparrow		9	9	3	5	0	0	0	0	12	14
unidentified swallow		4	4	0	0	0	0	0	0	4	4
unidentified wren		2	2	0	0	0	0	0	0	2	2
vesper sparrow	*Pooecetes gramineus*	65	79	3	4	0	0	32	38	100	121
western kingbird	*Tyrannus verticalis*	1	1	1	1	0	0	0	0	2	2
western meadowlark	*Sturnella neglecta*	33	34	4	7	0	0	28	28	65	69
Other Birds		**10**	**22**	**0**	**0**	**0**	**0**	**3**	**4**	**13**	**26**
common nighthawk	*Chordeiles minor*	5	6	0	0	0	0	0	0	5	6
northern flicker	*Colaptes auratus*	1	1	0	0	0	0	1	1	2	2
unidentified hummingbird		2	2	0	0	0	0	0	0	2	2
white-throated swift	*Aeronautes saxatalis*	2	13	0	0	0	0	2	3	4	16
Overall		**576**	**783**	**239**	**451**	**17**	**46**	**469**	**725**	**1,301**	**2,005**

[a] Regardless of distance from observer.

Table 4a. Mean bird use (number of birds/800-plot/20-min survey), percent of total composition (%), and frequency of occurrence (%) for each large bird type and species by season during the fixed-point bird use surveys at the Chokecherry-Sierra Madre Wind Resource Area, June 26, 2008 – June 16, 2009.

	Use				% Composition				% Frequency			
Species/Type	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**
Waterbirds	**0**	**0**	**0**	**0.10**	**0**	**0**	**0**	**10.5**	**0**	**0**	**0**	**1.4**
American white pelican	0	0	0	0.09	0	0	0	9.0	0	0	0	0.6
great blue heron	0	0	0	0.02	0	0	0	1.6	0	0	0	0.8
Shorebirds	**0**	**0**	**0**	**0.01**	**0**	**0**	**0**	**0.8**	**0**	**0**	**0**	**0.8**
killdeer	0	0	0	0.01	0	0	0	0.8	0	0	0	0.8
Raptors	**0.58**	**0.62**	**0.17**	**0.35**	**53.1**	**45.2**	**27.9**	**36.1**	**37.2**	**36.8**	**16.7**	**28.6**
Accipiters	*0*	*0.03*	*0*	*0.01*	*0*	*2.3*	*0*	*0.6*	*0*	*2.4*	*0*	*0.6*
Cooper's hawk	0	0.01	0	0	0	0.8	0	0	0	1.0	0	0
sharp-shinned hawk	0	0.01	0	0.01	0	0.5	0	0.6	0	0.7	0	0.6
unidentified accipiter	0	0.01	0	0	0	1.0	0	0	0	1.4	0	0
Buteos	*0.18*	*0.15*	*0.03*	*0.08*	*16.8*	*11.1*	*4.7*	*8.0*	*14.1*	*8.7*	*2.8*	*7.3*
ferruginous hawk	0.01	0.01	0.03	0.01	0.7	1.0	4.7	1.5	0.7	1.4	2.8	1.4
red-tailed hawk	0.11	0.04	0	0.04	10.3	3.1	0	3.9	8.4	2.9	0	3.8
rough-legged hawk	0	0.07	0	0.02	0	4.8	0	2.0	0	5.1	0	2.0
Swainson's hawk	0.06	0	0	0.01	5.2	0	0	0.6	4.9	0	0	0.6
unidentified buteo	0.01	0.03	0	0	0.6	2.2	0	0	0.7	2.2	0	0
Northern Harrier	*0.10*	*0.16*	*0*	*0.03*	*9.0*	*11.5*	*0*	*3.3*	*8.3*	*10.1*	*0*	*2.4*
northern harrier	0.10	0.16	0	0.03	9.0	11.5	0	3.3	8.3	10.1	0	2.4
Eagles	*0.11*	*0.26*	*0.14*	*0.08*	*10.4*	*19.1*	*23.3*	*8.3*	*9.6*	*20.3*	*13.9*	*6.1*
bald eagle	0	0	0	0.01	0	0	0	1.3	0	0	0	1.3
golden eagle	0.11	0.25	0.14	0.07	10.4	18.5	23.3	7.0	9.6	19.6	13.9	5.4
unidentified eagle	0	0.01	0	0	0	0.5	0	0	0	0.7	0	0
Falcons	*0.18*	*0.02*	*0*	*0.15*	*16.8*	*1.3*	*0*	*15.2*	*14.0*	*1.8*	*0*	*13.4*
American kestrel	0.18	0.01	0	0.12	16.2	0.8	0	12.1	13.3	1.1	0	11.1
prairie falcon	0.01	0.01	0	0.03	0.6	0.5	0	3.1	0.7	0.7	0	3.0
Other Raptors	*0*	*0*	*0*	*0.01*	*0*	*0*	*0*	*0.6*	*0*	*0*	*0*	*0.6*
osprey	0	0	0	0.01	0	0	0	0.6	0	0	0	0.6

Table 4a. Mean bird use (number of birds/800-plot/20-min survey), percent of total composition (%), and frequency of occurrence (%) for each large bird type and species by season during the fixed-point bird use surveys at the Chokecherry-Sierra Madre Wind Resource Area, June 26, 2008 – June 16, 2009.

	Use				% Composition				% Frequency			
Species/Type	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**
Vultures	**0**	**0.01**	**0**	**0.01**	**0**	**0.5**	**0**	**0.8**	**0**	**0.7**	**0**	**0.8**
turkey vulture	0	0.01	0	0.01	0	0.5	0	0.8	0	0.7	0	0.8
Upland Gamebirds	**0**	**0.01**	**0.09**	**0.06**	**0**	**1.1**	**15.1**	**5.9**	**0**	**0.7**	**4.9**	**5.8**
greater sage grouse	0	0.01	0.09	0.06	0	1.1	15.1	5.9	0	0.7	4.9	5.8
Doves/Pigeons	**0.07**	**0**	**0**	**0**	**6.4**	**0**	**0**	**0**	**4.9**	**0**	**0**	**0**
mourning dove	0.07	0	0	0	6.4	0	0	0	4.9	0	0	0
Large Corvids	**0.44**	**0.73**	**0.34**	**0.45**	**40.5**	**53.2**	**57.0**	**45.9**	**7.7**	**29.7**	**16.0**	**20.5**
black-billed magpie	0	0.02	0.05	0	0	1.7	8.1	0	0	1.5	4.9	0
common raven	0.10	0.71	0.29	0.34	9.1	51.5	48.8	35.1	5.7	29.0	13.9	19.1
American crow	0.34	0	0	0.11	31.4	0	0	10.8	2.1	0	0	1.4
Overall	**1.08**	**1.37**	**0.60**	**0.98**	**100**	**100**	**100**	**100**				

Table 4b. Mean use (number of birds/100-m plot/20-min survey), percent of total composition (%), and frequency of occurrence (%) for each small bird type and species by season during the fixed-point bird use surveys at the Chokecherry-Sierra Madre Wind Resource Area, June 26, 2008 – June 16, 2009.

	Use				% Composition				% Frequency			
Species/Type	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**
Passerines	**4.04**	**1.57**	**0.02**	**4.97**	**96.8**	**100.0**	**100.0**	**99.5**	**83.4**	**29.4**	**2.1**	**89.2**
American robin	0.01	0	0	0	0.2	0	0	0	0.7	0	0	0
barn swallow	0	0	0	0.02	0	0	0	0.3	0	0	0	1.6
Brewer's blackbird	0.06	0	0	0.14	1.4	0	0	2.7	4.3	0	0	1.1
Brewer's sparrow	0.39	0.03	0	0.12	9.4	1.8	0	2.4	24.1	1.7	0	7.6
Clark's nutcracker	0	0	0	0	0	0	0	0	0	0	0	0
cliff swallow	0	0	0	0.01	0	0	0	0.1	0	0	0	0.5
grasshopper sparrow	0	0	0	0.03	0	0	0	0.5	0	0	0	1.9
green-tailed towhee	0.01	0	0	0	0.2	0	0	0	0.7	0	0	0
horned lark	1.83	1.15	0.02	3.38	43.7	73.1	100.0	67.6	55.6	19.8	2.1	79.2
house wren	0.09	0.02	0	0	2.2	1.3	0	0	4.2	1.4	0	0
lark bunting	0.02	0	0	0.12	0.5	0	0	2.4	2.1	0	0	1.0
lark sparrow	0	0.01	0	0	0	0.9	0	0	0	0.7	0	0
Lincoln's sparrow	0	0	0	0.01	0	0	0	0.3	0	0	0	1.3
loggerhead shrike	0.01	0	0	0.01	0.2	0	0	0.3	0.7	0	0	0.6
mountain bluebird	0.01	0.11	0	0.19	0.4	6.7	0	3.8	1.5	2.5	0	9.4
rock wren	0.05	0	0	0.05	1.2	0	0	1.1	3.6	0	0	2.6
sage sparrow	0.05	0	0	0.37	1.2	0	0	7.5	4.4	0	0	20.6
sage thrasher	0.32	0.01	0	0.06	7.6	0.9	0	1.2	27.0	1.4	0	3.9
Say's phoebe	0.01	0	0	0.01	0.2	0	0	0.2	0.7	0	0	1.0
song sparrow	0	0.02	0	0	0	1.4	0	0	0	1.4	0	0
Townsend's solitaire	0	0.01	0	0	0	0.4	0	0	0	0.7	0	0
tree swallow	0.02	0	0	0	0.5	0	0	0	2.2	0	0	0
unidentified blackbird	0	0	0	0	0	0	0	0	0	0	0	0
unidentified passerine	0.29	0.10	0	0.03	6.8	6.3	0	0.6	14.8	6.4	0	0.5
unidentified sparrow	0.06	0.04	0	0	1.4	2.2	0	0	5.7	2.1	0	0
unidentified swallow	0.03	0	0	0	0.7	0	0	0	2.8	0	0	0

Table 4b. Mean use (number of birds/100-m plot/20-min survey), percent of total composition (%), and frequency of occurrence (%) for each small bird type and species by season during the fixed-point bird use surveys at the Chokecherry-Sierra Madre Wind Resource Area, June 26, 2008 – June 16, 2009.

	Use				% Composition				% Frequency			
Species/Type	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**
unidentified wren	0.01	0	0	0	0.2	0	0	0	0.7	0	0	0
vesper sparrow	0.56	0.03	0	0.23	13.4	1.8	0	4.6	26.2	2.1	0	11.5
western kingbird	0.01	0	0	0	0.2	0	0	0	0.7	0	0	0
western meadowlark	0.23	0.05	0	0.19	5.4	3.2	0	3.9	17.5	2.2	0	15.4
Other Birds	**0.13**	**0**	**0**	**0.03**	**3.2**	**0**	**0**	**0.5**	**4.4**	**0**	**0**	**2.0**
common nighthawk	0.01	0	0	0	0.3	0	0	0	1.4	0	0	0
northern flicker	0.01	0	0	0.01	0.2	0	0	0.2	0.8	0	0	0.8
unidentified hummingbird	0.01	0	0	0	0.3	0	0	0	0.7	0	0	0
white-throated swift	0.10	0	0	0.02	2.3	0	0	0.4	1.5	0	0	1.3
Overall	**4.18**	**1.57**	**0.02**	**5.00**	**100**	**100**	**100**	**100**				

Table 5. Flight height characteristics by bird type during fixed-point bird use surveys at the Chokecherry-Sierra Madre Wind Resource Area, June 26, 2008 – June 16, 2009. Large bird observations were limited to within 800 m and small birds were limited to within 100 m.

Bird Type	# Groups Flying	# Obs Flying	Mean Flight Height (m)	% Obs Flying	% within Flight Height Categories 0-35 m	35-130 m	> 130 m
Waterbirds	2	16	87.50	100	0	100	0
Shorebirds	1	1	10.00	100	100	0	0
Raptors	192	207	52.65	92.8	61.8	30.4	7.7
Accipiters	*6*	*6*	*23.33*	*100*	*66.7*	*33.3*	*0*
Buteos	*51*	*55*	*51.39*	*94.8*	*50.9*	*43.6*	*5.5*
Northern Harrier	*37*	*40*	*12.97*	*97.6*	*90.0*	*10.0*	*0*
Eagles	*57*	*62*	*106.75*	*91.2*	*35.5*	*45.2*	*19.4*
Falcons	*40*	*43*	*19.05*	*87.8*	*86.0*	*11.6*	*2.3*
Other Raptors	*1*	*1*	*20.00*	*100*	*100*	*0*	*0*
Vultures	2	2	27.50	100	50.0	50.0	0
Upland Gamebirds	4	6	2.25	75.0	100	0	0
Doves/Pigeons	4	5	4.25	50.0	100	0	0
Large Corvids	106	230	23.49	95.8	74.8	24.8	0.4
Large Birds Overall	**311**	**467**	**41.36**	**93.4**	**67.0**	**29.3**	**3.6**
Passerines	586	1,023	4.25	71.0	99.8	0.2	0
Other Birds	10	23	13.30	95.8	100	0	0
Small Birds Overall	**596**	**1,046**	**4.40**	**71.4**	**99.8**	**0.2**	**0**

ZOR: The likely "zone of risk" for potential collision with a turbine blade, or 35-130 m above ground level (AGL).

Table 6a. Relative exposure index and flight characteristics by large bird species during the fixed-point bird use surveys at the Chokecherry-Sierra Madre Wind Resource Area, June 26, 2008 – June 16, 2009.

Species	# Groups Flying	Overall Mean Use	% Flying	% Flying within ZOR based on initial obs	Exposure Index	% Within ZOR at anytime
common raven	98	0.35	95.9	27.6	0.09	42.9
golden eagle	55	0.14	92.3	45.0	0.06	68.3
American crow	5	0.14	98.5	18.8	0.03	18.8
American white pelican	1	0.02	100	100	0.02	100
red-tailed hawk	25	0.06	96.4	29.6	0.02	55.6
rough-legged hawk	11	0.02	100	72.7	0.02	100
Swainson's hawk	8	0.02	100	66.7	0.01	88.9
northern harrier	37	0.08	97.6	10.0	0.01	22.5
American kestrel	34	0.09	86.0	8.1	0.01	16.2
great blue heron	1	<0.01	100	100	<0.01	100
prairie falcon	6	0.01	100	33.3	<0.01	66.7
unidentified accipiter	2	<0.01	100	100	<0.01	100
ferruginous hawk	5	0.01	100	20.0	<0.01	20.0
unidentified buteo	2	0.01	60.0	33.3	<0.01	100
turkey vulture	2	<0.01	100	50.0	<0.01	50.0
bald eagle	2	<0.01	100	50.0	<0.01	50.0
greater sage grouse	4	0.03	75.0	0	0	0
mourning dove	4	0.02	50.0	0	0	0
black-billed magpie	3	0.01	60.0	0	0	0
sharp-shinned hawk	2	<0.01	100	0	0	0
Cooper's hawk	2	<0.01	100	0	0	0
killdeer	1	<0.01	100	0	0	0
unidentified eagle	0	<0.01	0	0	0	0
osprey	1	<0.01	100	0	0	100

ZOR: The likely “zone of risk” for potential collision with a turbine blade, or 35-130 m above ground level (AGL).

Table 6b. Relative exposure index and flight characteristics for small birds during the fixed-point bird use surveys at the Chokecherry-Sierra Madre Wind Resource Area, June 26, 2008 – June 16, 2009.

Species	# Groups Flying	Overall Mean Use	% Flying	% Flying within ZOR based on initial obs	Exposure Index	% Within ZOR at anytime
horned lark	381	1.78	89.1	0.1	<0.01	1.3
unidentified passerine	38	0.12	87.8	1.4	<0.01	1.4
vesper sparrow	39	0.25	38.8	0	0	2.1
Brewer's sparrow	39	0.16	55.0	0	0	0
western meadowlark	8	0.14	13.0	0	0	0
sage thrasher	10	0.12	15.4	0	0	0
sage sparrow	12	0.12	23.7	0	0	0
mountain bluebird	10	0.08	55.9	0	0	0
Brewer's blackbird	10	0.05	100	0	0	0
lark bunting	3	0.04	93.3	0	0	0
white-throated swift	4	0.04	100	0	0	87.5
house wren	2	0.03	31.3	0	0	0
rock wren	3	0.03	30.8	0	0	0
unidentified sparrow	11	0.03	92.9	0	0	0
unidentified swallow	4	0.01	100	0	0	25.0
tree swallow	3	0.01	100	0	0	0
grasshopper sparrow	0	0.01	0	0	0	0
song sparrow	1	0.01	33.3	0	0	0
loggerhead shrike	3	0.01	100	0	0	0
Say's phoebe	2	<0.01	100	0	0	0
northern flicker	1	<0.01	50.0	0	0	0
common nighthawk	3	<0.01	100	0	0	50.0
unidentified hummingbird	2	<0.01	100	0	0	0
barn swallow	2	<0.01	100	0	0	0
lark sparrow	1	<0.01	50.0	0	0	0
Lincoln's sparrow	1	<0.01	50.0	0	0	0
American robin	1	<0.01	100	0	0	0

Table 6b. Relative exposure index and flight characteristics for small birds during the fixed-point bird use surveys at the Chokecherry-Sierra Madre Wind Resource Area, June 26, 2008 – June 16, 2009.

Species	# Groups Flying	Overall Mean Use	% Flying	% Flying within ZOR based on initial obs	Exposure Index	% Within ZOR at anytime
green-tailed towhee	0	<0.01	0	0	0	0
unidentified wren	0	<0.01	0	0	0	0
western kingbird	1	<0.01	50.0	0	0	0
Townsend's solitaire	0	<0.01	0	0	0	0
cliff swallow	1	<0.01	100	0	0	100

ZOR: The likely “zone of risk” for potential collision with a turbine blade, or 114-427 ft (35-130 m) above ground level (AGL).

Table 7. Summary of sensitive species observed at the Chokecherry-Sierra Madre Wind Resource Area during fixed-point bird use surveys (FP) and as incidental wildlife observations (Inc.), June 26, 2008 – June 16, 2009.

			FP		Inc.		Total	
Species	**Scientific Name**	**Status**	**# of grps**	**# of obs**	**# of grps**	**# of obs**	**# of grps**	**# of obs**
greater sage-grouse	*Centrocercus urophasianus*	NSS2, P	6	28	29	123	35	151
Brewer's sparrow	*Spizella breweri*	NSS4	70	80	0	0	70	80
sage thrasher	*Oreoscoptes montanus*	NSS4	60	65	0	0	60	65
sage sparrow	*Amphispiza belli*	NSS4	55	59	0	0	55	59
Swainson's hawk	*Buteo swainsoni*	NSS4	8	9	7	10	15	19
lark bunting	*Calamospiza melanocorys*	NSS4	4	15	0	0	4	15
ferruginous hawk	*Buteo regalis*	NSS3	5	5	8	8	13	13
bald eagle	*Haliaeetus leucocephalus*	NSS2	2	2	4	4	6	6
grasshopper sparrow	*Ammodramus savannarum*	NSS4	4	4	0	0	4	4
great blue heron	*Ardea herodias*	NSS4	1	2	0	0	1	2
burrowing owl	*Athene cunicularia*	NSS4	0	0	1	1	1	1
Bird Subtotal	**11 species**		**215**	**269**	**49**	**146**	**293**	**538**
white-tailed prairie dog	*Cynomys leucurus*	NSS4	0	0	1	5	1	5
Total	**12 species**		**215**	**269**	**50**	**151**	**294**	**543**

P= petitioned for Federal listing.

NSS1= Populations greatly restricted or declining, extirpation possible OR ongoing significant loss of habitat.

NSS2= Populations declining, extirpation possible; habitat restricted or vulnerable but no recent or ongoing significant loss; species likely sensitive to human disturbance OR populations declining or restricted in numbers or distribution, extirpation not imminent; ongoing significant loss of habitat.

NSS3= Populations greatly restricted or declining, extirpation possible; habitat not restricted, vulnerable but no loss; species not sensitive to human disturbance OR populations declining or restricted in numbers or distribution, extirpation not imminent; habitat restricted or vulnerable but no recent or ongoing significant loss; species likely sensitive to human disturbance OR species widely distributed; population status or trends unknown but suspected to be stable; on-going significant loss of habitat.

NSS4= Populations greatly restricted or declining, extirpation possible; habitat stable and not restricted OR populations declining or restricted in numbers or distribution, extirpation not imminent; habitat not restricted, vulnerable but no loss; species not sensitive to human disturbance OR species widely distributed, population status or trends unknown but suspected to be stable; habitat restricted or vulnerable but no recent or on-going significant loss; species likely sensitive to human disturbance OR populations stable or increasing and not restricted in numbers or distribution; on-going significant loss of habitat

(From Wyoming Game and Fish Department [WGFD 2005] and Wyoming's Natural Diversity Database [WYNDD 2009]).

Table 8. Incidental wildlife observed while conducting all surveys at the Chokecherry-Sierra Madre Wind Resource Area, June 26, 2008 – June 16, 2009.

Species	Scientific Name	#grps	# obs
American goldfinch	*Carduelis tristis*	1	1
bald eagle	*Haliaeetus leucocephalus*	4	4
burrowing owl	*Athene cunicularia*	1	1
ferruginous hawk	*Buteo regalis*	8	8
golden eagle	*Aquila chrysaetos*	44	52
greater sage-grouse	*Centrocercus urophasianus*	29	123
northern harrier	*Circus cyaneus*	34	38
prairie falcon	*Falco mexicanus*	8	8
red-tailed hawk	*Buteo jamaicensis*	14	18
rough-legged hawk	*Buteo lagopus*	6	6
snow bunting	*Plectrophenax nivalis*	1	1
Swainson's hawk	*Buteo swainsoni*	7	10
Bird Subtotal	**12 species**	**157**	**270**
elk	*Cervus elephus*	14	189
white-tailed prairie dog	*Cynomys leucurus*	1	5
mule deer	*Odocoileus hemionus*	4	10
pronghorn	*Antilocapra americana*	285	2,879
Mammal Subtotal	**4 species**	**304**	**3,083**

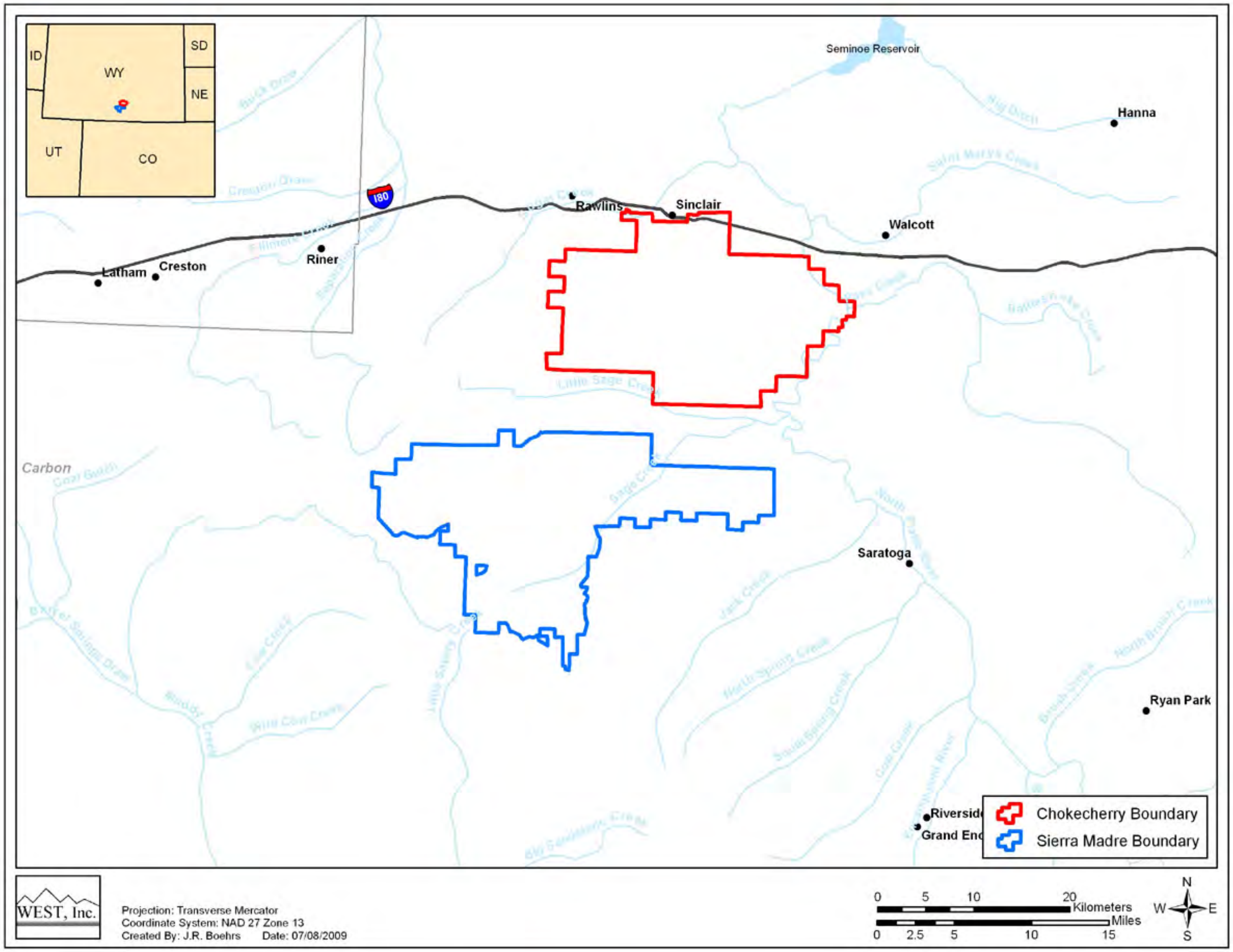


Figure 1. Location of the Chokecherry-Sierra Madre Wind Resource Areas.

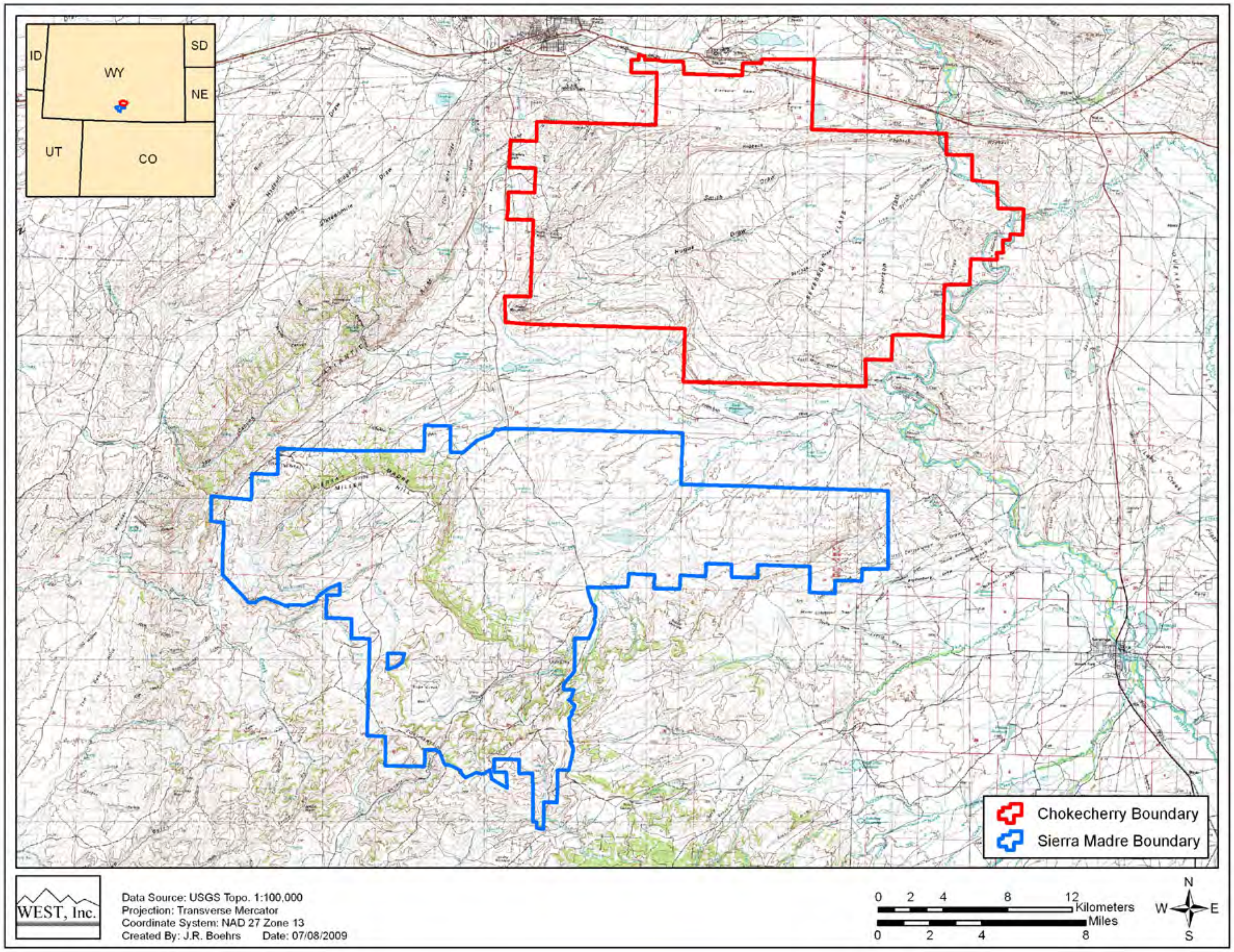


Figure 2. Elevation and topography of the Chokecherry-Sierra Madre Wind Resource Areas.

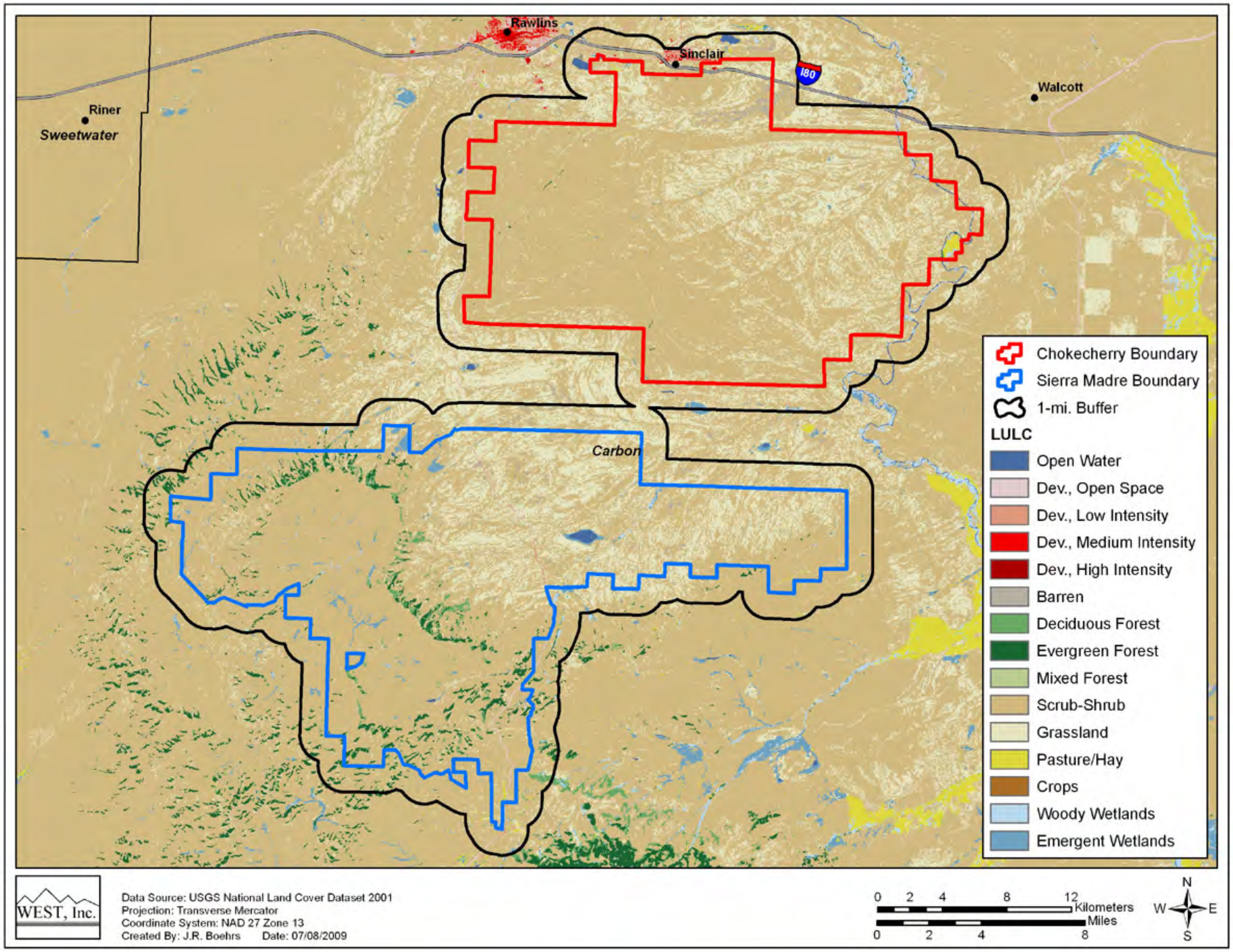


Figure 3. The land cover types and coverage within the Chokecherry-Sierra Madre Wind Resource Areas (USGS NLCD 2001).

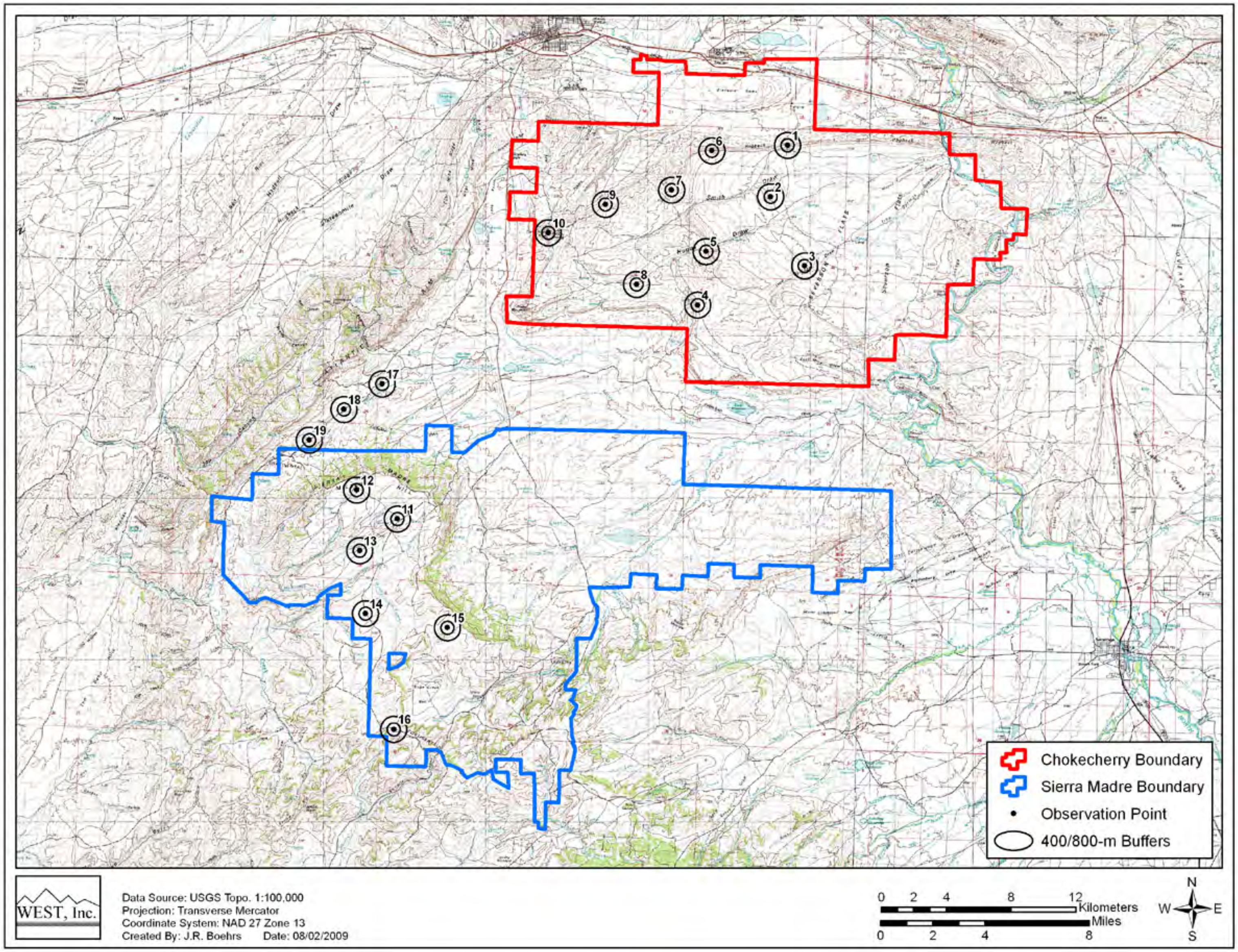
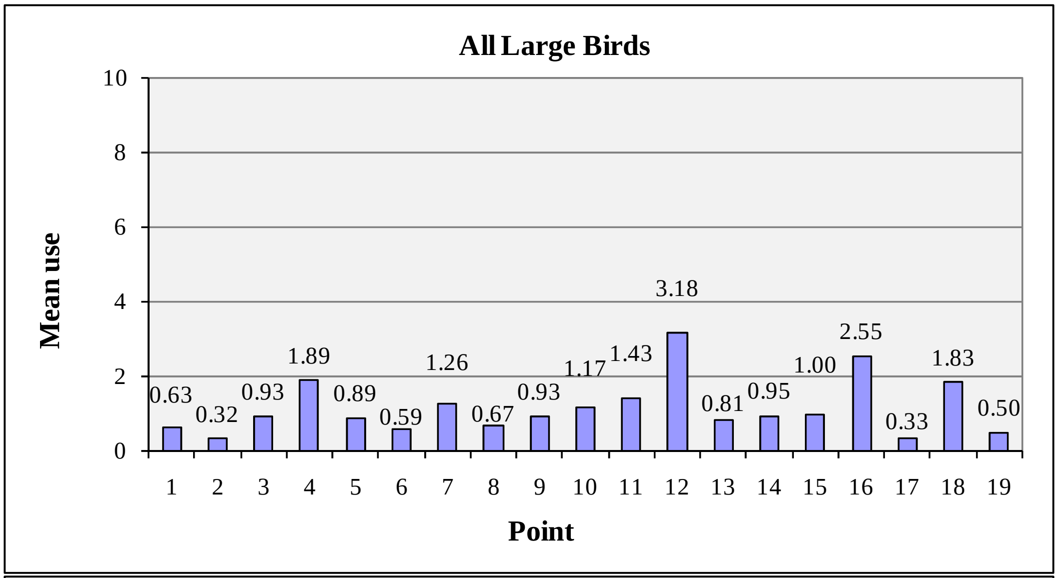


Figure 4. Fixed-point bird use survey points at the Chokecherry-Sierra Madre Wind Resource Areas.



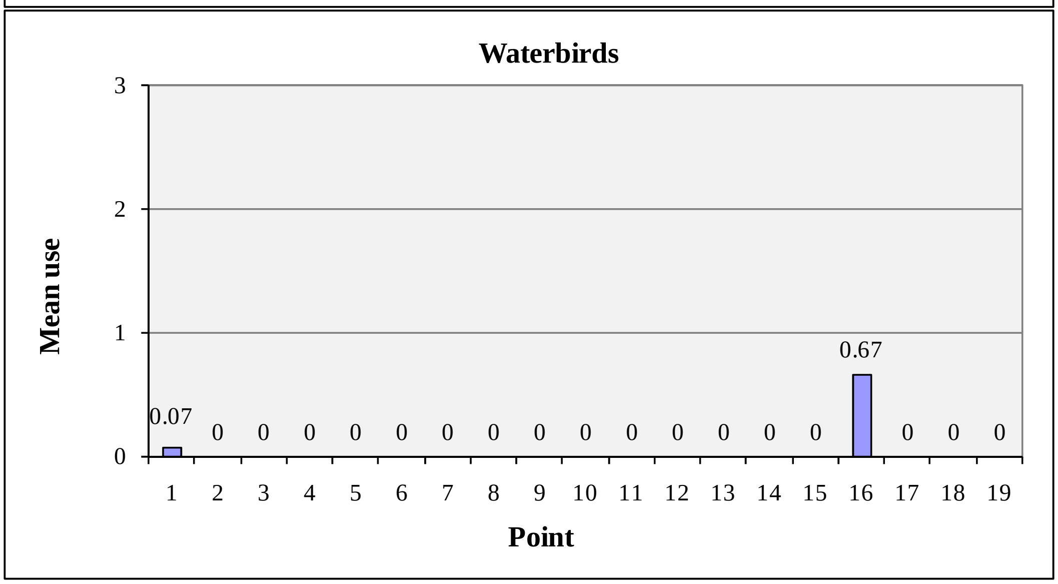
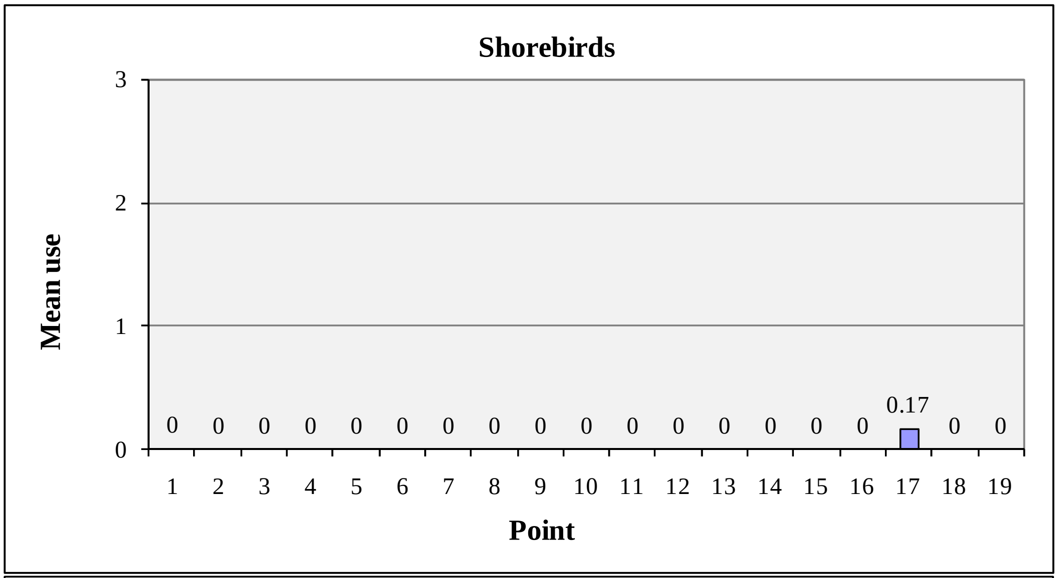


Figure 5. Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Chokecherry-Sierra Madre Wind Resource Area.



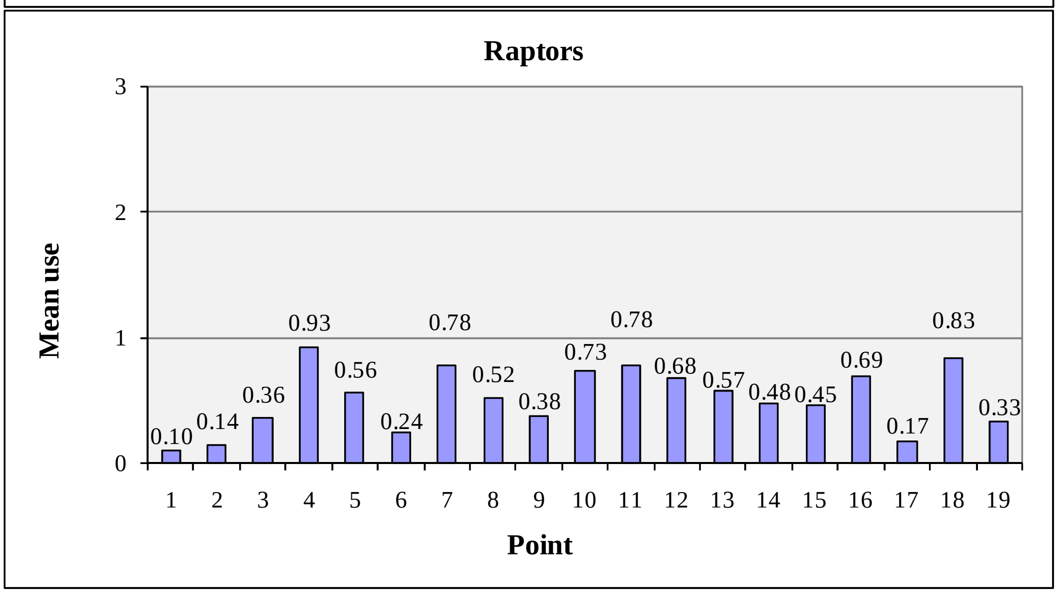


Figure 5 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Chokecherry-Sierra Madre Wind Resource Area.

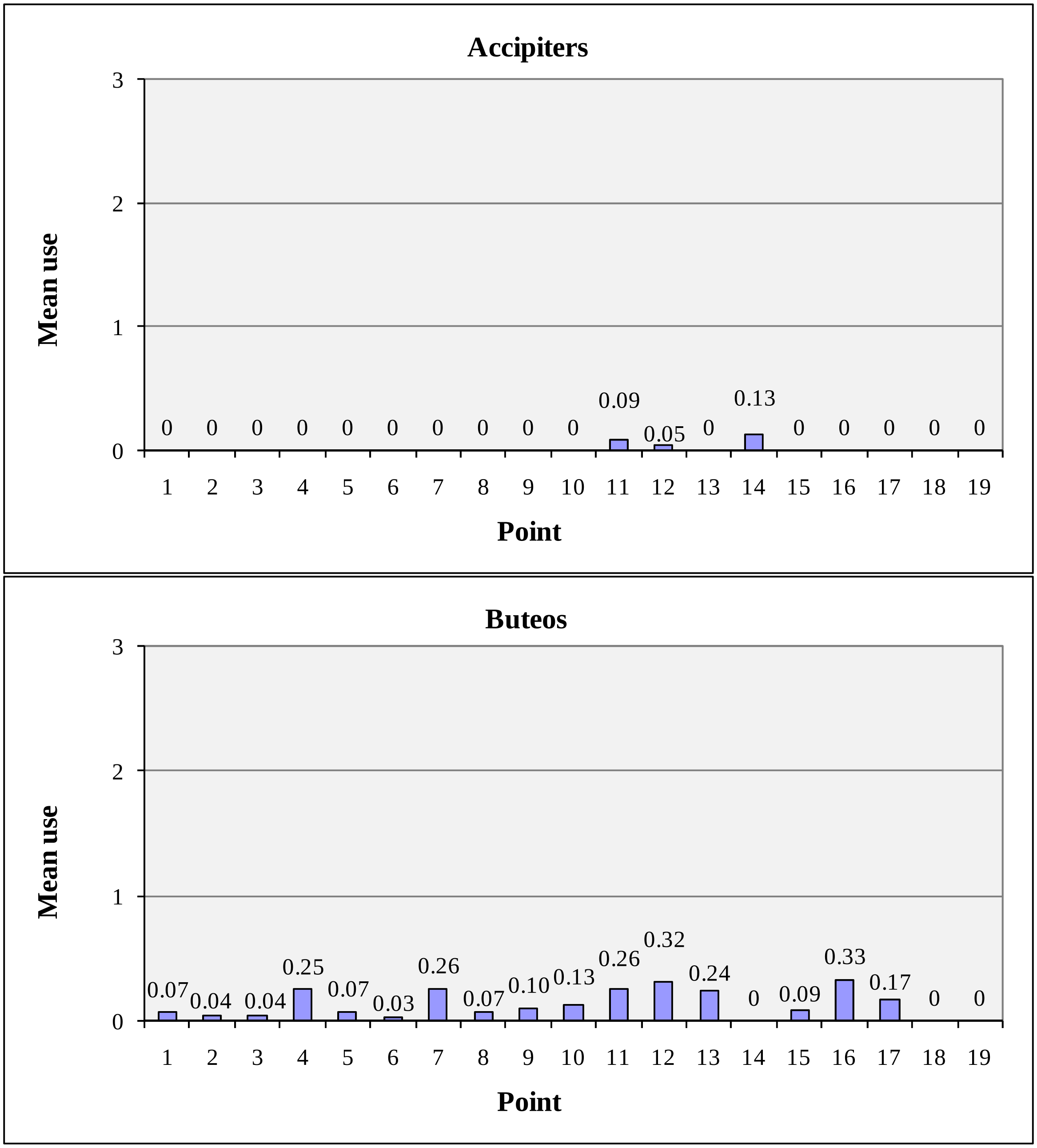
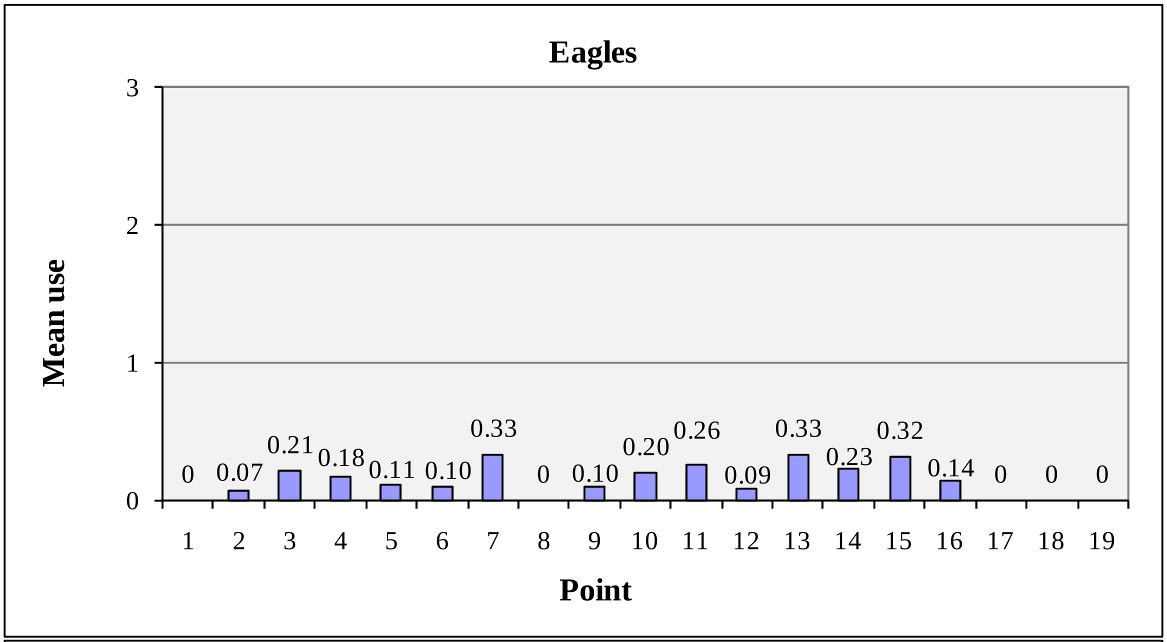


Figure 5 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Chokecherry-Sierra Madre Wind Resource Area.



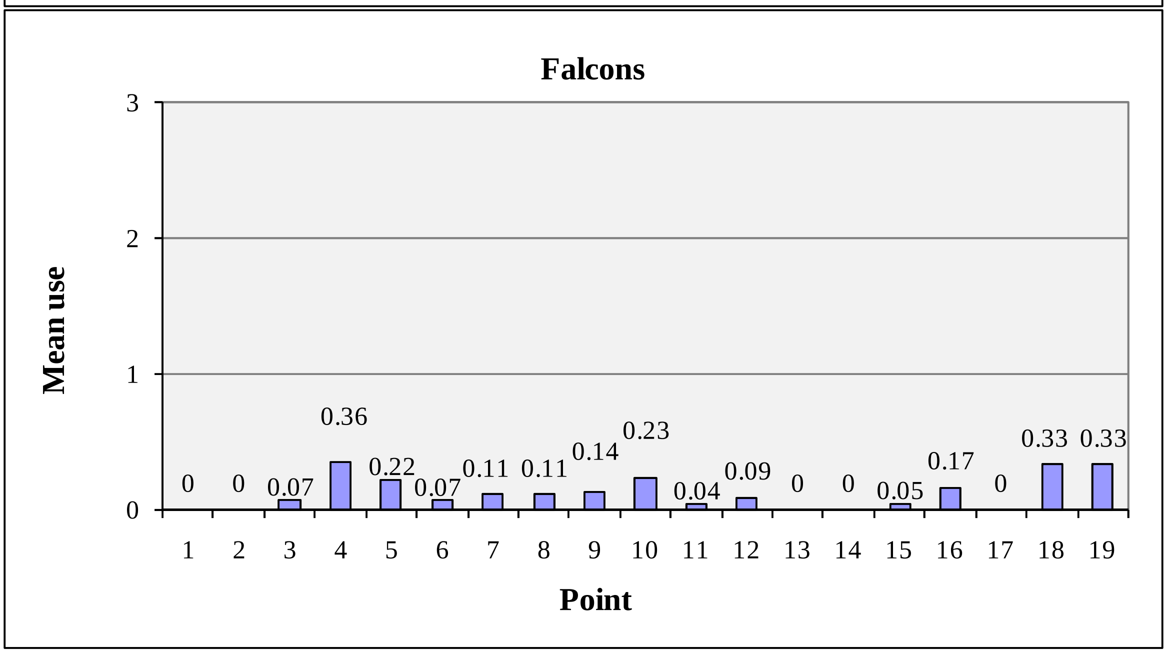
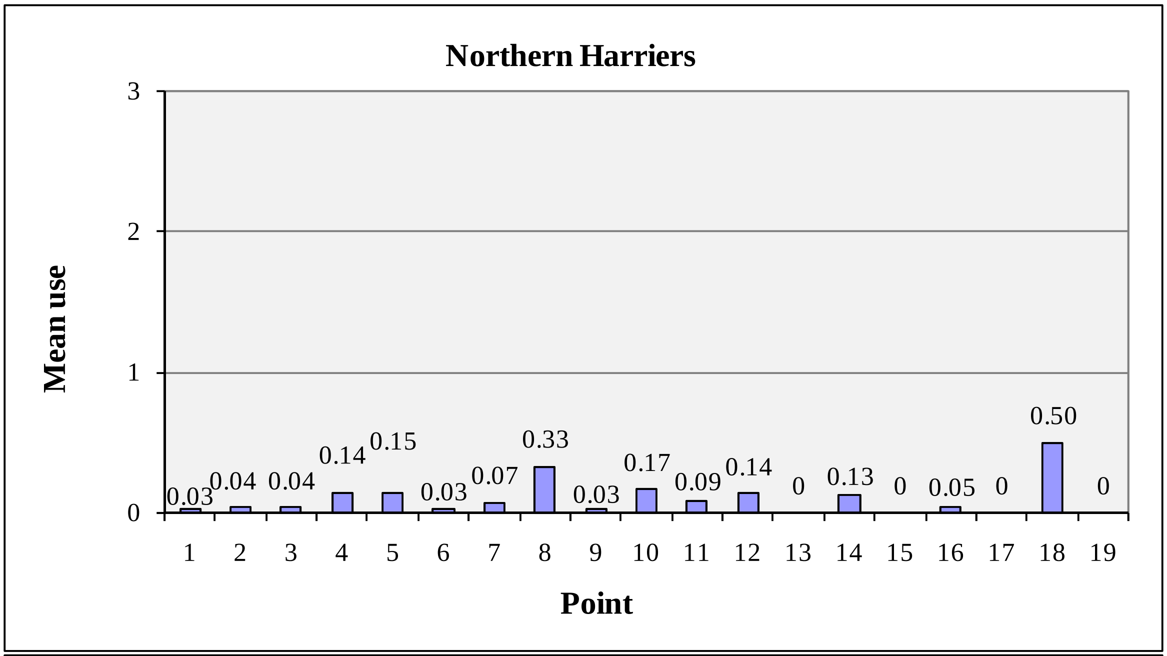


Figure 5 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Chokecherry-Sierra Madre Wind Resource Area.



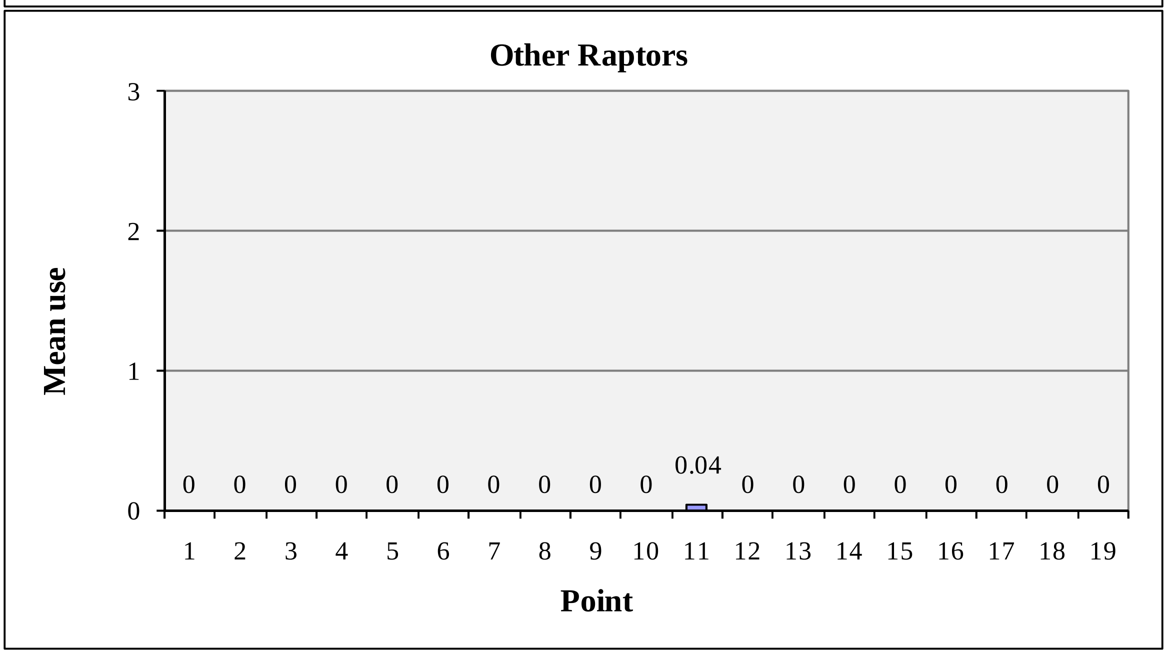
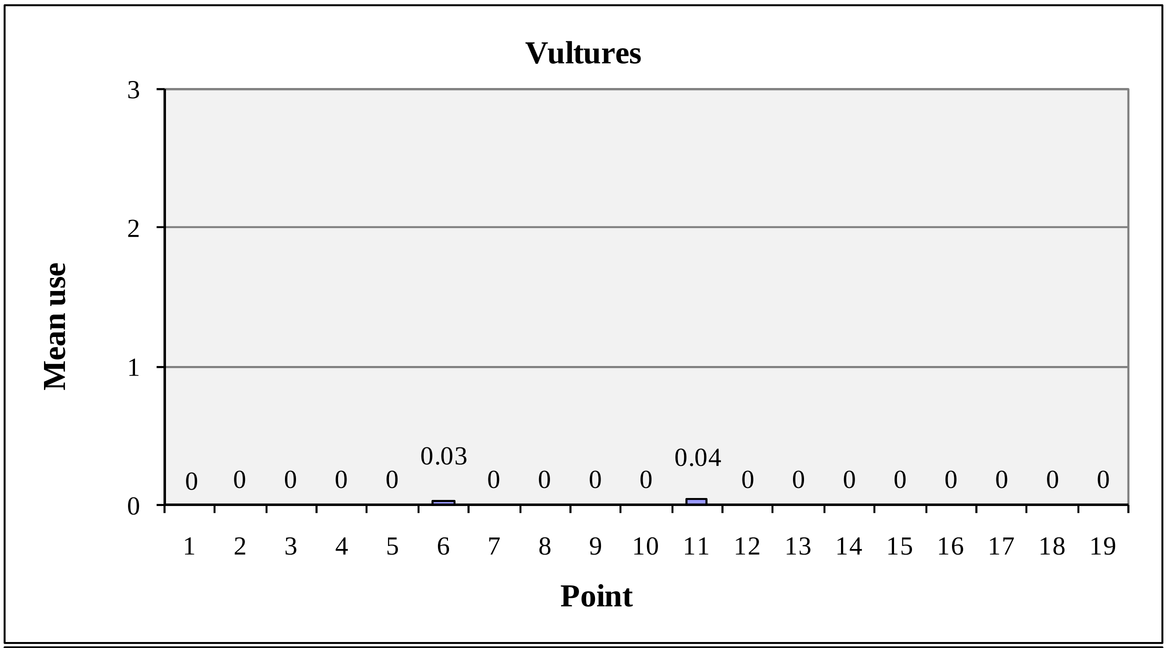


Figure 5 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Chokecherry-Sierra Madre Wind Resource Area.



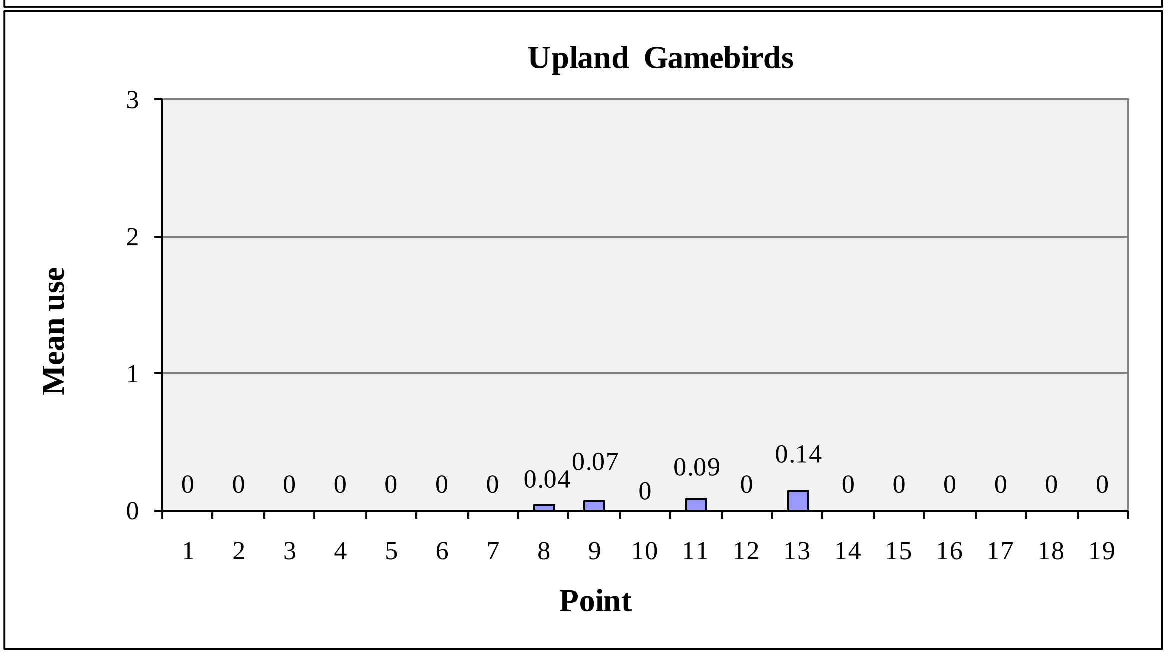
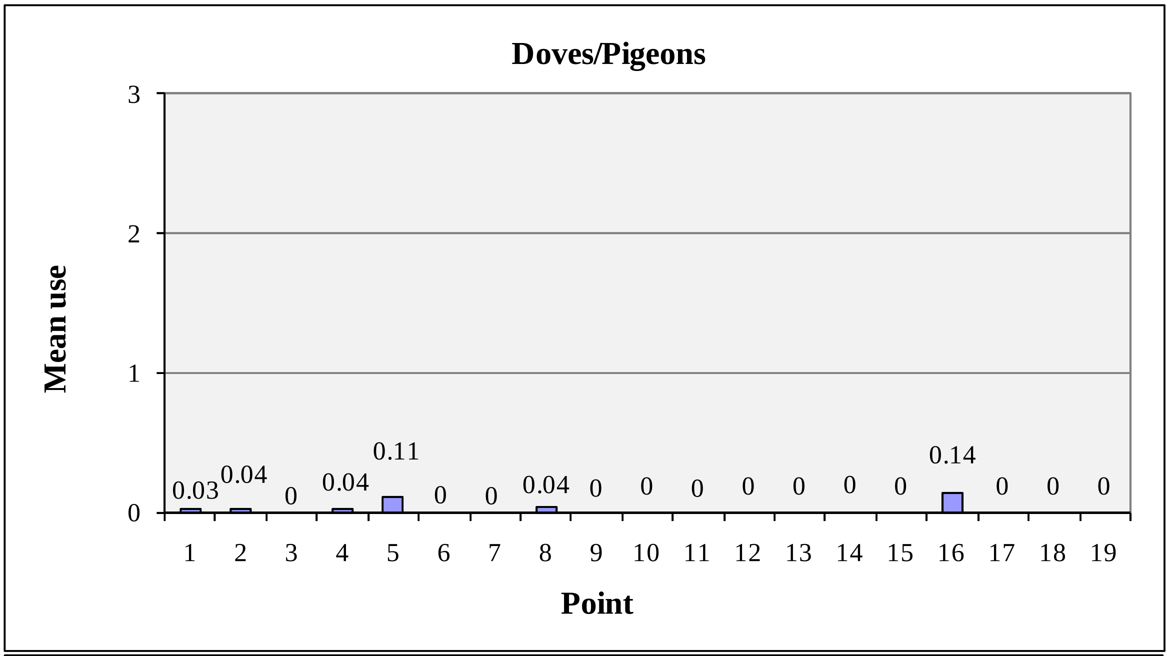


Figure 5 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Chokecherry-Sierra Madre Wind Resource Area.



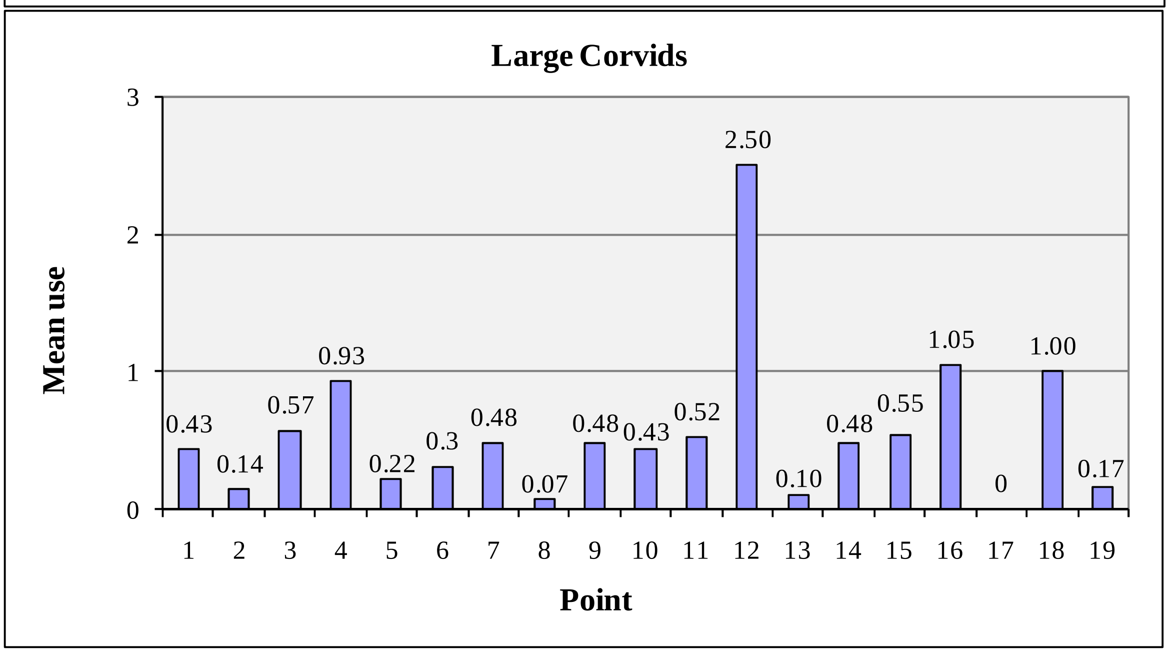
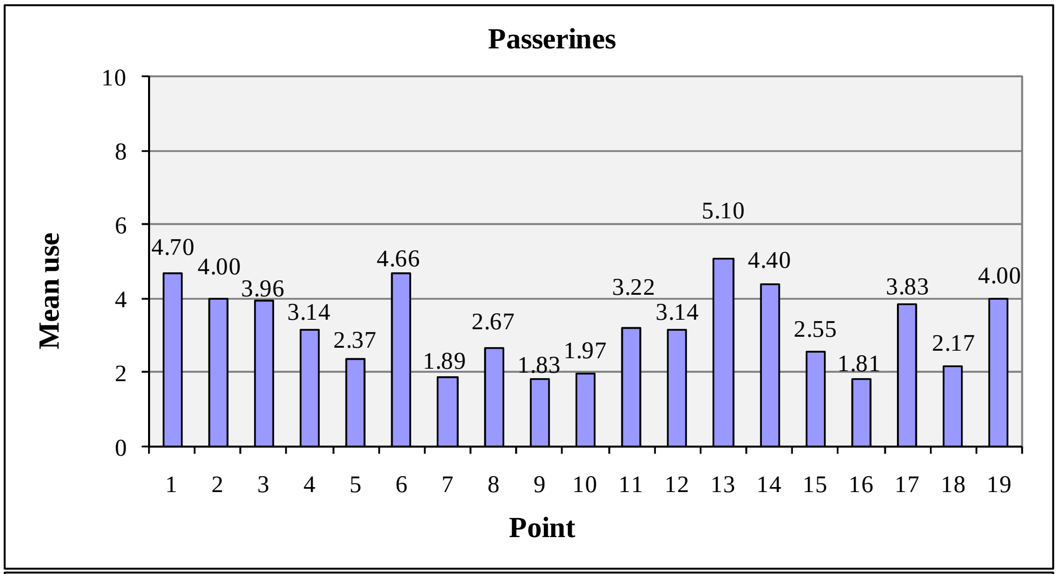


Figure 5 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Chokecherry-Sierra Madre Wind Resource Area.



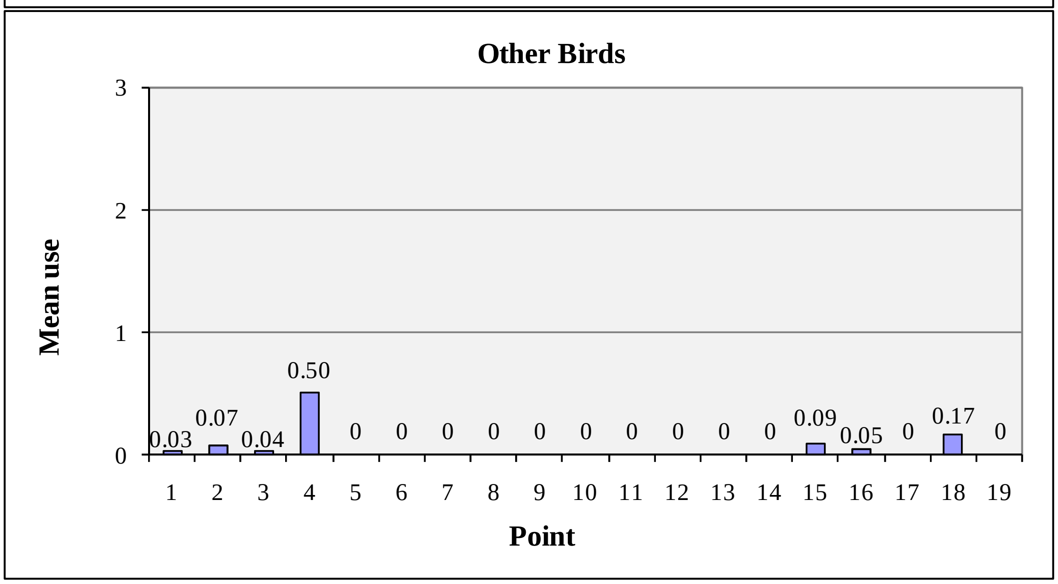


Figure 5 (*continued*). Mean use (number of birds/20-min survey) at each fixed-point bird use survey point for all birds and major bird types at the Chokecherry-Sierra Madre Wind Resource Area. Passerine and other bird observations were focused within 100-m viewsheds.

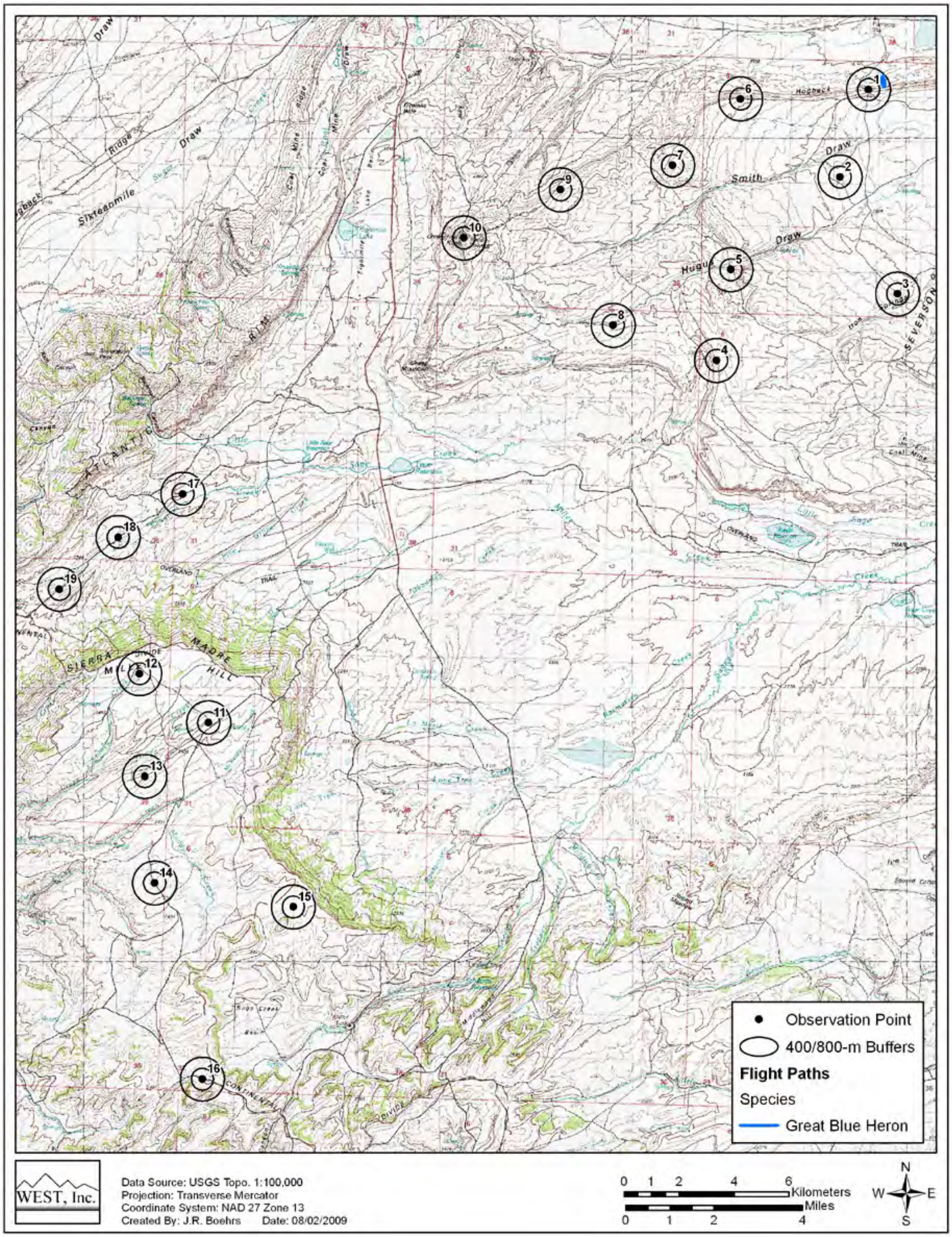


Figure 6a. Flight paths of waterbirds at the Chokecherry-Sierra Madre Wind Resource Area.

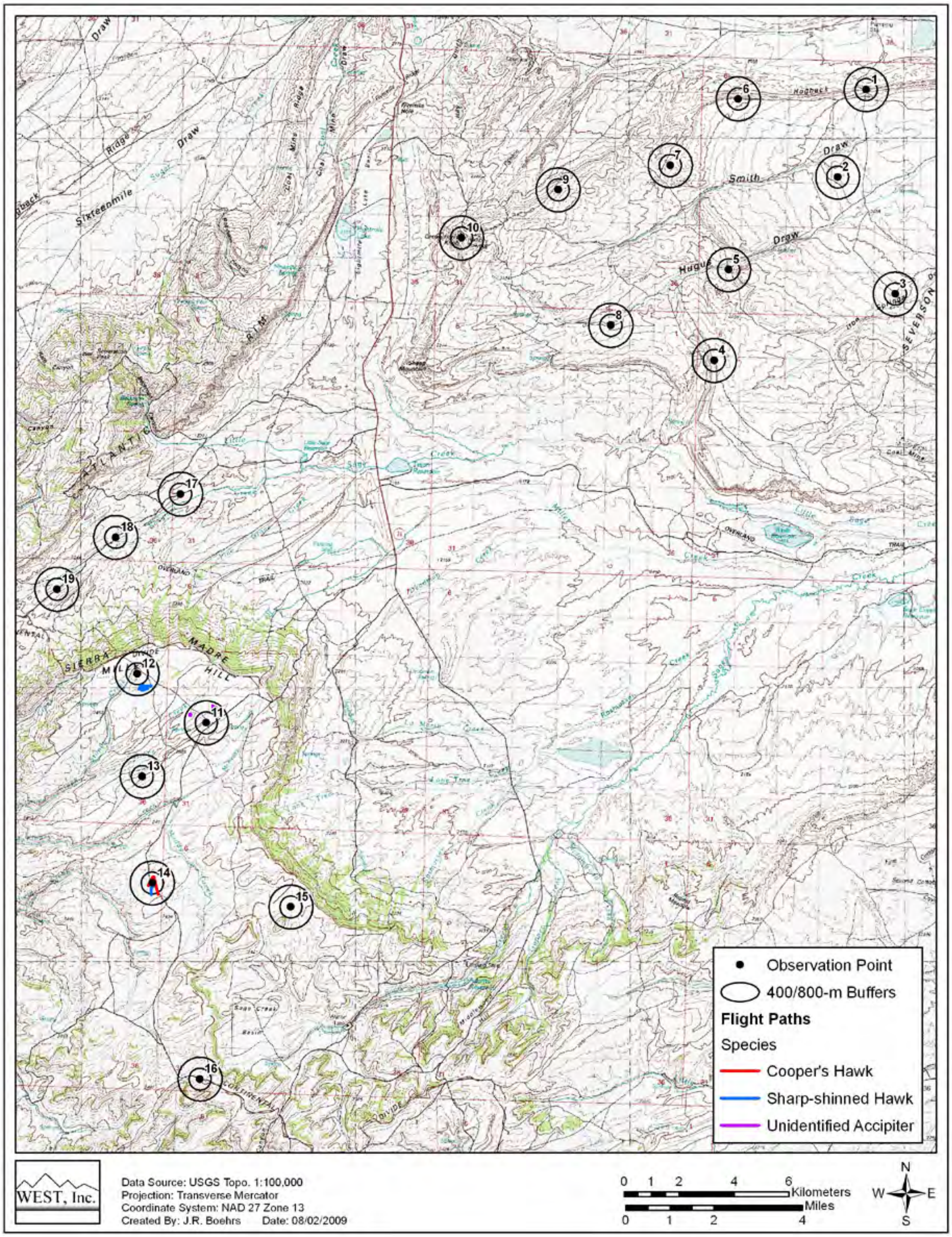


Figure 6b. Flight paths of accipiters at the Chokecherry-Sierra Madre Wind Resource Area.

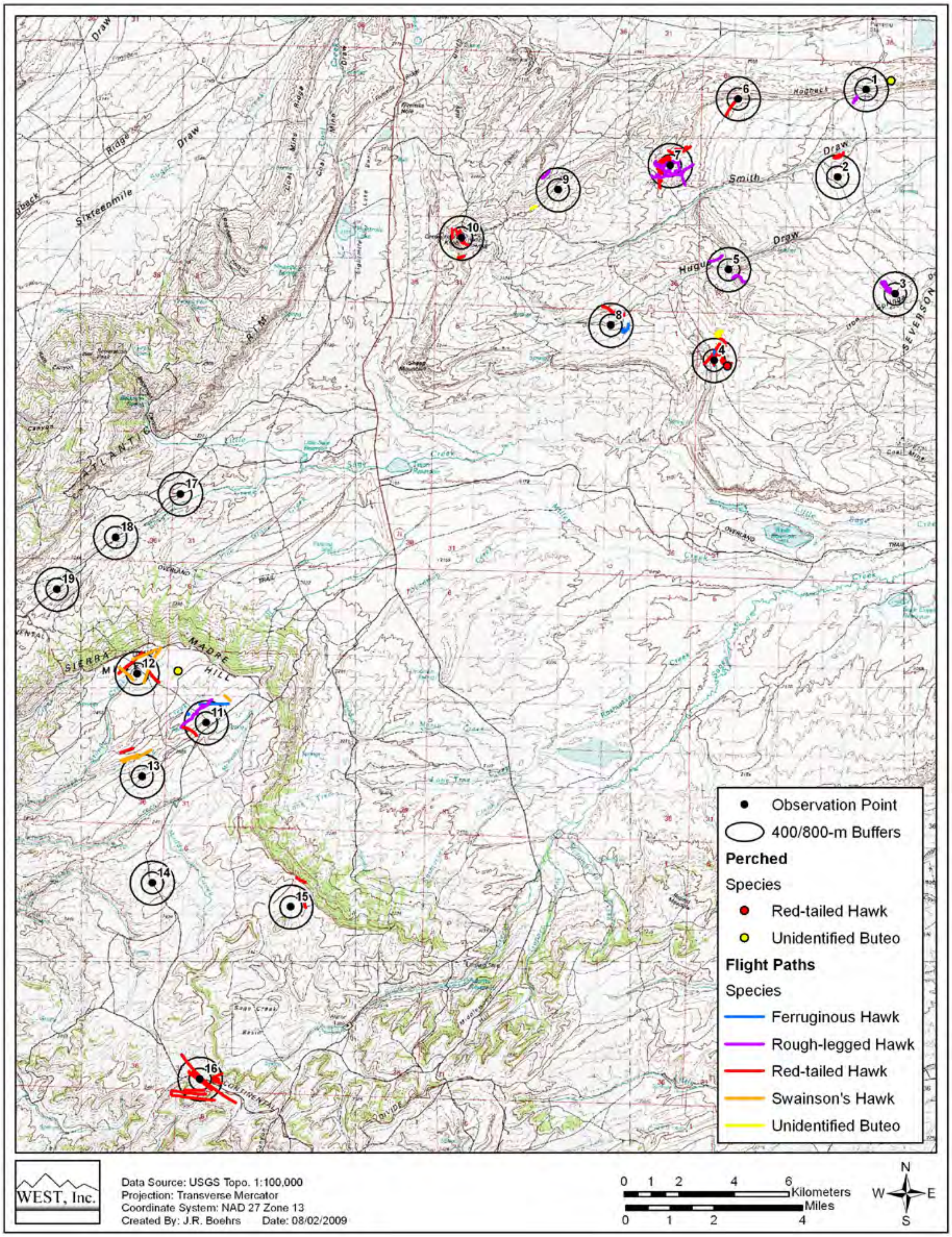


Figure 6c. Flight paths of buteos at the Chokecherry-Sierra Madre Wind Resource Area.

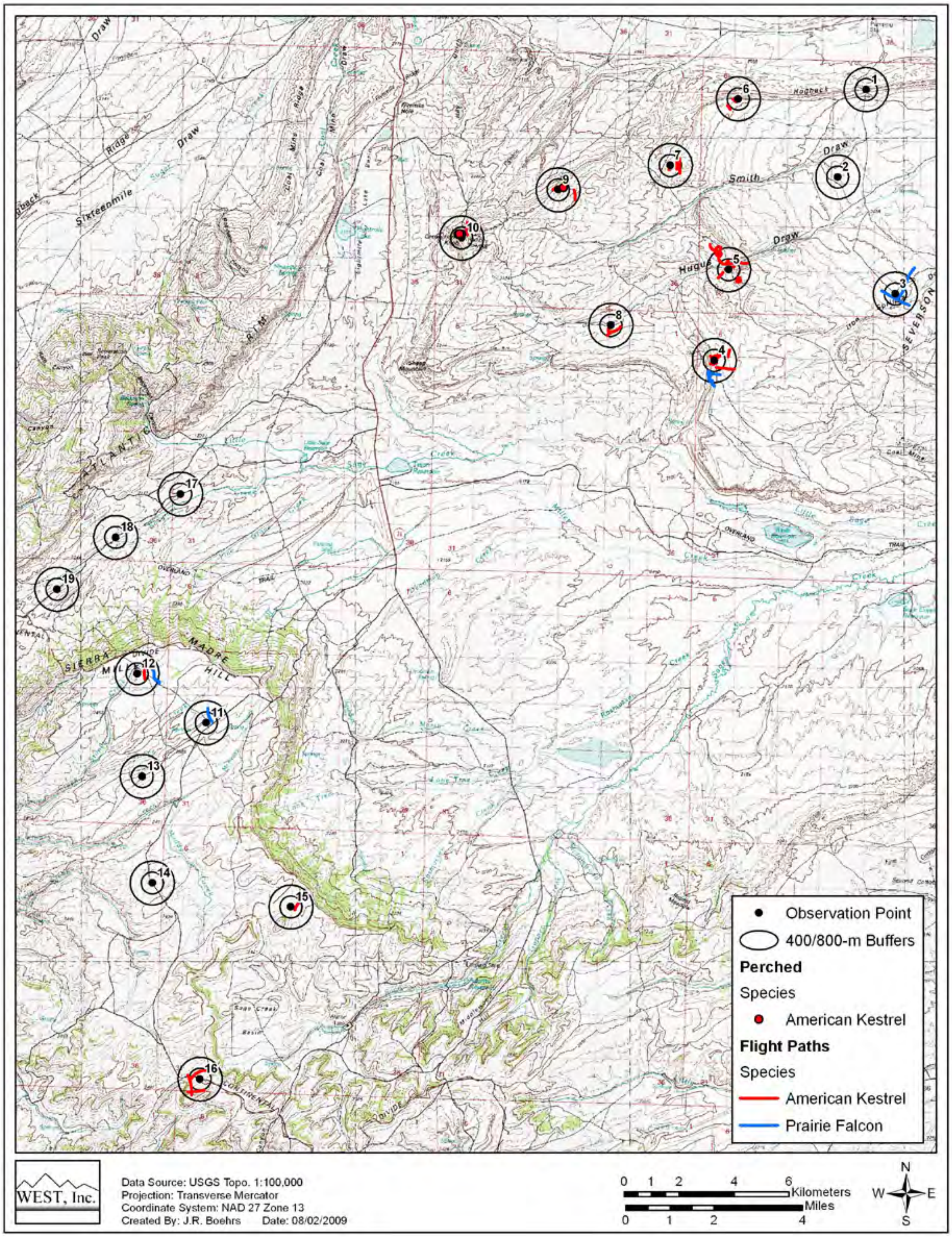


Figure 6d. Flight paths of falcons at the Chokecherry-Sierra Madre Wind Resource Area.

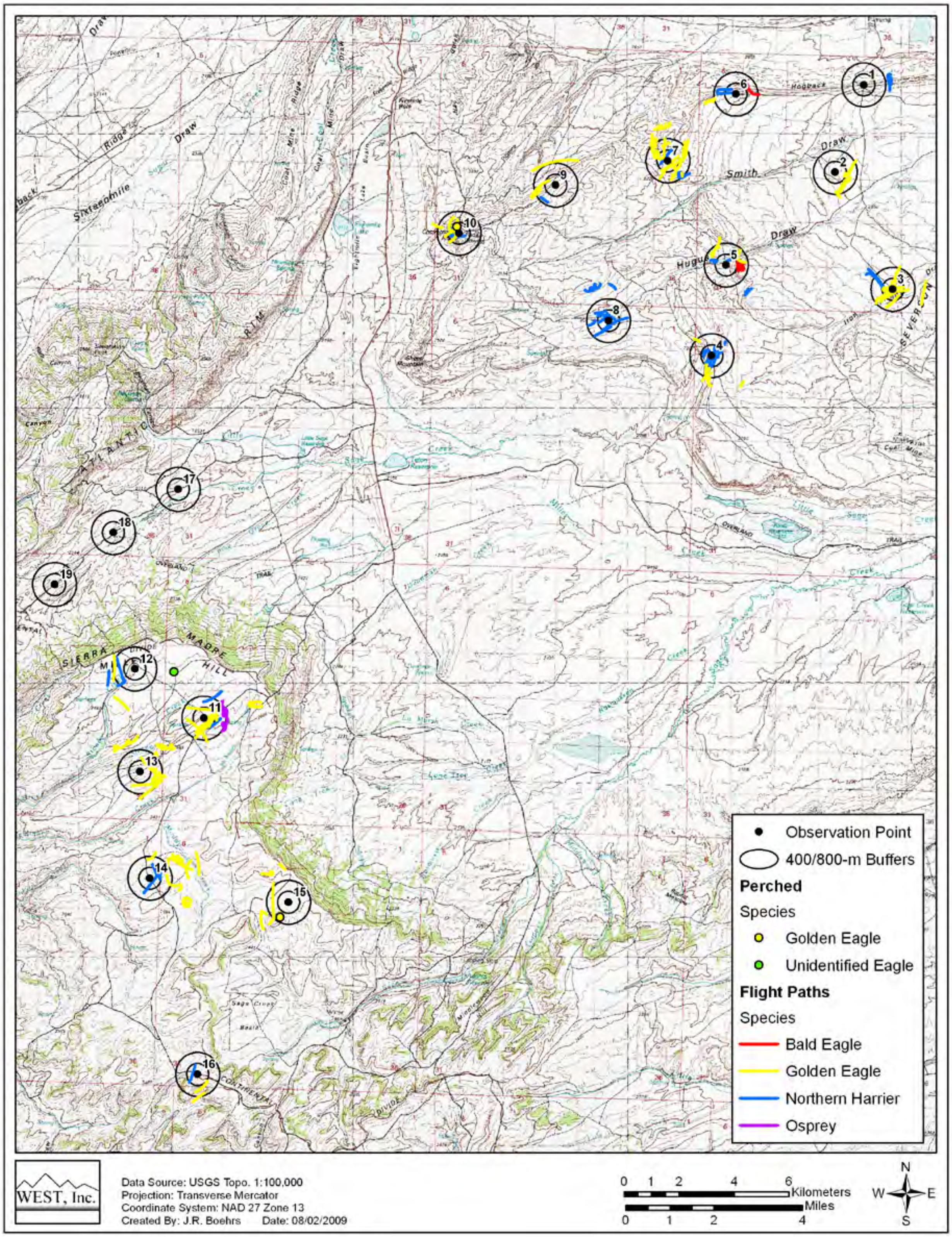


Figure 6e. Flight paths of eagles, northern harriers, and other raptors at the Chokecherry-Sierra Madre Wind Resource Area.

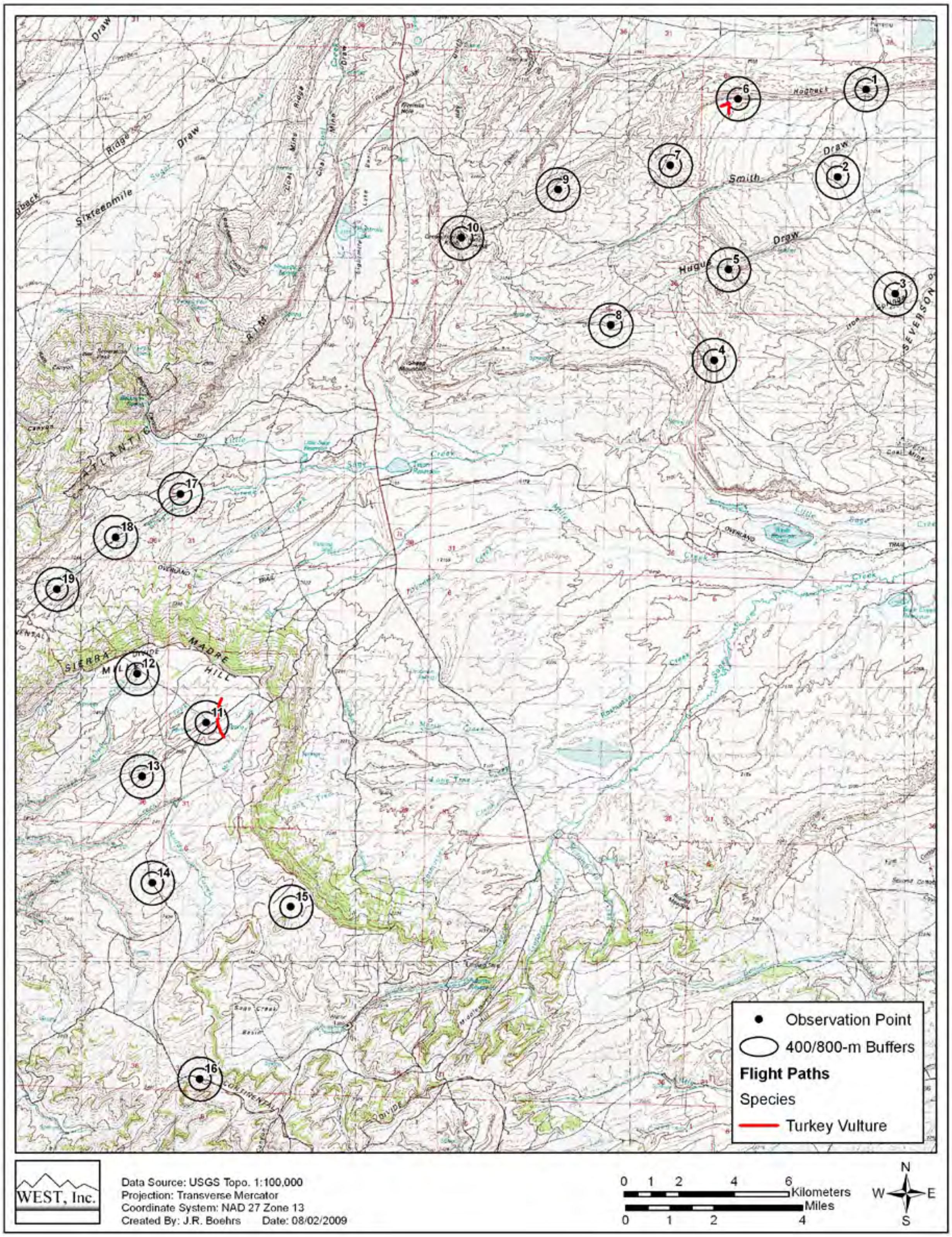


Figure 6f. Flight paths of vultures at the Chokecherry-Sierra Madre Wind Resource Area.

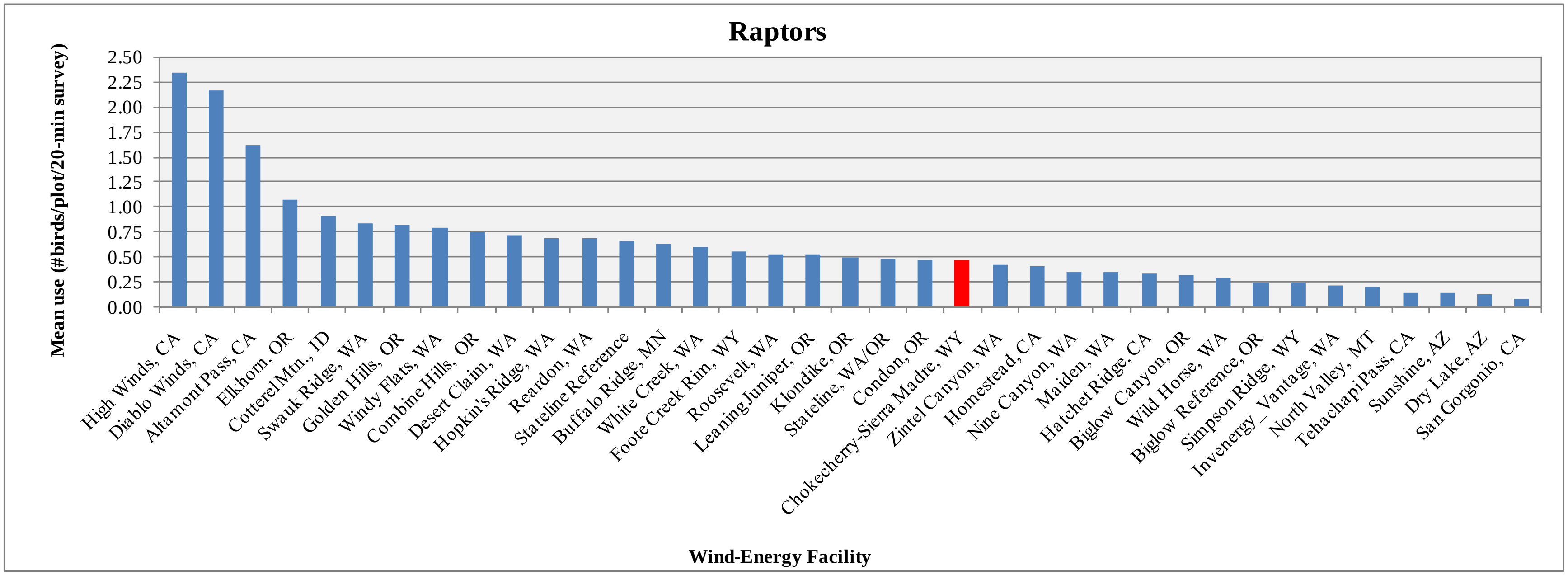
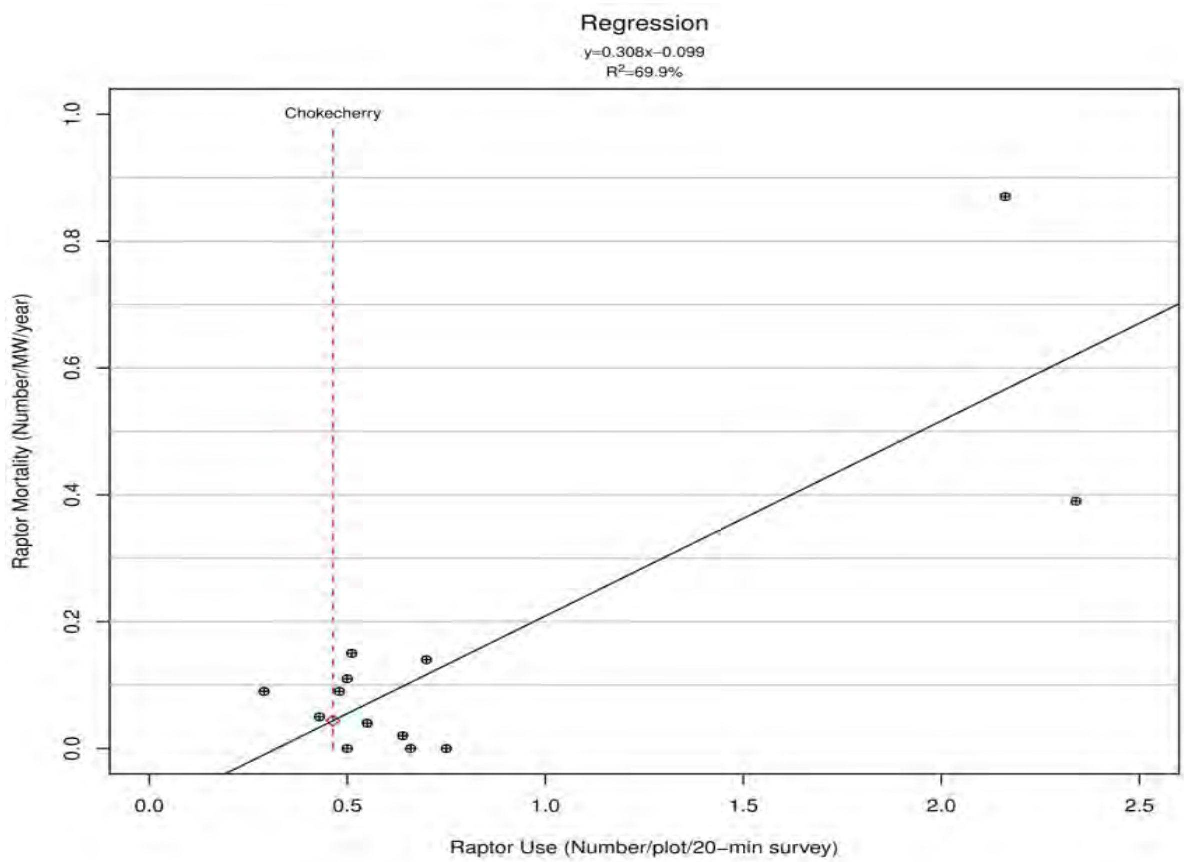


Figure 9. Comparison of annual raptor use between the Chokecherry-Sierra Madre Wind Resource Area and other US wind-energy facilities.

Data from the following sources:

Chokecherry-Sierra Madre, WY	This study.				
High Winds, CA	Kerlinger et al. 2005	Stateline Reference	URS et al. 2001	Maiden, WA	Erickson et al. 2002b
Diablo Winds, CA	WEST 2006a	Buffalo Ridge, MN	Erickson et al. 2002b	Hatchet Ridge, CA	Young et al. 2007b
Altamont Pass, CA	Erickson et al. 2002b	White Creek, WA	NWC and WEST 2005a	Biglow Canyon, OR	WEST 2005c
Elkhorn, OR	WEST 2005a	Foote Creek Rim, WY	Erickson et al. 2002b	Wild Horse, WA	Erickson et al. 2003a
Cotterel Mtn., ID	Cooper et al. 2004	Roosevelt, WA	NWC and WEST 2004	Biglow Reference, OR	WEST 2005c
Swauk Ridge, WA	Erickson et al. 2003b	Leaning Juniper, OR	NWC and WEST 2005b	Simpson Ridge, WY	Johnson et al. 2000b
Golden Hills, OR	Jeffrey et al. 2008	Klondike, OR	Johnson et al. 2002a	Invenergy_Vantage, WA	WEST 2007
Windy Flats, WA	Johnson et al. 2007	Stateline, WA/OR	Erickson et al. 2002b	North Valley, MT	WEST 2006b
Combine Hills, OR	Young et al. 2003c	Condon, OR	Erickson et al. 2002b	Tehachapi Pass, CA	Erickson et al. 2002b
Desert Claim, WA	Young et al. 2003b	Zintel Canyon, WA	Erickson et al. 2002a	Sunshine, AZ	WEST and the CPRS 2006
Hopkin's Ridge, WA	Young et al. 2003a	Homestead, CA	WEST et al. 2007	Dry Lake, AZ	Young et al. 2007c
Reardon, WA	WEST 2005b	Nine Canyon, WA	Erickson et al. 2001b	San Gorgonio, CA	Erickson et al. 2002b



Overall Raptor Use 0.46
Predicted Fatality Rate 0.04 fatalities/MW/year
90.0% Prediction Interval (0, 0.30 fatalities/MW/year)

Figure 10. Regression analysis comparing raptor use estimates versus estimated raptor mortality.

Data from the following sources:

Study and Location	Raptor Use (birds/plot /20-min survey)	Source	Raptor Mortality (fatalities/MW/yr)	Source
Buffalo Ridge, MN	0.64	Erickson et al. 2002b	0.02	Erickson et al. 2002b
Combine Hills, OR	0.75	Young et al. 2003c	0.00	Young et al. 2005
Diablo Winds, CA	2.161	WEST 2006a	0.87	WEST 2006a
Foote Creek Rim, WY	0.55	Erickson et al. 2002b	0.04	Erickson et al. 2002b
High Winds, CA	2.34	Kerlinger et al. 2005	0.39	Kerlinger et al. 2006
Hopkins Ridge, WA	0.70	Young et al. 2003a	0.14	Young et al. 2007a
Klondike II, OR	0.50	Johnson 2004	0.11	NWC and WEST 2007
Klondike, OR	0.50	Johnson et al. 2002a	0.00	Johnson et al. 2003
Stateline, WA/OR	0.48	Erickson et al. 2002b	0.09	Erickson et al. 2002b
Vansycle, OR	0.66	WCIA and WEST 1997	0.00	Erickson et al. 2002b
Wild Horse, WA	0.29	Erickson et al. 2003a	0.09	Erickson et al. 2008
Zintel, WA	0.43	Erickson et al. 2002a	0.05	Erickson et al. 2002b
Bighorn, WA	0.51	Johnson and Erickson 2004	0.15	Kronner et al. 2008

August 20 through November 9, 2012, Eagle Summary Report

Chokecherry and Sierra Madre Wind Energy Project

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May 2013

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EXECUTIVE SUMMARY

Between August 20 and November 9, 2012, SWCA Environmental Consultants performed raptor count surveys as part of Power Company of Wyoming, LLC's (PCW's) ongoing avian survey program at the Chokecherry and Sierra Madre Wind Energy Project (Project) site. This survey period captures late summer use, fall migration, and early winter use. This report documents use during these eagle use periods.

For this survey period, 64 minutes of golden eagle (*Aquila chrysaetos*) use were recorded within the Project site during 29,176 survey minutes (486.27 hours) for 0.0022 flight minute per minute of survey. Of the recorded eagle flight minutes, 71.9% were outside the Rotor Swept Zone (RSZ). By altitudinal classification, 23.4% of the golden eagle flight minutes were below the RSZ (0 to 30 meters above ground), 28.1% of the golden eagle flight minutes were within the RSZ (30 to 150 meters), and 48.5% of the golden eagle flight minutes were above the RSZ (above 150 meters).

With respect to bald eagle (*Haliaeetus leucocephalus*), 2 minutes of use were recorded during 29,176 survey minutes for 0.00007 flight minute per minute of survey. Both of these flight minutes (100%) were recorded between 0 and 30 meters and therefore were below the RSZ.

For the Chokecherry Wind Development Area (WDA), 20 minutes of golden eagle use were recorded during 13,816 survey minutes (230.27 hours) for 0.0015 flight minute per minute of survey. In total, 114 survey sessions were conducted during which eight golden eagle observations were recorded during seven of the sessions. Individual observation times ranged between 1 minute and 6 minutes, rounded up to the nearest whole minute. Of the recorded use in the Chokecherry WDA, 80% occurred outside the RSZ. No bald eagles were recorded in the Chokecherry WDA.

For the Sierra Madre WDA, 44 minutes of golden eagle use and 2 minutes bald eagle use were recorded during 15,360 survey minutes (256 hours) for 0.0029 flight minute per minute of survey and 0.0001 flight minute per minute of survey, respectively. In total, 126 survey sessions were conducted during which 16 golden eagle observations were recorded during 13 of the sessions[1], and one bald eagle observation was recorded during one session. Individual observation times ranged between 1 minute and 7 minutes, rounded up to the nearest whole minute. Of the recorded use in the Sierra Madre WDA, 68.2% of golden eagle use and 100% of bald eagle occurred outside the RSZ.

[1] Two observations at SCR1 were likely of the same golden eagle as the observations were made within 17 minutes of each other and in the same general location, and two observations at MH1 were possibly of the same golden eagle as the observations were made during the same session within 54 minutes of each other.

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INTRODUCTION AND PROJECT DESCRIPTION

Surveys described in this report are part of the avian survey program directed towards identifying eagle and raptor use across the Chokecherry and Sierra Madre Wind Energy Project (Project) site. The survey data will be used for modeling eagle collision risk and developing avoidance measures and Best Management Practices to reduce potential Project impacts to eagles, to the extent practicable. All protocols and survey methodologies used to assess avian species in the Project site during surveys in 2011 and 2012 were developed in consultation with the U.S. Fish and Wildlife Service (Service), and are in accordance with recommendations made by the Service, the Bureau of Land Management (BLM), and the Wyoming Game and Fish Department (WGFD). Appendix A contains the protocols used to collect eagle use data for the period of this report.

This report summarizes the data from the August 20 through November 9, 2012 raptor counts and captures late summer eagle use, fall migration, and early winter use within the Project site. It is one of four reports covering 12 consecutive calendar months from August 2012 to August 2013. Subsequent reports will roughly correspond to 1) winter use, spring migration, and early nesting activities; 2) incubation, nesting, and chick rearing periods in spring and early summer; and 3) fledging and summer use.

In 2012, based on the extensive avian data that have been collected for the Project, Power Company of Wyoming, LLC (PCW) substantially re-designed the Project and identified Turbine No-Build Areas. These designated Turbine No-Build Areas have relatively higher eagle use than other areas of the Project and PCW has committed to not build turbines in these areas. This will substantially contribute to avoiding and minimizing collision risk to eagles. Next, to assess use by eagles and other raptors in the remaining potential wind development areas (WDAs), surveys were initiated during August 2012 at 40, 800-meter (m) survey locations across the probable turbine footprint outside of the Turbine No-Build Areas (Figures 1 and 2).

Selection of the 40, 800-m survey locations was achieved using a spatially balanced sampling design used to capture the variability in habitat conditions, terrain features, and turbine numbers and densities. Minimum convex polygons[2] (MCPs) were placed around potential turbine construction areas in the Project site that are separated by the Turbine No-Build Areas established by PCW (Figures 1 and 2). MCPs were evaluated for differences in habitat characteristics, forage potential, and topography. While differences in habitat characteristics, forage potential, and topography occur among the 10 discrete MCPs, within each MCP these factors are similar and additional stratification beyond the MCP level was not necessary. Using Geostatistical Analyst tools in ArcGIS, spatially balanced survey locations were sequentially selected in a manner that is consistent with the recommendations made by the Service while ensuring that no overlap occurs between survey locations. Total number of sampling locations per MCP was based on the relative surface area, number of turbines, and turbine densities in each MCP.

[2] MCPs were generated using the ArcGIS Spatial Analyst minimum bounding geometry function with the minimum convex hull option selected.

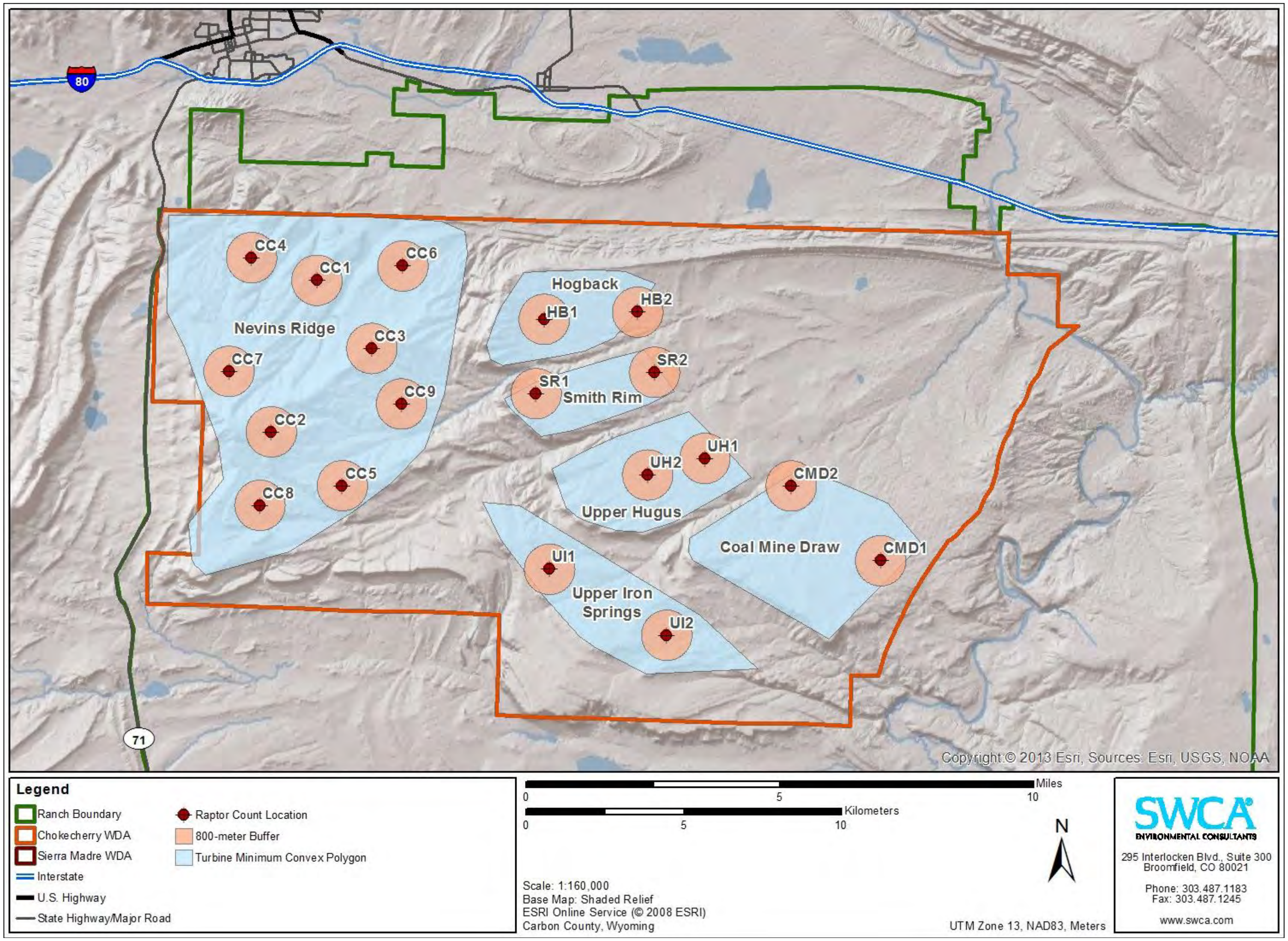

Figure 1. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Chokecherry.

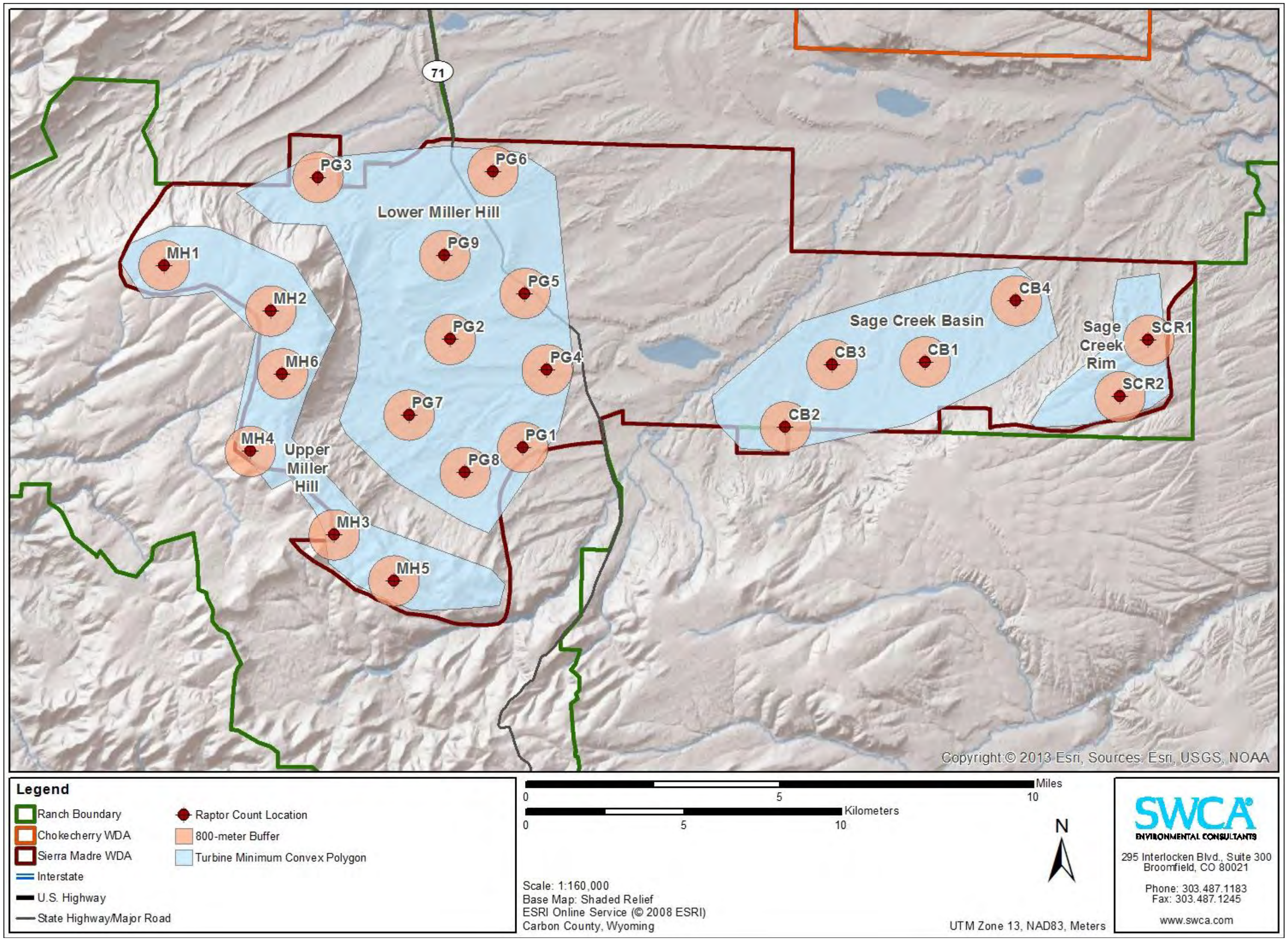

Figure 2. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Sierra Madre.

Raptor surveys documented in this report occurred from August 20 through November 9, 2012. Surveys occurred at 40 survey locations across the Project site, with 19 survey locations in the Chokecherry WDA and 21 survey locations in the Sierra Madre WDA (Figures 1 and 2). Surveys were designed to occur at each of the 40 survey locations for 2 hours per survey date in accordance with guidance from the Service. Two avian technicians each surveyed two survey locations per day resulting in surveys of four survey locations per day and 40 survey locations in a 10-day period. The schedule was designed and implemented to provide survey coverage across all daylight hours for each of the 40 survey locations. The schedule was also designed such that the four raptor count surveys conducted on any given day were separated temporally and spatially to increase the likelihood of independence of any observations made.

Surveys were completed across all daylight hours in accordance with the Service's recommendations. Each raptor flight path was recorded by technicians on aerial maps. Additional data collected included species, number of individuals per observation, age, sex, behavior, azimuth to bird, distance to bird, heading of bird, altitude of bird, the beginning and ending time for each observation, interactions with other birds, and hourly weather data among other variables. Appendix A to this report contains the detailed protocols used to collect the data.

RESULTS AND DISCUSSION

During the August 20 to November 9, 2012 survey period, 240 individual surveys were conducted across both WDAs for a total of 29,176 survey minutes (486.27 hours; Tables 1 and 2). Generally, survey minutes were evenly distributed across the 40 survey locations but varied slightly at some survey locations due to safety and accessibility issues caused by inclement weather.

During the August 20 to November 9, 2012 survey period, golden eagles (*Aquila chrysaetos*) were observed in flight for 64 total flight minutes (Tables 1 and 2). Overall use for golden eagle during this survey period was 0.0022 flight minute per minute of survey. This use value is the total use without consideration of flight heights and proportion of time in the Rotor Swept Zone (RSZ). Golden eagle use in the Chokecherry WDA during this survey period was 0.0015 flight minute per minute of survey while use in the Sierra Madre WDA was 0.0029 flight minute per minute of survey.

All eagle flight minutes recorded during the August 20 to November 9, 2012 survey period were subdivided into three altitudinal categories as recorded during field surveys (below RSZ = 0–30 m, within RSZ = 30–150 m, above RSZ = above 150 m) to determine the proportion of time eagles flew through the RSZ (30–150 m) and therefore at risk of collision. These altitudinal categories were developed to be reflective of the actual turbine heights that will be used for the Project. Of the 64 total golden eagle flight minutes, 15 minutes (23.4%) were recorded within the 0–30 m bin, 18 minutes (28.1%) were recorded within the 30–150 m bin, and 31 minutes (48.4%) were recorded above 150 m (Tables 1 and 2). When considering observed flight heights, total use across the Project site in the RSZ where collisions could occur was 0.0006 minute of flight time per minute of survey, a decrease of nearly 72% compared to total flight minutes.

With respect to bald eagle (*Haliaeetus leucocephalus*), one bald eagle was observed twice on the same day at the same location during the August 20 to November 9, 2012 survey period, which resulted in a total of 2 flight minutes. Overall use for bald eagle during this survey period was 0.00007 flight minute per minute of survey.

Results and Discussion of Chokecherry Use Observations

Surveys in the Chokecherry WDA were conducted at 19 locations for a total of 13,816 minutes during the August 20 to November 9, 2012 survey period. During this survey period, golden eagles were observed in flight at five of the 19 survey locations for a total of 20 minutes (Table 1). Golden eagle use for the Chokecherry WDA during this survey period was calculated as 0.0015 flight minute per survey minute.

Four of the 20 golden eagle flight minutes (20%) occurred within the 0–30 m altitudinal bin, 4 minutes (20%) occurred within the 30–150 m bin, and the remaining 12 minutes (60%) occurred above 150 m (Table 1). In the Chokecherry WDA, 80% of all use occurred outside of the RSZ where eagles are not at risk for collision. No bald eagles were observed in the Chokecherry WDA during fall 2012 surveys.

The five sites in the Chokecherry WDA with golden eagle observations occurred within two of the MCPs, Nevins Ridge and Smith Rim (Figure 1). Survey locations within the Coal Mine Draw, Hogback, Upper Hugus Draw, and Upper Iron Springs MCPs all had zero eagle observations during the August 20 to November 9, 2012 survey period. Within the Nevins Ridge MCP, golden eagles were observed at CC3, CC4, CC6, and CC8. Within the Smith Rim MCP, a golden eagle was observed at SR1.

Within the Nevins Ridge MCP, at CC3 one golden eagle was observed on one survey date for a total of 2 flight minutes. One of the flight minutes occurred in the 0–30 m height category, and one occurred in the 30–150 m height category. Over the course of the 2 flight minutes, this individual's behavior was recorded as gliding and powered flight. At CC4, two golden eagle observations were made on two separate days for a total of 4 flight minutes. Two of the flight minutes occurred in the 0–30 m height category, and two occurred in the 30–150 m height category. One eagle observation was recorded as gliding for 3 minutes, while the other observation was recorded as both gliding and powered flight during the 1 minute it was observed. At CC6, two golden eagle observations were made on two separate days for a total of 4 flight minutes. One flight minute occurred in the 0–30 m height category, 1 flight minute occurred in the 30–150 m height category, and 2 flight minutes occurred above 150 m. One eagle observation was recorded as soaring for 2 minutes, while the other observation was recorded as gliding for 1 minute and soaring for 1 minute. At CC8, two golden eagle observations were made on a single day for a total of 8 flight minutes. All 8 flight minutes occurred above 150 m. One eagle observation was recorded as soaring for 2 minutes, while the other observation was recorded as soaring for 4 minutes, gliding for 1 minute, and displaying for 1 minute (Table 3).

Within the Smith Rim MCP, at SR1 one golden eagle was observed on a single day for 2 flight minutes. Both flight minutes for this eagle observation occurred above 150 m, and the behavior for both flight minutes was recorded as soaring (Table 3).

Results and Discussion of Sierra Madre Use Observations

In the Sierra Madre WDA, surveys were conducted for 15,360 minutes during the August 20 to November 9, 2012 survey period. During this survey period, golden eagles were observed in flight at eight of 21 survey locations for a total of 44 minutes (Table 2). Golden eagle use for the Sierra Madre WDA during this period was 0.0029 flight minute per survey minute.

Eleven of the 44 golden eagle flight minutes (25%) occurred in the 0–30 m height category, 14 minutes (31.8%) occurred within 30–150 m, and the remaining 19 minutes (43.2%) occurred above 150 m (Table 2). In the Sierra Madre WDA, nearly 70% of all use occurred outside of the RSZ where eagles are not at risk for collision.

The eight sites with eagle observations in the Sierra Madre WDA occurred within three of the MCPs: Upper Miller Hill, Lower Miller Hill, and Sage Creek Rim (Figure 2). Survey locations within the Sage Creek Basin MCP all had zero eagle observations during the August 20 to November 9, 2012 survey period. Within the Upper Miller Hill MCP, golden eagles were observed at MH1 and MH6. Within the Lower Miller Hill MCP, golden eagles were observed at PG1, PG2, PG3, and PG5. One bald eagle was also observed for 2 total flight minutes at PG3. Within the Sage Creek Rim MCP, golden eagles were observed at SCR1 and SCR2.

Within the Upper Miller Hill MCP, at MH1 two eagle observations of single individuals occurred on the same survey day for a total of 7 flight minutes. It is possible that these observations are of the same individual as the observations occurred in the same general location within the 800-m survey perimeter within 1 hour of each other. One of the flight minutes occurred in the 0–30 m height category, 4 minutes occurred in the 30–150 m height category, and 2 minutes occurred above 150 m. One eagle observation was recorded as soaring for 2 minutes and circle soaring for 2 minutes. The second observation was recorded as powered flight for 1 minute and circle soaring for 2 minutes. At MH6, one golden eagle was observed on one survey day for a total of 4 flight minutes. Two of the flight minutes were recorded within the 0–30 m height category and 2 flight minutes were recorded within 30–150 m. Two of these flight minutes were recorded as gliding, 1 minute was recorded as powered flight, and 1 minute was recorded as hovering (Table 4).

Within the Lower Miller Hill MCP, at PG1 one golden eagle was observed on one survey day for a total of 2 flight minutes. Both flight minutes occurred in the 0–30 m height category. Both minutes of this observation were recorded as powered flight. At PG2, two golden eagle observations were made on two separate days for a total of 8 flight minutes. One of these flight minutes occurred within the 0–30 m height category, one occurred within 30–150 m, and six flight minutes were above 150 m. One observation was recorded as soaring for 5 minutes and circle soaring for 2 minutes; the second observation was recorded as powered flight for 1 minute. At PG3, one golden eagle was observed in flight on one survey day for a total of 4 flight minutes, and one bald eagle was observed on a different survey day for 2 minutes. For the golden eagle observation, all of the 4 flight minutes occurred above 150 m. For the bald eagle observation both flight minutes occurred within the 0–30 m height category. The golden eagle was recorded as circle soaring for all 4 minutes, and the bald eagle was recorded as powered flight for 2 flight minutes. At PG5, two golden eagle observations were made on two separate days for a total of 8 flight minutes. Two of these flight minutes occurred within the 30–150 m height category, while 6 minutes occurred above 150 m. One golden eagle observation was recorded as circle soaring for 4 minutes and soaring for 2 minutes; the second observation was recorded as soaring for 2 minutes (Table 4).

Within the Sage Creek Rim MCP, at SCR1 one golden eagle was observed in flight on a single survey day for 2 minutes. Both flight minutes occurred within the 0–30 m height category, and the flight behavior for both minutes was recorded as gliding. At SCR2, six golden eagle observations were made across four survey days for a total of 9 flight minutes. Five of these flight minutes occurred within the 0–30 m height category, 3 minutes occurred within 30–150 m, and 1 minute occurred above 150 m. On one survey day, two golden eagles were observed together and both were recorded as gliding for 2 minutes (total of 4 minutes for both individuals). Another survey day one golden eagle was recorded as soaring for 1 minute and circle soaring for 1 minute. On the third survey day, one golden eagle was recorded as powered flight for 1 minute, and a second golden eagle observation (possibly the same individual) on the same day was recorded as powered flight for 1 minute. On the final survey day, one golden eagle was observed as gliding for 1 minute (Table 4).

The majority of golden eagle flight minutes recorded within Project site during the August 20 to November 9, 2012 survey period are not independent as most were generated by only a few eagles. In the Chokecherry WDA, 40% of all golden eagle flight minutes were associated with only 1 of 7 total observations (Table 3, 8 minutes of flight time at CC8 on September 7). Similarly, 45% of the golden eagle flight minutes in the Sierra Madre WDA occurred between just 3 of the 13 total observations (Table 4, 7 minutes of flight time at PG2 on August 21, 7 minutes of flight time at MH1 on August 27, and 6 minutes of flight time at PG5 on October 4).

Treatment of these data as independent observations will overstate the expected impacts to eagles. In the case of the data described in the paragraph above, treating the 28 minutes of observed eagle use as independent is the equivalent of stating that 28 eagles were observed in flight for one minute each. This assumption of independence is not valid for these data and should be accounted for in future planning efforts and analysis of potential Project impacts to eagles.

COMPARISON TO PREVIOUS SURVEY RESULTS

As a result of PCW's re-design efforts, golden eagle use in the WDAs during the August 20 to November 9, 2012 survey period was substantially lower than the same period in 2011. Golden eagle use during the August 20 to November 9, 2012 survey period was 0.0022 flight minute per minute of survey compared with 0.0038 flight minute per minute of survey during the August to November 2011 survey period, a decrease in use of more than 42%. The reduction in golden eagle use estimates between the two survey periods are due to the establishment of Turbine No-Build Areas where high eagle-use was documented from 2011 survey data and demonstrates the avoidance and minimization benefits of PCW's re-design efforts. In PCW's Eagle Conservation Plan Supplement submitted to the Service on September 26, 2012, it was demonstrated that the establishment of the Turbine No-Build Areas would substantially reduce observed eagle use. The reduction in use observed during the survey period included in this report is consistent with the findings presented in the September 26, 2012, Eagle Conservation Plan Supplement.

Overall use for bald eagle during the August 20 to November 9, 2012 survey period was 0.00007 flight minute per minute of survey compared to 0.0008 during the August to November 2011 survey period, a reduction of more than 91%. This reduction in use between the two survey periods also demonstrates the avoidance and minimization value of PCW's Project re-design that includes Turbine No-Build Areas.

Golden eagle use for the Chokecherry WDA during the August 20 to November 9, 2012 survey period was calculated as 0.0015 flight minute per survey minute compared with 0.0037 during the August to November 2011 survey period, a 60% decrease in use resulting from PCW's identification of Turbine No-Build Areas in multiple eagle use areas that were identified during 2008–2009, 2011, and 2012 survey efforts.

No bald eagles were observed in the Chokecherry WDA during the August 20 to November 9, 2012 survey period, compared with bald eagle use of 0.0003 flight minute per survey minute during the August to November 2011 survey period.

Golden eagle use for the Sierra Madre WDA during the August 20 to November 9, 2012 survey period was 0.0029 flight minute per survey minute compared with 0.0038 during the August to November 2011 survey period, a 24% decrease in use resulting from PCW's identification of Turbine No-Build Areas in multiple eagle use areas that were identified during 2008–2009, 2011, and 2012 survey efforts.

Bald eagle use for the Sierra Madre WDA during the August 20 to November 9, 2012 survey period was 0.0001 flight minute per minute of survey compared with 0.0012 during the August to November 2011 survey period, a 91% decrease in use resulting from PCW's identification of Turbine No-Build Areas in multiple eagle use areas that were identified during 2008–2009, 2011, and 2012 survey efforts.

Table 1. Number of Survey Minutes, Days, Individuals, Golden Eagle Flight Minutes, and Height Categories for all Survey Locations in the Chokecherry WDA.

MCP	Location	Survey Minutes	Number of Individual Eagles	Golden Eagle Flight Minutes	Minutes within 0–30 m	Minutes within 30–150 m (RSZ)	Minutes above 150 m
Nevins Ridge	CC1	720	0	0	0	0	0
	CC2	720	0	0	0	0	0
	CC3	698	1	2	1	1	0
	CC4	720	2	4	2	2	0
	CC5	720	0	0	0	0	0
	CC6	716	2	4	1	1	2
	CC7	780	0	0	0	0	0
	CC8	720	2	8	0	0	8
	CC9	720	0	0	0	0	0
Coal Mine Draw	CMD1	780	0	0	0	0	0
	CMD2	720	0	0	0	0	0
Hogback	HB1	720	0	0	0	0	0
	HB2	720	0	0	0	0	0
Smith Rim	SR1	720	1	2	0	0	2
	SR2	720	0	0	0	0	0
Upper Hugus Draw	UH1	762	0	0	0	0	0
	UH2	720	0	0	0	0	0
Upper Iron Springs	UI1	720	0	0	0	0	0
	UI2	720	0	0	0	0	0
Total	–	**13,816**	**8**	**20**	**4**	**4**	**12**

Table 2. Number of Survey Minutes, Days, Individuals, Golden Eagle Flight Minutes, and Height Categories for all Survey Locations in the Sierra Madre WDA.

MCP	Location	Survey Minutes	Number of Individual Eagles	Golden Eagle Flight Minutes	Minutes within 0–30 m	Minutes within 30–150 m (RSZ)	Minutes above 150 m
Sage Creek Basin	CB1	780	0	0	0	0	0
	CB2	720	0	0	0	0	0
	CB3	600	0	0	0	0	0
	CB4	840	0	0	0	0	0
Upper Miller Hill	MH1	720	2	7	1	4	2
	MH2	720	0	0	0	0	0
	MH3	780	0	0	0	0	0
	MH4	720	0	0	0	0	0
	MH5	780	0	0	0	0	0
	MH6	720	1	4	2	2	0
Lower Miller Hill	PG1	720	1	2	2	0	0
	PG2	720	2	8	1	1	6
	PG3	720	1	4	0	0	4
	PG4	840	0	0	0	0	0
	PG5	780	2	8	0	2	6
	PG6	600	0	0	0	0	0
	PG7	720	0	0	0	0	0
	PG8	840	0	0	0	0	0
	PG9	600	0	0	0	0	0
Sage Creek Rim	SCR1	720	1	2	0	2	0
	SCR2	720	6	9	5	3	1
Total	**–**	**15,360**	**16**	**44**	**11**	**14**	**19**

Table 3. Summary of Golden Eagle Observations in the Chokecherry WDA.

Date and Time of Observation	Location	Number of Golden Eagle Observed	Golden Eagle Observations per Survey Minute	Golden Eagle Flight Minutes	Flight Minutes in RSZ	Flight Behavior (minutes)
9/7/2012 15:33 15:45	CC8	2	0.0028	2 (1st Obs.) 6 (2nd Obs.)	0	1st Obs. Soaring (2) 2nd Obs. Display (1) Gliding (1) Soaring (4)
9/26/2012 15:35	CC4	1	0.0028	1	1	Gliding/ Powered Flight (1)
09/27/2012 15:24	CC6	1	0.0028	2	0	Soaring (2)
10/2/2012 10:23	CC6	1		2	1	Gliding (1) Soaring (1)
10/11/2012 12:47	SR1	1	0.0014	2	0	Soaring (2)
10/25/2012 17:22	CC3	1	0.0014	2	1	Gliding (1) Powered Flight (1)
11/1/2012 15:48	CC4	1	0.0028	3	1	Gliding (3)

Table 4. Summary of Golden Eagle Observations in the Sierra Madre WDA.

Date and Time of Observation	Location	Number of Golden Eagle Observed	Golden Eagle Observations per Survey Minute	Golden Eagle Flight Minutes	Flight Minutes in RSZ	Flight Behavior (minutes)
8/21/2012 13:10	PG2	1	0.0028	7	1	Circle Soaring (2) Soaring (5)
8/22/2012 12:08	SCR1	1	0.0014	2	2	Gliding (2)
08/24/2012 9:13 10:07	MH1	2	0.0028	4 (1st Obs.) 3 (2nd Obs.)	4	1st Obs. Circle Soaring (3) Soaring (1) 2nd Obs. Circle Soaring (2) Powered Flight (1) Possibly the same individual
8/28/2012 11:56	PG3	1	0.0014	4	0	Circle Soaring (4)
9/7/2012 7:51	SCR2	2 (paired flight)	0.0083	4	0	Gliding (4)
10/4/2012 12:21	PG5	1	0.0026	6	0	Circle Soaring (4) Soaring (2)
10/12/2012 10:41	SCR2	1	0.0083	2	2	Circle Soaring (1) Soaring (1)
10/15/2012 17:19	PG2	1	0.0028	1	0	Powered Flight (1)
10/16/2012 8:46	PG1	1	0.0014	2	0	Powered Flight (2)
10/19/2012 17:07 17:24	SCR2	2	0.0083	2	1	1st Obs. Powered Flight (1) 2nd Obs. Powered Flight (1) Likely the same individual
10/31/2012 13:35	SCR2	1	0.0083	1	0	Gliding (1)
11/6/2012 09:07	MH6	1	0.0014	4	2	Gliding (2) Hovering (1) Powered Flight (1)
11/8/2012 15:04	PG5	1	0.0026	2	2	Soaring (2)

Appendix A:

August 20-November 9, 2012

800-meter Raptor Survey Protocols
Chokecherry and Sierra Madre Wind Energy Project

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August 20-November 9, 2012, 800-meter Raptor Survey Protocols

Chokecherry and Sierra Madre Wind Energy Project

Prepared for:

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August 31, 2012

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Introduction

The Power Company of Wyoming LLC (PCW) recently initiated revisions to the methodologies currently used to survey for raptors at the Chokecherry and Sierra Madre Wind Energy Project (Project). Based on conversations with U.S. Fish and Wildlife Service (Service) personnel, and in an effort to collect data that are appropriate for use in the Service's model that predicts the potential fatality rate of eagles for wind energy projects (hereafter, the Service's model), raptor survey protocols were revised for the fall 2012 season and for future raptor survey efforts. These survey methodology revisions are fully compliant with the recommendations for raptor surveys set forth by the Service in their Draft Eagle Conservation Plan Guidance (Draft ECP Guidance), the Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices (Technical Appendices; as received from Kevin Kritz, Service Region 6, on August 4, 2012), and the Land-Based Wind Energy Guidelines, while still maintaining expansive coverage of the Project site.

Year Two and Year Three 4,000-meter-radius long-watch raptor surveys were fully compliant with the recommendations set forth by the Service's Draft ECP Guidance (Service 2011) and Land-Based Wind Energy Guidelines (Service 2012a), the Bureau of Land Management's (BLM's) Wildlife Survey Protocols for Wind Energy Development (BLM 2008), and the Wyoming Game and Fish Department's (WGFD's) Wildlife Protection Recommendations for Wind Energy Development (WGFD 2010). These surveys were successful in identifying concentrated raptor use areas across the Project that could be used to design avoidance areas in order to minimize avian impacts. Additionally, 4,000-meter data were instructive in showing the Project site is not a strong migratory corridor for raptors, and the flight paths digitized from these data were used to identify high eagle-use areas as recommended by the Service's Technical Appendices (Service 2012b).

Because the Service's model requires data from 800-meter point count survey efforts, the 4,000-meter data were truncated to include only those observations that occurred within 800 meters (Figure 1). However, due to the 4,000-meter raptor count locations being placed on promenades, ridgelines, and in areas where there was an expectation of high raptor use, estimates of use, and therefore risk calculations that were developed for use across the entire Project site, were overstated due to many of these data being collected in identified high-use areas. Because use estimates were being driven upwards for the Project by many of the data being collected in high-use areas, unrealistic projections of eagle risk were being generated by the Service's model. This in part facilitated the revision to survey protocols.

800-meter Raptor Survey Protocols

The revised raptor count protocols follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices (Service 2012b), and are also in accordance with the aforementioned guidance documents produced by the Service, BLM, and WGFD. PCW also sought consultation with Dr. Joshua Millspaugh (Professor of Wildlife Management, University of Missouri) to ensure the development of a rigorous sampling design that would result in the collection of data appropriate for the analysis methods and fatality model currently being used by the Service.

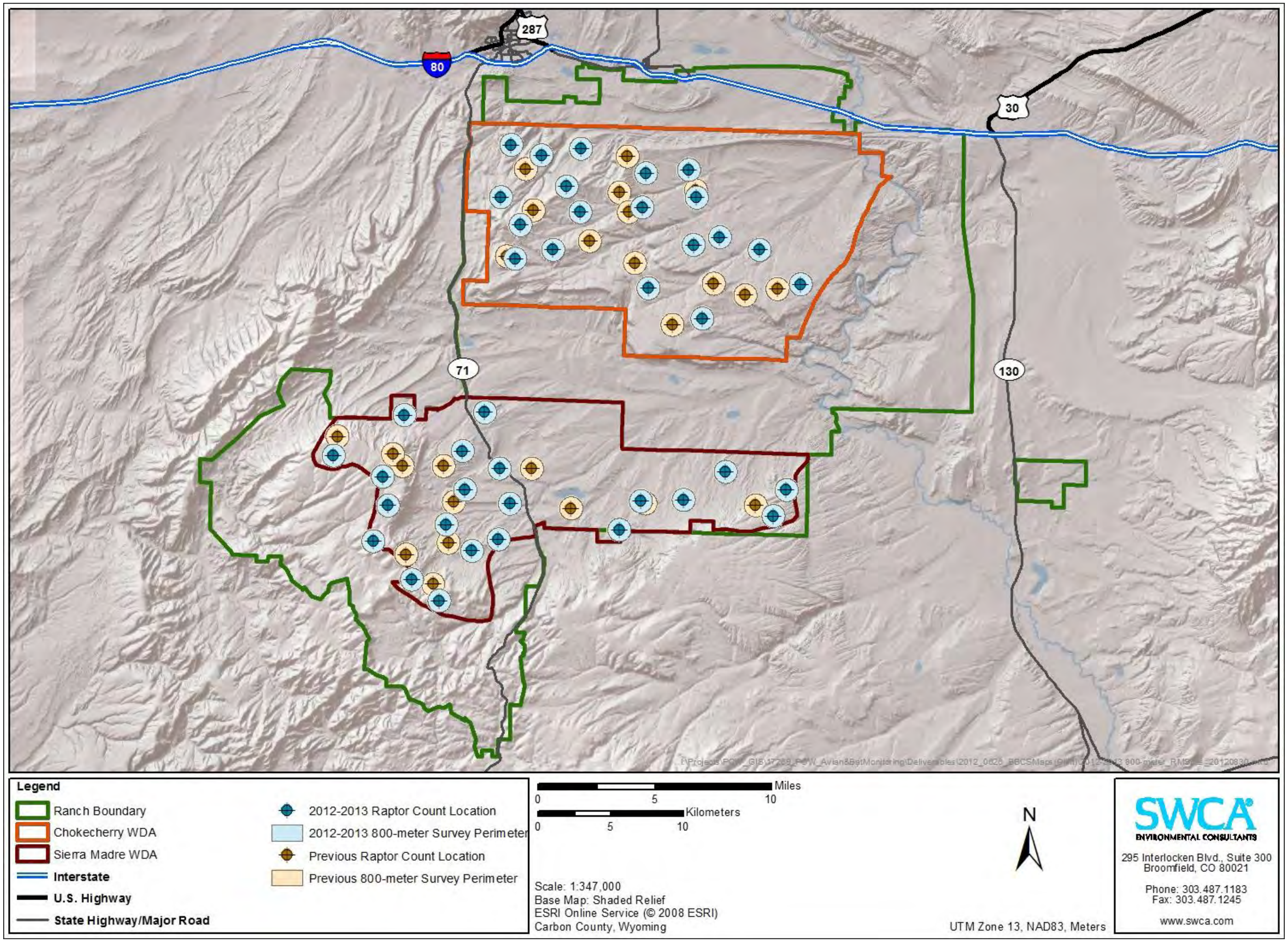

Figure 1. All 800-meter raptor count locations and survey perimeters on the Project site.

Based upon agency guidance and logistical considerations, the revised protocols were designed to include 40, 800-meter raptor count locations throughout areas of the Project site where turbine development was likely (Figure 1). Locations were selected using a spatially balanced random selection process with the number of 800-meter raptor count locations per area determined by the relative turbine density in the different areas of the Project. Raptor count locations were selected such that no overlap occurs between survey locations or with the avoidance areas that PCW has committed to as part of the Project Eagle Conservation Plan (ECP). Once the initial 800-meter raptor count locations were selected, some minimal micrositing of the locations was conducted to ensure full visibility of the survey areas and safe and consistent accessibility on the part of field personnel. Coordinates for each of the final 800-meter raptor survey locations are listed in Table 1. Landmarks and lathe stakes were located within each survey location perimeter to provide distance references for field personnel completing survey efforts. When the 800-meter radius survey areas of the new 40 point count locations are combined with the 800-meter radius survey areas of the Year Two and Year Three sites, 34.7% of the probable development areas are covered by raptor count surveys, which is greater than the 30% recommendation made by the Service (Service 2012b).

Table 1. Names and Coordinates for 2012 – 2013 800-meter Raptor Count Locations.

Location	Easting	Northing	Location	Easting	Northing
CB1	326414	4597515	MH4	305024	4594675
CB2	321985	4595451	MH5	309573	4590571
CB3	323462	4597428	MH6	306043	4597131
CB4	329306	4599449	PG1	313663	4594801
CC1	316611	4621251	PG2	311358	4598224
CC2	315166	4616447	PG3	307172	4603361
CC3	318351	4619090	PG4	314434	4597259
CC4	314539	4621971	PG5	313730	4599682
CC5	317418	4614741	PG6	312721	4603547
CC6	319335	4621702	PG7	310058	4595825
CC7	313825	4618366	PG8	311832	4594006
CC8	314807	4614119	PG9	311187	4600886
CC9	319294	4617332	SCR1	333505	4598194
CMD1	334482	4612363	SCR2	332597	4596408
CMD2	331648	4614732	SR1	323560	4617658
HB1	323818	4620014	SR2	327318	4618336
HB2	326781	4620243	UH1	328912	4615606
MH1	302291	4600564	UH2	327099	4615081
MH2	305677	4599125	UI1	323987	4612091
MH3	307684	4592030	UI2	327702	4610001

Surveys will be conducted at each raptor count location for two hours per guidance in the Technical Appendices (Service 2012b). Two avian technicians will each survey two locations a day for a total of 20 locations per week. Each location will be surveyed bi-weekly. A schedule for all 40 raptor count locations was designed to provide survey coverage across all daylight hours for each of the 40 sites. The schedule was also designed such that the four raptor count surveys conducted on any given day are separated temporally and spatially to provide independence of any observations that are made.

Avian technicians are equipped with binoculars, spotting scopes, laser rangefinders, and aerial maps to assist with accurate detection and documentation of all raptors observed within the 800-meter survey area. Each aerial map is displayed with relevant landforms occurring in the area, locations of lathe stakes, and concentric rings at each 200-meter interval to facilitate accurate distance estimation (Attachment 1). Each raptor flight path is recorded by technicians on the provided aerial maps. Additional data collected include species, number of individuals per observation, age, sex, behavior, bearing to bird, distance to bird, heading of bird, altitude of bird, the beginning and ending time for each observation, and hourly weather data (Attachment 2).

At present, the 800-meter raptor counts are scheduled to continue bi-weekly at each location through the fall migration period (November 15). Surveys are tentatively slated to occur once per month at each location during the winter season (December 2012 through March 2013) due to accessibility and safety concerns. The end of winter surveys in March 2013 will complete three full years of data collection for the Project. Consultations are ongoing with Service personnel to determine the scope of potential survey efforts beyond March 2013.

References

Bureau of Land Management (BLM). 2008. Wildlife Survey Protocols for Wind Energy Development.

U.S. Fish and Wildlife Service (Service). 2011. Draft Eagle Conservation Plan Guidance. Available online at http://www.fws.gov/windenergy/. Accessed December 2011.

———. 2012a. Land Based Wind Energy Guidelines. Wind Turbine Guidelines Advisory Committee. U.S. Fish and Wildlife Service, Department of the Interior, Washington D.C. Available online at http://www.fws.gov/windenergy/docs/WEG_final.pdf. Accessed August 2012.

———. 2012b. Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices. Received from Kevin Kritz, Service Region 6, on August 4, 2012.

Wyoming Game and Fish Department (WGFD). 2010. Wildlife Protection Recommendations for Wind Energy Development in Wyoming. Wyoming Game and Fish Commission Approved November 17, 2010. Wyoming Game and Fish Department, Cheyenne, WY.

ATTACHMENT 1

Example Aerial Map Used to Map Flight Paths during 800-meter Raptor Count Surveys

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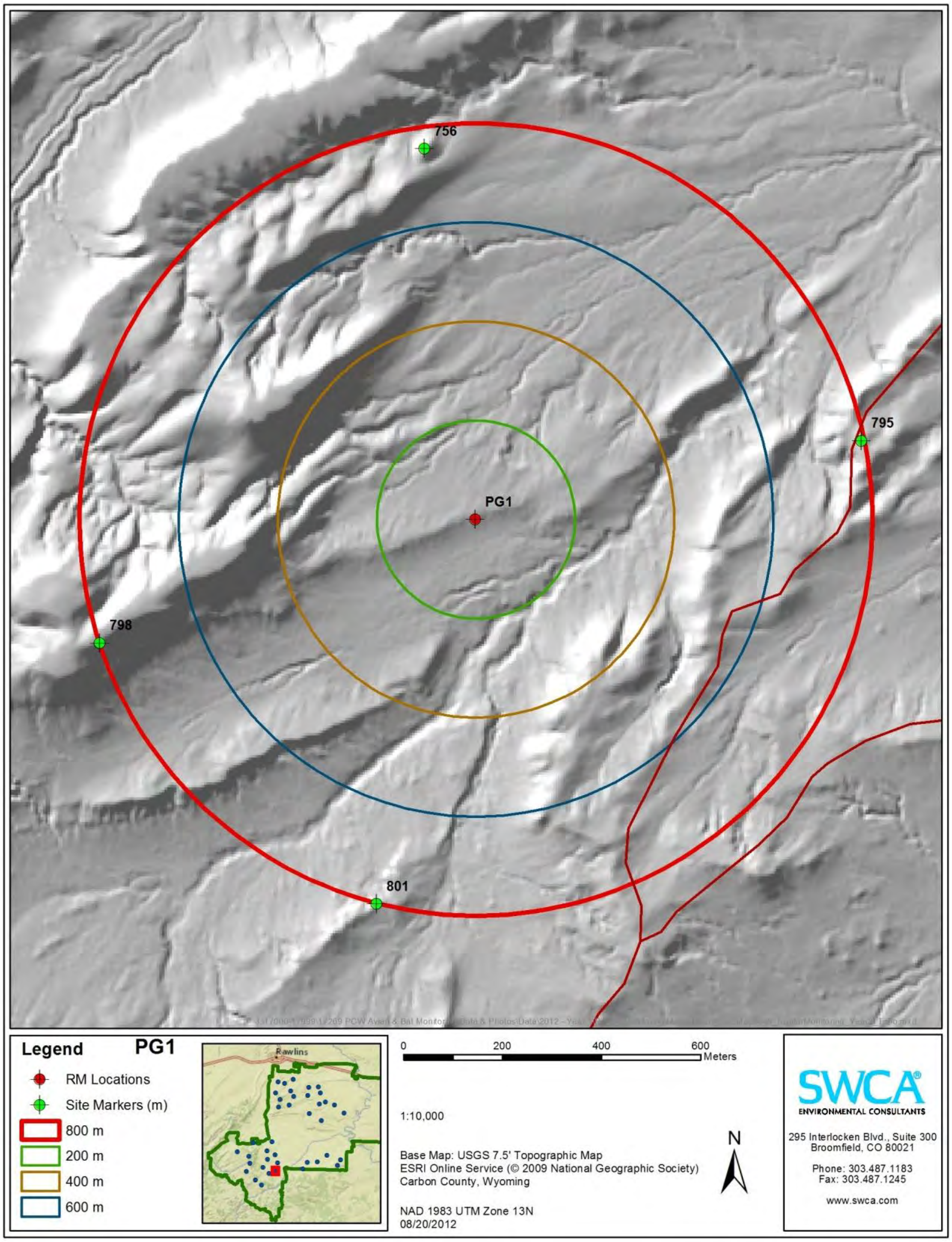

Aerial map example.

ATTACHMENT 2

Data Sheets Used to Collect Data during 800-meter Raptor Count Surveys

PCW 2011 Raptor Survey

Field Observer: ________________________ **Survey Location:** ____________

Start time: ____________

End time: ____________

Date: _________________

Page: ____ **of** _____

Target #	Obs #	Species	# Birds	Age	Sex	Behav	Bearing to Bird (°)	Distance to Bird (m)	Angle of Bird (°)	Heading of Bird	0-30	30-150	150+	Time Begin	Time End

PCW 2011 Raptor Survey Notes

Field Observer: ______________________________ **Survey Pt:** ____

Date: ______________ **Page:** _____ of _____

Other species and Notes:

Weather Conditions

Time	Sky	Wind Dir	Wind Spd	Temp (°F)

Incidental Species Observations

November 12, 2012, through March 29, 2013, Eagle Summary Report

Chokecherry and Sierra Madre Wind Energy Project

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May 2013

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EXECUTIVE SUMMARY

Between November 12, 2012, and March 29, 2013, SWCA Environmental Consultants performed raptor count surveys as part of Power Company of Wyoming, LLC's (PCW's) ongoing avian survey program at the Chokecherry and Sierra Madre Wind Energy Project (Project) site. The survey period captures winter eagle use, spring migration, and early nesting activities within the Project site. This report documents use during these eagle use periods.

For this survey period, 86 minutes of golden eagle (*Aquila chrysaetos*) use were recorded within the Project site during 30,523 survey minutes (508.72 hours) for 0.0028 flight minute per minute of survey. Of the recorded eagle flight minutes, 59.3% were outside the Rotor Swept Zone (RSZ). By altitudinal classification, 24.4% of the golden eagle flight minutes were below the RSZ (0 to 30 meters above ground), 40.7% of the golden eagle flight minutes were within the RSZ (30 to 150 meters), and 34.9% of the golden eagle flight minutes were above the RSZ (above 150 meters).

For the Chokecherry Wind Development Area (WDA), 31 minutes of golden eagle use were recorded during 16,003 survey minutes (266.72 hours) for 0.0019 flight minute per minute of survey. In total, 268 survey sessions were conducted during which 12 golden eagle observations were recorded during eight of the sessions.[1] Observation times ranged between 1 minute and 4 minutes, rounded up to the nearest whole minute. Of the recorded use in the Chokecherry WDA, 64.5% occurred outside the RSZ.

For the Sierra Madre WDA, 55 minutes of golden eagle use were recorded during 14,520 survey minutes (242.00 hours) for 0.0038 flight minute per minute of survey. In total, 242 survey sessions were conducted during which 17 golden eagle observations were recorded during 13 of the sessions[2]. Observation times ranged between 1 minute and 8 minutes, rounded up to the nearest whole minute. More than 56% of all use within the Sierra Madre WDA occurred outside the RSZ.

During the survey period, there were no observations of bald eagles (*Haliaeetus leucocephalus*).

[1] Two observations were possibly of the same golden eagle as the observations were made during the same session at SR1 within 45 minutes of each other.
[2] Two observations were likely of the same juvenile golden eagle as the observations were made during the same session at CB4 and in the same general location.

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INTRODUCTION AND PROJECT DESCRIPTION

Surveys described in this report are part of the avian survey program directed towards identifying eagle and raptor use across the Chokecherry and Sierra Madre Wind Energy Project (Project) site. The survey data will be used for modeling eagle collision risk and developing avoidance measures and Best Management Practices to reduce potential Project impacts to eagles, to the extent practicable. All protocols and survey methodologies used to assess avian species in the Project site during surveys in 2011, 2012, and 2013 were developed in consultation with the U.S. Fish and Wildlife Service (Service), and are in accordance with recommendations made by the Service, the Bureau of Land Management (BLM), and the Wyoming Game and Fish Department (WGFD). Appendix A contains the protocols used to collect eagle use data for the period of this report.

This report summarizes the data from the November 12, 2012 to March 29, 2013 raptor counts and captures winter eagle use, spring migration, and early nesting activities within the Project site. It is one of four reports covering 12 consecutive calendars months from August 2012 to August 2013. Report 1 covers the period of August 20 to November 9, 2012; this report covers the period of November 12, 2012, to March 29, 2013. Subsequent reports will roughly correspond to 1) incubation, nesting, and chick rearing periods in spring and early summer; and 2) fledging and summer use.

In 2012, based on the extensive avian data that have been collected for the Project, Power Company of Wyoming, LLC (PCW) substantially re-designed the Project and identified Turbine No-Build Areas. These designated Turbine No-Build Areas have relatively higher eagle use than other areas of the Project and PCW has committed to not build turbines in these areas. This will substantially contribute to avoiding and minimizing collision risk to eagles. Next, to assess use by eagles and other raptors in the remaining potential wind development areas (WDAs), surveys were initiated during August 2012 at 40, 800-meter (m) survey locations across the probable turbine footprint outside of the Turbine No-Build Areas. After further consultation with the Service, the survey program was increased to 60, 800-m survey locations (Figures 1 and 2) for surveys occurring from mid-November 2012 through August 2013. The increased survey locations achieve coverage of 30% of the probable turbine locations for the Project as recommended by the Service. The addition of 20 survey locations also allowed the inclusion of seven sites that were previously surveyed in 2011 and early 2012 for further analysis.

Selection of the 60, 800-m survey locations was achieved using a spatially balanced sampling design used to capture the variability in habitat conditions, terrain features, and turbine numbers and densities. Minimum convex polygons[3] (MCPs) were placed around potential turbine construction areas in the Project site that are separated by the Turbine No-Build Areas established by PCW (Figures 1 and 2). MCPs were evaluated for differences in habitat characteristics, forage potential, and topography. While differences in habitat characteristics,

[3] MCPs were generated using the ArcGIS Spatial Analyst minimum bounding geometry function with the minimum convex hull option selected.

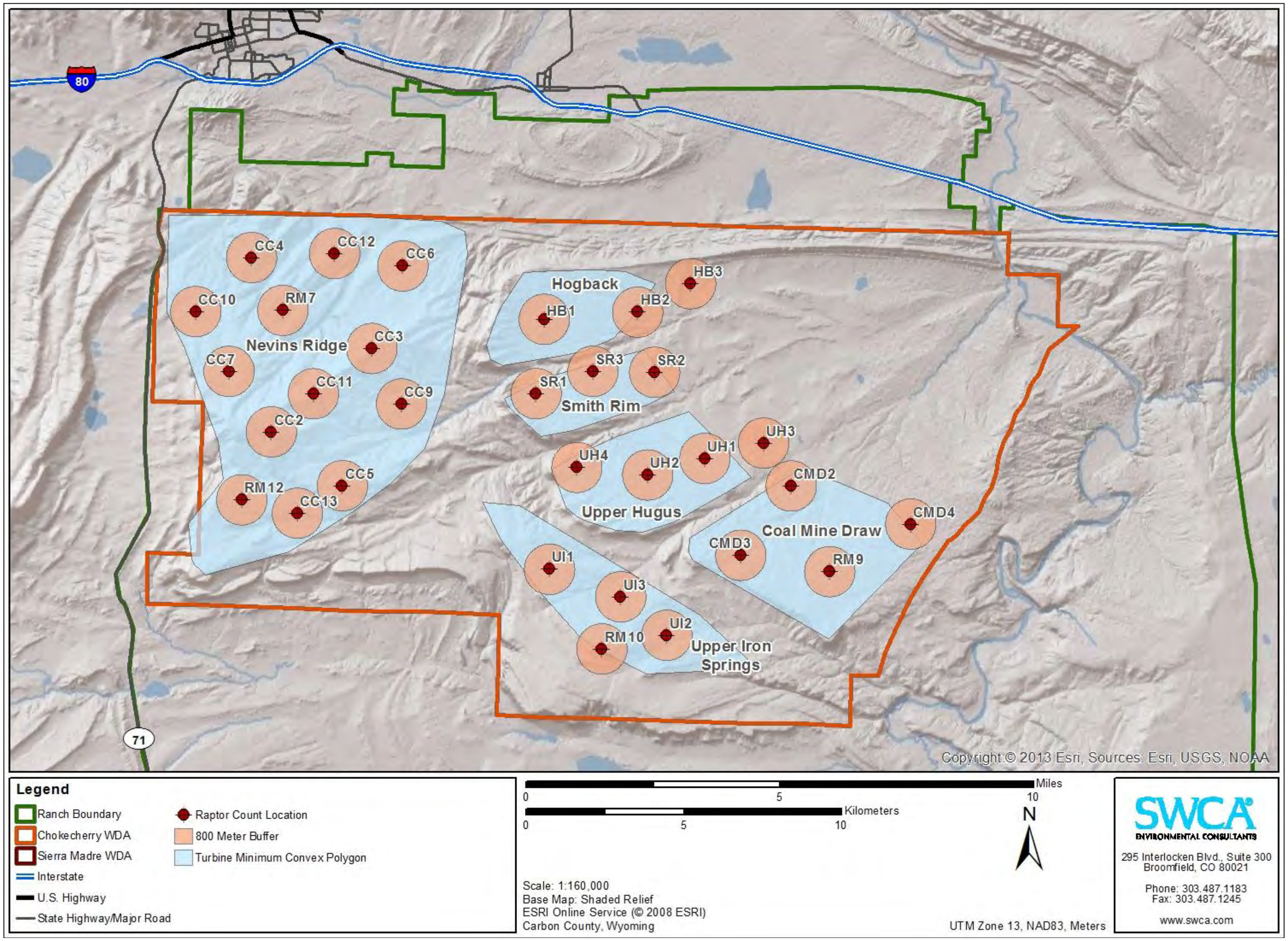

Figure 1.Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Chokecherry.

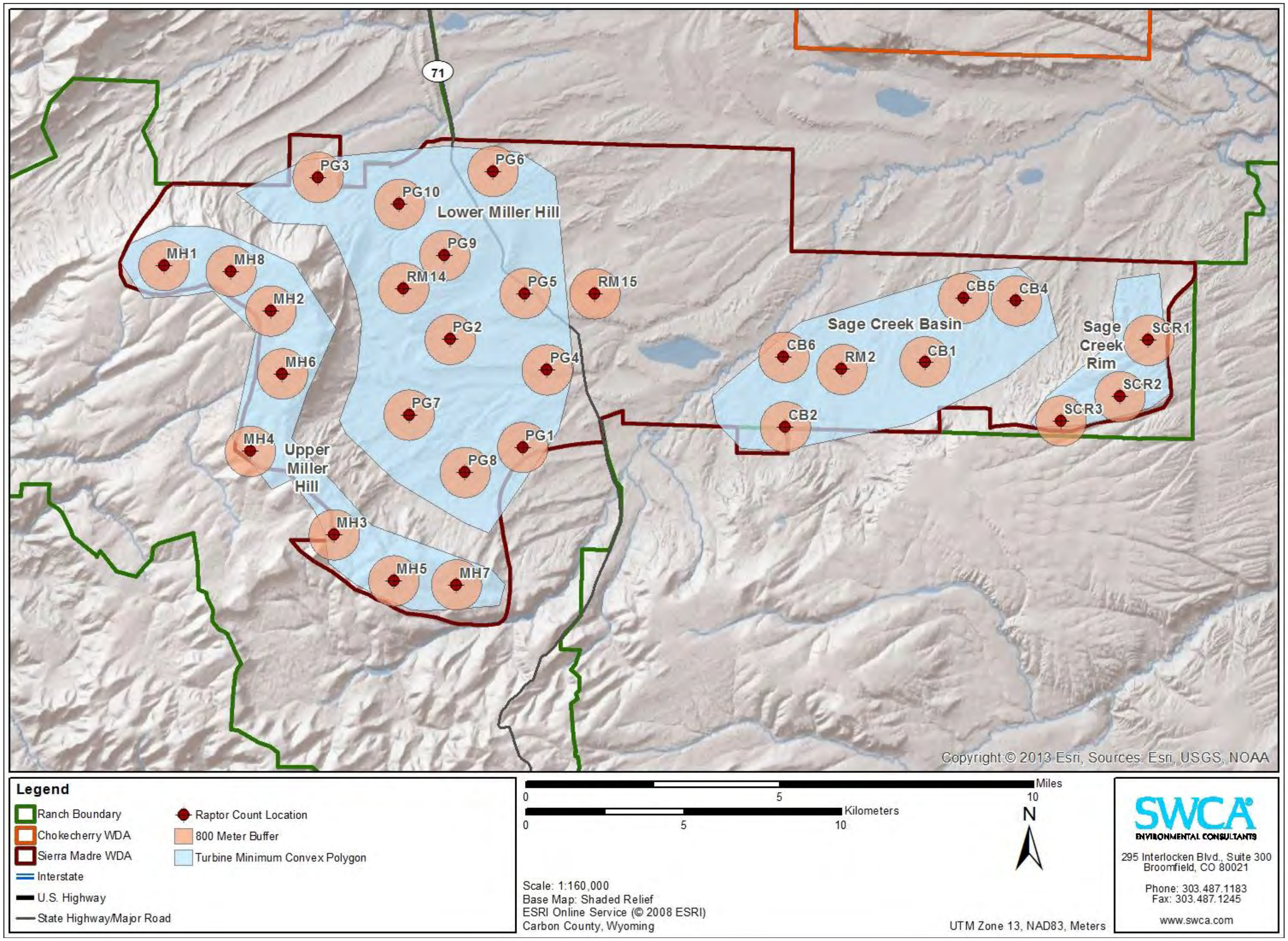

Figure 2. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Sierra Madre.

forage potential, and topography occur among the 10 discrete MCPs, within each MCP these factors are similar and additional stratification beyond the MCP level was not necessary. Using Geostatistical Analyst tools in ArcGIS, spatially balanced survey locations were sequentially selected in a manner that is consistent with the recommendations made by the Service while ensuring that no overlap occurs between survey locations. Total number of sampling locations per MCP was based on the relative surface area, number of turbines, and turbine densities in each MCP.

Raptor surveys documented in this report occurred from November 12, 2012, through March 29, 2013. Surveys occurred at 60 survey locations across the Project site, with 31 survey locations in the Chokecherry WDA and 29 survey locations in the Sierra Madre WDA (Figures 1 and 2). Surveys were designed to occur at each of the 60 survey locations for 1 hour per survey date in accordance with guidance from the Service. Three avian technicians each surveyed two survey locations per day resulting in surveys of six survey locations per day and 60 survey locations in a 10-day period. The schedule was designed and implemented to provide survey coverage across all daylight hours for each of the 60 survey locations. The schedule was also designed such that the six raptor count surveys conducted on any given day were separated temporally and spatially to increase the likelihood of independence of any observations made.

Each survey location was scheduled to be surveyed twice per month; however, inclement winter weather and associated safety concerns occasionally limited the technicians' ability to successfully complete surveys. The majority of the 60 survey locations were visited nine times during the survey period. A few were visited 10 times and two survey locations on Upper Miller Hill (the highest elevation point within the Project site) were only visited five times due to extreme and dangerous winter conditions and deep snow. While the relatively mild winter allowed vehicle or all-terrain vehicle access to most survey locations, the more extreme survey locations required snow-machines to access. However, as shown in the data, except for one golden eagle (*Aquila chrysaetos*) observation at MH8 (behavior recorded as powered flight), there were no other eagle observations on Upper Miller Hill during the survey period. Therefore, notwithstanding the inability to reach all survey locations nine times as planned, the data collected are consistent with the Service's recommendations for eagle use data.

Surveys were completed across all daylight hours in accordance with the Service's recommendations. Each raptor flight path was recorded by technicians on aerial maps. Additional data collected included species, number of individuals per observation, age, sex, behavior, azimuth to bird, distance to bird, heading of bird, altitude of bird, the beginning and ending time for each observation, interactions with other birds, and hourly weather data among other variables. Appendix A to this report contains the detailed protocols used to collect the data.

RESULTS AND DISCUSSION

During the November 12, 2012 to March 29, 2013 survey period, 510 individual surveys were conducted across both WDAs for a total of 30,523 survey minutes (508.72 hours; Tables 1 and 2). Generally, survey minutes were evenly distributed across the 60 survey locations but varied slightly at some survey locations due to safety and accessibility issues caused by inclement weather.

During the November 12, 2012 to March 29, 2013 survey period, golden eagles were observed in flight for a total of 86 minutes (Tables 1 and 2). Overall use for golden eagle during this survey period was 0.0028 flight minute per minute of survey. This use value is the total use without consideration of flight heights and proportion of time in the Rotor Swept Zone (RSZ). Use in the Chokecherry WDA during this survey period was 0.0019 flight minute per minute of survey while use in the Sierra Madre WDA was 0.0038 flight minute per minute of survey. No bald eagles (*Haliaeetus leucocephalus*) were detected during the November 12, 2012 to March 29, 2013 survey period.

All eagle flight minutes recorded during the November 12, 2012 to March 29, 2013 survey period were subdivided into altitudinal categories as recorded during field surveys (below RSZ = 0–30 m, within RSZ = 30–150 m, above RSZ = above 150 m) to determine the proportion of time eagles flew through the RSZ (30–150 m) and therefore at risk of collision. These altitudinal categories were developed to reflect the actual turbine heights that will be used for the Project. Of the 86 total golden eagle flight minutes, 21 minutes (24.4%) were recorded within the 0–30 m bin, 35 minutes (40.7%) were recorded within the 30–150 m bin, and 30 minutes (34.9%) were recorded above 150 m (Tables 1 and 2). When considering observed flight heights, total use across the Project site in the RSZ where collisions could occur was 0.0011 minute of flight time per minute of survey, a decrease of nearly 60% compared to total flight minutes.

Results and Discussion of Chokecherry Use Observations

Surveys in the Chokecherry WDA were conducted at 31 locations for a total of 16,003 minutes during the November 12, 2012 to March 29, 2013 survey period. During this survey period, golden eagles were observed in flight at eight of the 31 survey locations for a total of 31 minutes (Table 1). Golden eagle use for the Chokecherry WDA during this survey period was calculated as 0.0019 flight minute per survey minute.

Nine of the 31 golden eagle flight minutes (29%) occurred within the 0–30 m altitudinal bin, 11 minutes (35.5%) occurred within the 30–150 m bin, and the remaining 11 minutes (35.5%) occurred above 150 m (Table 1). In the Chokecherry WDA, 64.5% of all use occurred outside of the RSZ where eagles are not at risk for collision.

The eight sites in the Chokecherry WDA with golden eagle observations occurred within five of the MCPs: Nevins Ridge, Hogback, Smith Rim, Upper Hugus, and Upper Iron Springs (Figure 1). Survey locations within the Coal Mine Draw MCP all had zero eagle observations during the November 12, 2012 to March 29, 2013 survey period. Within the Nevins Ridge MCP, golden eagles were observed at CC2, CC7, and CC13; in the Hogback MCP, a golden eagle was observed at HB3; in the Smith Rim MCP, golden eagles were observed at SR1; in the Upper Hugus MCP, a golden eagle was observed at UH4; and in the Upper Iron Springs MCP, golden eagles were observed at UI1 and UI2 (Table 1).

Within the Nevins Ridge MCP, at CC2 one golden eagle was observed on one survey date for a total of 2 flight minutes; both minutes occurred above 150 m. Over the course of the 2 flight minutes, this individual's behavior was recorded as soaring. At CC7, two golden eagles were observed flying together on one survey date for a total of 6 flight minutes. One flight minute occurred in the 0–30 m height category, 1 minute occurred in the 30–150 m height category, and 4 minutes were recorded above 150 m. Both individuals' behavior was recorded circle soaring for 5 minutes and soaring for 1 minute. At CC13, two golden eagles were observed flying together on one survey date for a total of 10 flight minutes. Two of the flight minutes occurred in the 0–30 m height category, 6 minutes occurred in the 30–150 m height category, and 2 minutes occurred above 150 m. Both eagles' behavior was recorded as gliding for 6 minutes and soaring for 4 minutes (Table 3). It should be recognized that the majority of golden eagle flight minutes recorded in the Nevins Ridge MCP are not independent as most were generated by a few eagles using an area for an extended time.

Within the Hogback MCP in the Severson Flats development area, at HB3 one golden eagle was observed on one survey date for a total of 3 flight minutes, all of which occurred above 150 m. All 3 flight minutes for this observation were recorded as circle soaring (Table 3).

Within the Smith Rim MCP in the Severson Flats development area, at SR1 two golden eagle observations were made on a single day for a total of 4 flight minutes. It is possible that these observations are of the same individual as the observations occurred in the same general location within the 800-m survey perimeter within 45 minutes of each other. One flight minute occurred in the 0–30 m height category and 3 minutes occurred in the 30–150 m height category. The behavior for both observations was recorded as powered flight (Table 3).

Within the Upper Hugus MCP in the Severson Flats development area, at UH4 one golden eagle was observed on one survey date for a total of 1 flight minute, which occurred in the 30–150 m height category. The behavior for this observation was recorded as soaring (Table 3).

Within the Iron Springs MCP, at UI1 one golden eagle was observed on one survey date for a total of 1 flight minute, which occurred in the 0–30 m height category. The behavior for this observation was recorded as powered flight. At UI2, two golden eagles were observed flying together on a single day for a total of 4 flight minutes. All 4 flight minutes occurred in the 0–30 m height category, and the behavior was recorded as powered flight for all 4 minutes (Table 3).

Results and Discussion of Sierra Madre Use Observations

In the Sierra Madre WDA, surveys were conducted for 14,520 minutes during the November 12, 2012 to March 29, 2013 survey period. During this survey period, golden eagles were observed in flight at 10 of 29 survey locations for a total of 55 minutes (Table 2). Golden eagle use for the Sierra Madre WDA during this period was 0.0038 flight minute per survey.

Twelve of the 55 golden eagle flight minutes (21.8%) occurred within 0–30 m height category, 24 minutes (43.6%) occurred within 30–150 m, and the remaining 19 minutes

(34.6%) occurred above 150 m (Table 2). In the Sierra Madre WDA, more than 56% of all use occurred outside of the RSZ where eagles are not at risk for collision.

The 10 sites with eagle observations in the Sierra Madre WDA occurred within three of the MCPs: Sage Creek Basin, Upper Miller Hill, and Lower Miller Hill (Figure 2). Survey locations within the Sage Creek Rim MCP all had zero eagle observations during the November 12, 2012 to March 29, 2013 survey period. Within the Sage Creek Basin MCP, golden eagles were observed at CB1, CB2, CB4, and CB6. Within the Upper Miller Hill MCP, only one golden eagle was observed at MH8. Within the Lower Miller Hill MCP, golden eagles were observed at PG3, PG4, PG6, RM14, and RM15 (Table 2).

Within the Sage Creek Basin MCP, at CB1 two golden eagle observations were made on two separate days for a total of 5 flight minutes. Three flight minutes occurred within the 30–150 m height category and 2 minutes were above 150 m. One observation was recorded as gliding for 2 minutes, soaring for 1 minute, and powered flight for 1 minute. The second observation was recorded as powered flight for 1 minute. At CB2, one golden eagle was recorded on a single date for a total of 2 flight minutes, both of which occurred above 150 m. Both flight minutes for this observation were recorded as gliding. At CB4, two golden eagle observations were made on a single day for a total of 4 flight minutes. It is likely that these observations are of the same individual as both observations were recorded as juveniles and occurred in the same general location within the 800-m survey perimeter within 1 hour of each other. One flight minute was recorded in the 0–30 m height category, 1 minute was in the 30–150 m height category, and 2 minutes were above 150 m. One observation was recorded as hovering for 1 minute and powered flight for 1 minute. The second observation was recorded as gliding for 1 minute and powered flight for 1 minute. At CB6, two golden eagle observations were made on two separate days for a total of 6 flight minutes. One minute occurred in the 0–30 m height category, 1 minute occurred in the 30–150 m height category, and 4 minutes were above 150 m. One eagle observation was recorded as gliding for 1 minute and powered flight for 1 minute. The second observation was recorded as circle soaring for 4 minutes (Table 4).

In the Upper Miller Hill MCP, at MH8 one golden eagle was observed on a single date for a total of 2 flight minutes. One minute occurred in the 0–30 m height category and 1 minute occurred in the 30–150 m height category. Both minutes were recorded as powered flight (Table 4).

In the Lower Miller Hill MCP, at PG3, two golden eagles were observed flying together on one survey date for a total of 10 flight minutes. Four minutes occurred in the 30–150 m height category and 6 minutes were above 150 m. All 10 flight minutes were recorded as circle soaring. At PG4, two golden eagles were observed flying together on one survey date for a total of 7 flight minutes. Four flight minutes occurred in the 30–150 m height category and 3 minutes were above 150 m. Four minutes were recorded as soaring and 3 minutes were recorded as circle soaring. At PG6, one golden eagle was observed on a single date for a total of 2 flight minutes. Both flight minutes occurred in the 30–150 m height category and were recorded as powered flight. At RM14, one golden eagle was observed on a single date for a total of 8 flight minutes. Three minutes occurred in the 0–30 m height category and 5 minutes occurred in the 30–150 m height category. All 8 minutes were recorded as soaring. At RM15, three golden eagle observations were made on two separate survey days for a total of 9 flight minutes. Six minutes occurred in the 0–30 m height category and 3 occurred within the 30–150 m height category. One golden eagle observation was recorded as powered flight for 1 minute; the second observation was recorded as gliding/powered flight for 1 minute; and the third observation was recorded as gliding for 1 minute and powered flight for 6 minutes (Table 4).

The majority of golden eagle flight minutes recorded within the Project site during the November 12, 2012 to March 29, 2013 survey period are not independent as most were generated by only a few eagles. Over half of the golden eagle flight minutes in the Chokecherry WDA occurred between just two of the eight total observations (Table 3, 10 minutes of flight time at CC13 on November 28 and 6 minutes at CC7 on February 11). Similarly, nearly 60% of the golden eagle flight minutes in the Sierra Madre WDA occurred during just 4 of the 14 total observations (Table 4, 10 minutes of flight time at PG3 on March 28, 8 minutes of flight time at RM14 on December 6, 7 minutes of flight time at RM15 on December 4, and 7 minutes of flight time at PG4 on November 29).

Treatment of these data as independent observations will overstate the expected impacts to eagles. In the case of the data described in the paragraph above, treating the 50 minutes of observed eagle use as independent is the equivalent of stating that 50 eagles were observed in flight for one minute each. This assumption of independence is not valid for these data and should be accounted for in future planning efforts and analysis of potential Project impacts to eagles.

COMPARISON TO PREVIOUS RESULTS

As a result of PCW's Project re-design, golden eagle use in the WDAs was substantially lower during the November 12, 2012 to March 29, 2013 survey period than the same period in 2011-2012. Golden eagle use during the November 12, 2012 to March 29, 2013 survey period was 0.0028 flight minute per minute of survey compared with 0.0060 flight minute per minute of survey during the November 2011 to March 2012 survey period, a decrease in use of more than 53%. The reduction in golden eagle use estimates between the two survey periods are due to the establishment of Turbine No-Build Areas where high eagle use was documented from 2011–2012 survey data and demonstrates the avoidance and minimization benefits of PCW's Project re-design. In PCW's Eagle Conservation Plan Supplement submitted to the Service on September 26, 2012, it was demonstrated that the establishment of the Turbine No-Build Areas would substantially reduce observed eagle use. The reduction in use observed during the survey period included in this report is consistent with the findings presented in the September 26, 2012, Eagle Conservation Plan Supplement.

No bald eagle use was recorded during the November 12, 2012 to March 29, 2013 survey period compared to 0.0004 flight minute per minute of survey observed during the November 2011 to March 2012 survey period. This reduction in use between the two survey periods also demonstrates the avoidance and minimization value of PCW's Project re-design as the observations of bald eagles in 2011-2012 were made within the Turbine No-Build Areas.

Golden eagle use for the Chokecherry WDA during the November 12, 2012 to March 29, 2013 survey period was calculated as 0.0019 flight minute per survey minute compared with

0.0062 during the November 2011 to March 2012 survey period, a 69% decrease in use resulting from PCW's identification of Turbine No-Build Areas in multiple eagle use areas that were identified during the 2008–2009, 2011, and 2012 survey programs.

No bald eagles were observed in the Chokecherry WDA during the November 12, 2012 to March 29, 2013 survey period, compared with bald eagle use of 0.0005 flight minute per survey minute during the November 2011 to March 2012 survey period.

Golden eagle use for the Sierra Madre WDA during the November 12, 2012 to March 29, 2013 survey period was 0.0038 flight minute per survey minute compared with 0.0060 during the November 2011 to March 2012 survey period, a 37% decrease in use resulting from PCW's identification of Turbine No-Build Areas in multiple eagle use areas that were identified during 2008–2009, 2011, and 2012 survey efforts.

No bald eagles were observed in the Sierra Madre WDA during either the November 12, 2012 to March 29, 2013 survey period or the November 2011 to March 2012 survey period .

Table 1.Number of Survey Minutes, Days, Individuals, Golden Eagle Flight Minutes, and Height Categories for all Survey Locations in the Chokecherry WDA.

MCP	Location	Survey Minutes	Number of Individual Eagles	Golden Eagle Flight Minutes	Minutes within 0–30 m	Minutes within 30–150 m (RSZ)	Minutes above 150 m
Nevins Ridge	CC2	540	1	2	0	0	2
	CC3	510	0	0	0	0	0
	CC4	540	0	0	0	0	0
	CC5	420	0	0	0	0	0
	CC6	480	0	0	0	0	0
	CC7	480	2	6	1	1	4
	CC9	480	0	0	0	0	0
	CC10	540	0	0	0	0	0
	CC11	540	0	0	0	0	0
	CC12	540	0	0	0	0	0
	CC13	540	2	10	2	6	2
	RM7	540	0	0	0	0	0
	RM12	540	0	0	0	0	0
Coal Mine Draw	CMD2	480	0	0	0	0	0
	CMD3	400	0	0	0	0	0
	CMD4	540	0	0	0	0	0
	RM9	480	0	0	0	0	0
Hogback	HB1	600	0	0	0	0	0
	HB2	540	0	0	0	0	0
	HB3	480	1	3	0	0	3
Smith Rim	SR1	540	2	4	1	3	0
	SR2	540	0	0	0	0	0
	SR3	540	0	0	0	0	0
Upper Hugus Draw	UH1	513	0	0	0	0	0
	UH2	600	0	0	0	0	0
	UH3	540	0	0	0	0	0
	UH4	480	1	1	0	1	0
Iron Springs	UI1	420	1	1	1	0	0
	UI2	600	2	4	4	0	0
	UI3	480	0	0	0	0	0
	RM10	540	0	0	0	0	0
Total	**–**	**16,003**	**12**	**31**	**9**	**11**	**11**

Table 2.Number of Survey Minutes, Days, Individuals, Golden Eagle Flight Minutes, and Height Categories for all Survey Locations in the Sierra Madre WDA.

MCP	Location	Survey Minutes	Number of Individual Eagles	Golden Eagle Flight Minutes	Minutes within 0–30 m	Minutes within 30–150 m (RSZ)	Minutes above 150 m
Sage Creek Basin	CB1	540	2	5	0	3	2
	CB2	420	1	2	0	0	2
	CB4	540	2	4	1	1	2
	CB5	540	0	0	0	0	0
	CB6	480	2	6	1	1	4
	RM2	540	0	0	0	0	0
Upper Miller Hill	MH1	300	0	0	0	0	0
	MH2	480	0	0	0	0	0
	MH3	480	0	0	0	0	0
	MH4	300	0	0	0	0	0
	MH5	480	0	0	0	0	0
	MH6	540	0	0	0	0	0
	MH7	480	0	0	0	0	0
	MH8	540	1	2	1	1	0
Lower Miller Hill	PG1	540	0	0	0	0	0
	PG2	540	0	0	0	0	0
	PG3	540	2	10	0	4	6
	PG4	540	2	7	0	4	3
	PG5	540	0	0	0	0	0
	PG6	540	1	2	0	2	0
	PG7	480	0	0	0	0	0
	PG8	480	0	0	0	0	0
	PG9	480	0	0	0	0	0
	PG10	540	0	0	0	0	0
	RM14	480	1	8	3	5	0
	RM15	600	3	9	6	3	0
Sage Creek Rim	SCR1	540	0	0	0	0	0
	SCR2	480	0	0	0	0	0
	SCR3	540	0	0	0	0	0
Total	**–**	**14,520**	**17**	**55**	**12**	**24**	**19**

Table 3. Summary of Golden Eagle Observations in the Chokecherry WDA.

Date and Time of Observation	Location	Number of Golden Eagle Observed	Golden Eagle Observations per Survey Minute	Golden Eagle Flight Minutes	Flight Minutes in RSZ	Flight Behavior (minutes)
11/18/2012 12:57	CC2	1	0.0019	2	0	Soaring (2)
11/28/2012 16:06	CC13	2 (paired flight)	0.0037	10	6	Gliding (6) Soaring (4)
12/20/2012 15:28	UI2	2 (paired flight)	0.0033	4	0	Powered Flight (4)
1/8/2013 9:27	UI1	1	0.0024	1	0	Powered Flight (1)
1/16/2013 15:40	UH4	1	0.0021	1	1	Soaring (1)
2/11/2013 13:05	CC7	2	0.0042	1 (1st Obs.) 5 (2nd Obs.)	1	Circle Soaring (5) Soaring (1)
2/26/2013 16:31 17:14	SR1	2	0.0037	3 (1st Obs.) 1 (2nd Obs.)	3	Powered Flight (4) Possibly the same individual
3/7/2013 13:29	HB3	1	0.0021	3	0	Circle Soaring (3)

Table 4.Summary of Golden Eagle Observations in the Sierra Madre WDA.

Date and Time of Observation	Location	Number of Golden Eagle Observed	Golden Eagle Observations per Survey Minute	Golden Eagle Flight Minutes	Flight Minutes in RSZ	Flight Behavior (minutes)
11/12/2012 15:18	PG6	1	0.0019	2	2	Powered Flight (2)
11/15/2012 11:30	RM15	1	0.005	1	0	Powered Flight (1)
11/16/2012 9:17	CB2	1	0.0024	2	0	Gliding (2)
11/29/2012 12:00	PG4	2 (Paired Flight)	0.0037	7	4	Soaring (4) Circle Soaring (3)
12/4/2012 9:30	RM15	1	0.005	1	0	Gliding/Powered Flight (1)
12/4/2012 9:32	RM15	1		7	3	Gliding (1) Powered Flight (6)
12/6/2012 14:22	CB6	1	0.0042	2	1	Gliding (1) Powered Flight (1)
12/6/2012 14:42	RM14	1	0.0021	8	5	Soaring (8)
12/11/2012 10:30 11:27	CB4	2	0.0037	2 (1st Obs.) 2 (2nd Obs.)	1	1st Obs. Hovering (1) Powered Flight (1) Diving(1) 2nd Obs. Gliding (1) Powered Flight (1) Likely the same individual
1/8/2013 14:25	MH8	1	0.0019	2	1	Powered Flight (2)
2/5/2013 12:30	CB1	1	0.0037	4	2	Gliding (2) Soaring (1) Powered Flight (1)
2/15/2013 10:40	CB6	1	0.0042	4	0	Circle Soaring (4)
2/19/2013 9:13	CB1	1	0.0037	1	1	Powered Flight (1)
3/28/2013 10:30	PG3	2 (Paired Flight)	0.0037	10	4	Circle Soaring (10)

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Appendix A:

Revised 2012-2013 800-meter Raptor Survey Protocols
Chokecherry and Sierra Madre Wind Energy Project

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Revised 2012-2013 800-meter Raptor Survey Protocols

Chokecherry and Sierra Madre Wind Energy Project

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November 2012

The Power Company of Wyoming (PCW) recently initiated revisions to the methodologies currently used to survey for raptors at their Chokecherry and Sierra Madre Wind Energy Project (Project). Based on conversations with U.S. Fish and Wildlife Service (Service) personnel, and in an effort to collect data that are appropriate for use in the Service's model that predicts the potential fatality rate of eagles for wind energy projects (hereafter, the Service's model), raptor survey protocols were revised for the fall 2012 season and for future raptor survey efforts. On August 31, 2012, PCW provided the Service with a revised protocol for conducting eagle and raptor surveys at 40 800-meter point count survey sites throughout the Project. PCW began surveying the 40 locations at the beginning of the autumn 2012 survey season and it is anticipated that those survey efforts will continue through October 2012 at which time the revised protocols discussed in this document will be initiated. On September 28, 2012, the Service issued a letter recommending slight modifications to the August 31, 2012 protocols. This revised protocol addresses the comments made by the Service and specific responses to each comment made are provided in Attachment 1.

These survey methodology revisions are fully consistent with the recommendations for raptor surveys set forth by the Service in their Draft Eagle Conservation Plan Guidance (Draft ECP Guidance), the Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices (Technical Appendices; as received from Kevin Kritz, Service Region 6, on August 4, 2012), and the Land-Based Wind Energy Guidelines, while still maintaining expansive coverage of the Project Site.

Year Two and Year Three long-watch raptor surveys were fully consistent with the recommendations set forth by the Service's Draft ECP Guidance (Service 2011) and Land-Based Wind Energy Guidelines (Service 2012a), the Bureau of Land Management's (BLM's) Wildlife Survey Protocols for Wind Energy Development (BLM 2008), and the Wyoming Game and Fish Department's (WGFD's) Wildlife Protection Recommendations for Wind Energy Development (WGFD 2010). These surveys were very successful in identifying concentrated raptor use areas across the Project that could be used to design avoidance areas to minimize avian impacts. Additionally, long-watch survey data were instructive in showing the Project Site is not a strong migratory corridor for raptors, and the flight paths digitized from these data were used to identify high eagle use areas as recommended by the Service's Technical Appendices (Service 2012b).

The revised raptor count protocols follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices (Service 2012b), and are also in accordance with the aforementioned guidance documents produced by the Service, BLM, and WGFD. PCW also sought consultation with Dr. Joshua Millspaugh (Professor of Wildlife Management, University of Missouri) to ensure the development of a rigorous sampling design that would result in the collection of data appropriate for the analysis methods and fatality model currently being used by the Service.

Based upon agency guidance and logistical considerations, the revised protocols were designed to include 60, 800-meter raptor count survey sites throughout the Chokecherry and Sierra Madre Wind Development Areas (WDAs) where turbine development is likely (Figures 1 and 2). Most of the 60 survey sites are identical to the original 40 sites identified in the August 31, 2012 protocols. However, some of those 40 sites were shifted slightly to

accommodate the placement of the additional 20 survey sites and ensure that no overlap occurs between samples. Seven of the new sites correspond to raptor monitoring locations that were used in 2011 and spring 2012 survey efforts (RM2, RM7, RM9, RM10, RM12, RM14, and RM15). Efforts were made to resample as many of the previous sampling sites as possible. However, because of PCW's Project re-design efforts identified in the Project Eagle Conservation Plan (ECP), many of the previous sampling locations are outside or on the very edge of the current development area and could not be included without violating the spatially balanced design that is critical to these protocols.

A spatially balanced sampling design was used to capture the variability in habitat conditions, terrain features, and turbine numbers and densities. Minimum convex polygons (MCPs) were placed around each of 10 discrete potential development areas that are separated by Turbine No-Build areas, topography, or other factors (Figures 1 and 2). MCPs were evaluated for differences in habitat characteristics, forage potential, and topography. While differences in habitat characteristics, forage potential, and topography occur among the 10 MCPs, within each MCP, these factors are similar and additional stratification beyond the MCP level was not necessary.

Using the "Create Spatially Balanced Points" tool in ArcGIS Geostatistical Analyst, 250 spatially balanced locations were generated within the MCPs. Using the spatially balanced points, survey sites were selected sequentially in a manner that was consistent with the recommendations made by the Service while ensuring that no overlap occurs between survey areas. Total number of sampling sites per MCP was based on the relative surface area and number of turbines in the MCP. Two primary selection criteria were used to select sampling sites. First, no overlap of sampling areas was permitted (sites had to be separated by more than 1,650 meters). Second, because of logistical considerations, sampling sites were required to be reasonably accessible from the existing road network and in a safe location. If a potential sampling location violated either of the selection criteria it was dropped and the next point was evaluated. Tables 1 and 2 provide the locations of each sampling site in the WDAs as well as information specific to the MCPs and sampling sites.

The first 36 survey sites that were selected correspond to locations that were identified in the August 31, 2012 protocols. These were sequentially selected using the spatially balanced points that were generated as part of the process described above while controlling for site overlap and logistical considerations for survey. Of the remaining 24 sites, 4 correspond with the original 40 sites with locations slightly shifted to avoid overlap with new sites, 7 correspond with the long-watch raptor monitoring sites that were surveyed in 2011 and spring/summer 2012, 3 were selected outside of the current probable turbine footprint, and 10 were selected using the remaining spatially balanced points. Some minimal micrositing of the new locations is anticipated to ensure maximum visibility of the survey areas as well as safe and consistent accessibility on the part of field personnel.

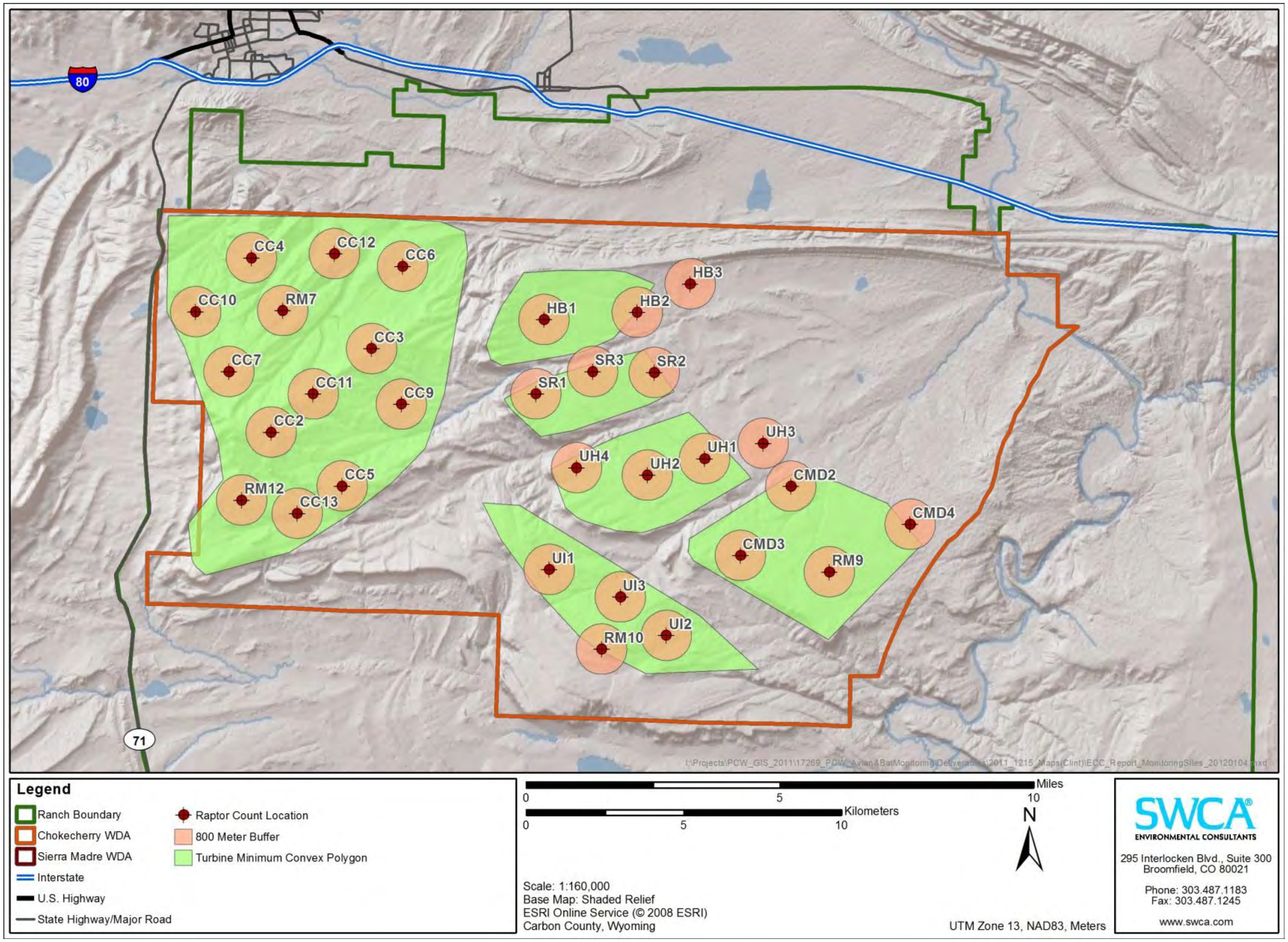

Figure 1. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Chokecherry.

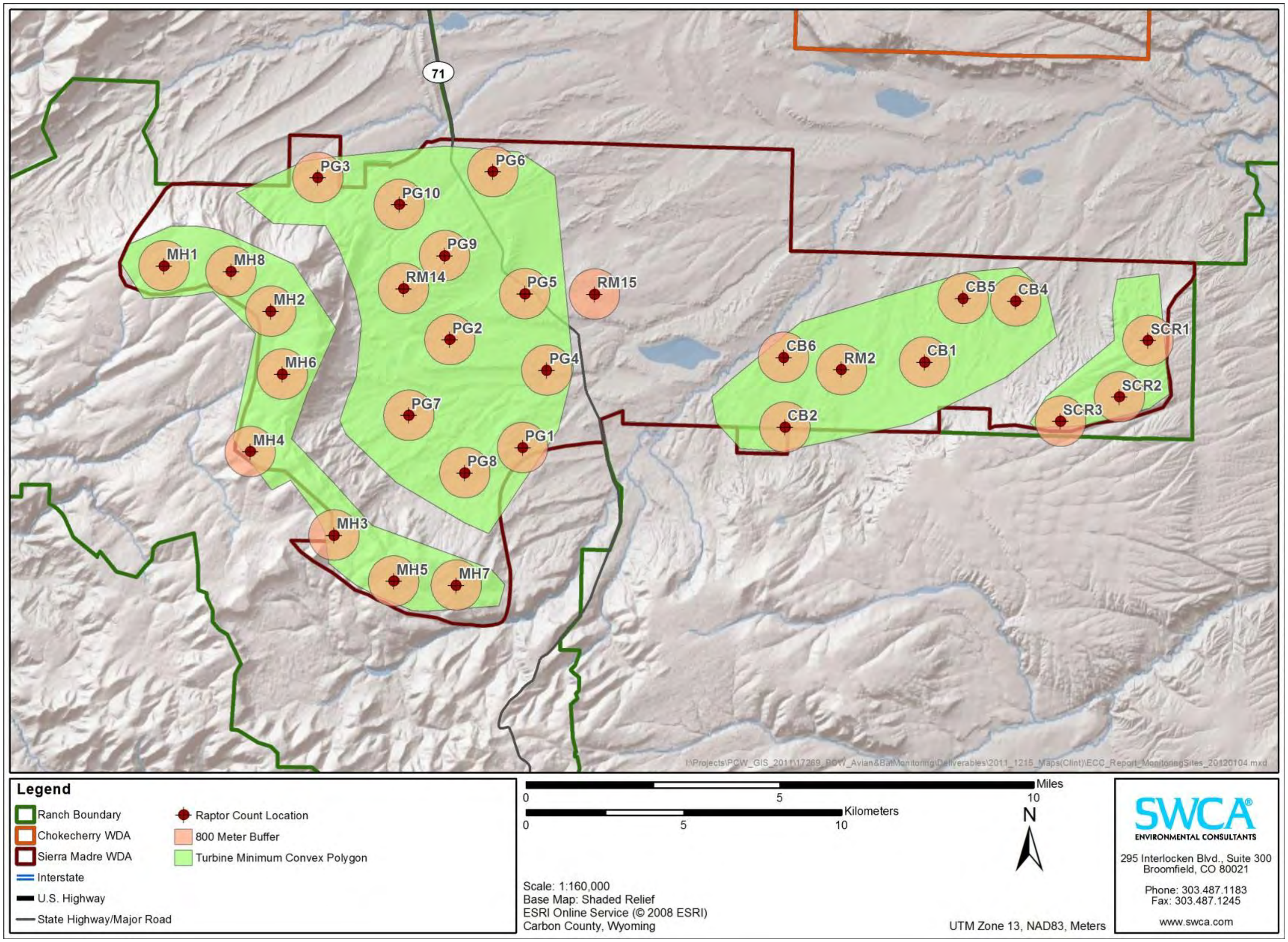

Figure 2. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Sierra Madre.

Table 1. Fall 2012-2013 Avian Monitoring Survey Locations for the Chokecherry WDA.

WDA	MCP	Site Name	Survey Site Status	Easting*	Northing*
Chokecherry	Chokecherry	CC2	Original Fall 2012 Site	315166	4616447
		CC3	Original Fall 2012 Site	318351	4619090
		CC4	Original Fall 2012 Site	314539	4621971
		CC5	Original Fall 2012 Site	317418	4614741
		CC6	Original Fall 2012 Site	319335	4621702
		CC7	Original Fall 2012 Site	313825	4618366
		CC9	Original Fall 2012 Site	319294	4617332
		CC10	New 2012 Survey Site	312770	4620262
		CC11	New 2012 Survey Site	316501	4617656
		CC12	New 2012 Survey Site, original CC1 site shifted north to eliminate overlap with RM7	317170	4622100
		CC13	New 2012 Survey Site, original CC8 site shifted southeast to eliminate overlap with RM12	315993	4613871
		RM7	2011-2012 Long-watch Site	315531	4620298
		RM12	2011-2012 Long-watch Site	314228	4614294
	Coal Mine Draw	CMD2	Original Fall 2012 Site	331648	4614732
		CMD3	New 2012 Survey Site	330049	4612535
		CMD4	New 2012 Survey Site, original CMD1 site shifted east to eliminate overlap with RM9	335437	4613524
		RM9	2011-2012 Long-watch Site	332870	4612018
	Hogback South	HB1	Original Fall 2012 Site	323818	4620014
		HB2	Original Fall 2012 Site	326781	4620243
		HB3	New 2012 Survey Site	328457	4621145
	Smith Rim	SR1	Original Fall 2012 Site	323560	4617658
		SR2	Original Fall 2012 Site	327318	4618336
		SR3	New 2012 Survey Site	325362	4618367
	Upper Hugus	UH1	Original Fall 2012 Site	328912	4615606
		UH2	Original Fall 2012 Site	327099	4615081
		UH3	New 2012 Survey Site	330772	4616091
		UH4	New 2012 Survey Site	324853	4615321
	Upper Iron Springs	UI1	Original Fall 2012 Site	323987	4612091
		UI2	Original Fall 2012 Site	327702	4610001
		UI3	New 2012 Survey Site	326242	4611221
		RM10	2011-2012 Long-watch Site	325646	4609568

*UTM Zone 13, NAD83, Meters

Table 2. Fall 2012-2013 Avian Monitoring Survey Locations for the Sierra Madre WDA.

WDA	MCP	Site Name	Survey Site Status	Easting*	Northing*
Sierra Madre	Central Basin	CB1	Original Fall 2012 Site	326414	4597515
		CB2	Original Fall 2012 Site	321986	4595452
		CB4	Original Fall 2012 Site	329306	4599449
		CB5	New 2012 Survey Site	327638	4599529
		CB6	New 2012 Survey Site, original CB3 site shifted west to eliminate overlap with RM2	321942	4597660
		RM2	2011-2012 Long-watch Site	323776	4597273
	Miller Hill	MH1	Original Fall 2012 Site	302291	4600564
		MH2	Original Fall 2012 Site	305677	4599125
		MH3	Original Fall 2012 Site	307684	4592030
		MH4	Original Fall 2012 Site	305024	4594675
		MH5	Original Fall 2012 Site	309573	4590571
		MH6	Original Fall 2012 Site	306043	4597131
		MH7	New 2012 Survey Site	311561	4590443
		MH8	New 2012 Survey Site	304412	4600385
	Pine Grove	PG1	Original Fall 2012 Site	313663	4594801
		PG2	Original Fall 2012 Site	311358	4598224
		PG3	Original Fall 2012 Site	307172	4603361
		PG4	Original Fall 2012 Site	314434	4597259
		PG5	Original Fall 2012 Site	313730	4599682
		PG6	Original Fall 2012 Site	312721	4603547
		PG7	Original Fall 2012 Site	310058	4595825
		PG8	Original Fall 2012 Site	311832	4594006
		PG9	Original Fall 2012 Site	311187	4600886
		PG10	New 2012 Survey Site	309753	4602508
		RM14	2011-2012 Long-watch Site	309884	4599843
		RM15	2011-2012 Long-watch Site	315948	4599668
	Sage Creek Rim	SCR1	Original Fall 2012 Site	333505	4598194
		SCR2	Original Fall 2012 Site	332596	4596407
		SCR3	New 2012 Survey Site	330727	4595638

*UTM Zone 13, NAD83, Meters

Landmarks will be identified and visible stakes will be placed around each survey location perimeter to provide distance references for field personnel completing survey efforts. The 800-meter radius survey areas of the new 60 point count locations provide coverage for approximately 35% of the probable turbine locations, which is greater than the 30% recommendation made by the Service (Service 2012b). Additionally, 46.7% of the raptor monitoring sites that were surveyed in 2011 will be resurveyed as part of the 60 point counts. Resurvey of 50% of all previous survey sites was not possible because many fall outside of the current project layout in Turbine No-Build areas and use of those sites would violate the spatially balanced study design in addition to sampling areas that are already known as high use areas for eagles and other raptors. Additionally, several sites that were only surveyed in spring/summer 2012 do not have a full year of data and would not be appropriate for comparison with ongoing and future data collection efforts. However, many of the 60 new survey sites overlap with areas previously surveyed as part of 2011 and 2012 raptor monitoring efforts. When these areas are included, 50.3% of the area surveyed as part of previous raptor monitoring efforts is within the perimeter of the 60 new point count survey sites.

Surveys will be conducted at each site for one hour per guidance in the ECP Technical Appendices (Service 2012b). Three avian technicians will each survey two locations per day for a total of 6 locations per day and 60 locations in a 10 day period. Each location will be surveyed twice per month. A schedule for all 60 raptor count locations was designed to provide survey coverage across all daylight hours for each of the 60 sites. The schedule was also designed such that the six raptor count surveys conducted on any given day are separated temporally and spatially to ensure independence of any observations that are made.

Avian technicians will be equipped with binoculars, spotting scopes, laser rangefinders, and aerial maps to assist with accurate detection and documentation of all raptors observed within the 800-meter survey area. Each aerial map is displayed with relevant landforms occurring in the area, locations of stakes, and concentric rings at each 200-meter interval to facilitate accurate distance estimation (Attachment 2). Each raptor flight path is recorded by technicians on the provided aerial maps. Additional data collected include species, number of individuals per observation, age, sex, behavior, bearing to bird, distance to bird, heading of bird, altitude of bird, the beginning and ending time for each observation, interactions with other birds, and hourly weather data among other variables (Attachment 3).

Surveys at the 60 800-meter raptor counts will begin in November 2012 and are scheduled to continue bi-weekly at each location through August of 2013. Surveys during winter months will be completed on the same schedule as the remainder of the year and efforts will be made to survey at least 50% of all locations twice per month during winter. However, winter surveys are subject to cancellation or delay based on weather conditions and safety of the field technicians.

REFERENCES

Bureau of Land Management (BLM). 2008. Wildlife Survey Protocols for Wind Energy Development.

U.S. Fish and Wildlife Service (Service). 2011. Draft Eagle Conservation Plan Guidance. Available online at http://www.fws.gov/windenergy/. Accessed December 2011.

———. 2012a. Land Based Wind Energy Guidelines. Wind Turbine Guidelines Advisory Committee. U.S. Fish and Wildlife Service, Department of the Interior, Washington D.C. Available online at http://www.fws.gov/windenergy/docs/WEG_final.pdf. Accessed August 2012.

———. 2012b. Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices. Received from Kevin Kritz, Service Region 6, on August 4, 2012.

Wyoming Game and Fish Department (WGFD). 2010. Wildlife Protection Recommendations for Wind Energy Development in Wyoming. Wyoming Game and Fish Commission Approved November 17, 2010. Wyoming Game and Fish Department, Cheyenne, WY.

ATTACHMENT 1

Response to Survey Recommendations Made in the Service's September 28, 2012 Letter

The following recommendations were made by the Service in the September 28, 2012 letter to Garry Miller (PCW) regarding Eagle Use Sampling Considerations and Recommendations for the proposed Chokecherry-Sierra Madre Wind Energy Development Project. A response is provided to document how each recommendation has been incorporated into the revised 800-meter point count survey protocols. Recommendations are presented in italics below.

1. *We recommend focusing sampling efforts within the most recently proposed project footprint in order to quantify eagle use in areas where turbines are planned for location. By collecting eagle and raptor use data in areas of likely development, we believe it will be easier to obtain a more reliable estimate of risk to eagles in these areas, from which more informed, site-specific, predictions can be made.*

   Response: The revised protocols and placement of the 60 point count sites are based on the most recent proposed Project footprint and probable turbine locations. The most recent Project footprint reflects PCW's commitment to the Turbine No-Build areas identified in the Project ECP.

2. *Although we recommend concentrating sampling effort within the project footprint as stated above, we believe it also would be prudent to establish additional sample points outside of the currently proposed footprint in areas of potential development. Adding points in areas of possible alternative turbine layouts will provide data to assess the impact of those alternatives, which may be necessary if survey results identify areas of high eagle use within areas currently proposed for development. Without eagle use data outside of the proposed footprint, it would be difficult to show that the relocation of turbines outside of the currently proposed project footprint would avoid and minimize impacts to eagles. Without these data, the only likely alternatives would be a reduction in the total number of turbines, or a reduction in the spacing between turbines in areas where avian and raptors surveys were conducted.*

   Response: Three of the 60 point count survey sites (RM15, HB3, and UH3) are placed outside of the most current probable turbine locations. Several additional locations (e.g., CMD2, HB2, RM10, SR2) have a substantial portion of their survey areas that fall outside of the current probable turbine locations. Each of these sites provides survey coverage in areas of the Project Site where turbines could be located if the current probable turbine location footprint changes.

3. *We recommend resampling at least fifty percent of the raptor point counts from previous years: this will help distinguish between apparent changes in documented eagle use caused by different point locations and associated differences in detectability, versus actual changes in habitat use. This is an important consideration, because the number of eagles and their location on the landscape is likely to vary across years (e.g., not every nest is active every year), making it difficult to account for inter-annual variability, which might lead to inaccurate conclusions about the risk of eagle fatalities. For example, observing fewer eagles at a second set of survey points could be misinterpreted as an area of lower eagle use, when in fact the number of eagles and eagle use across the landscape decreased due to other factors. In this*

example, the use (and hence risk) might have been the same for all survey points, but sampling different points across years would lead to the erroneous conclusion. Resampling some points across years can reduce this uncertainty by creating an index or allow for scaling of observations across years.

Response: Nearly 50% (46.7%) of the raptor monitoring sites that were surveyed in 2011 will be resurveyed as part of the 60 point counts. Resurvey of 50% of previous survey sites is not possible because many fall outside of the current project layout in Turbine No-Build areas. Additionally, several sites that were only surveyed in spring/summer 2012 do not have a full year of data and would not be appropriate for comparison with ongoing and future data collection efforts. Many of the 60 new survey sites overlap with areas previously surveyed as part of 2012 raptor monitoring efforts. When those areas are included, 50.3% of the area surveyed as part of 2012 raptor monitoring efforts is within the perimeter of the 60 new point count survey sites.

4. *Previous long-watch raptor surveys were based on an unlimited radius, and analysis of data from these surveys suggests that the detectability of eagles dropped off after 600 to 800 meters. We recommend using a distance of no more than 800 meters for point counts intended to collect data on eagles and other large raptors. This recommendation is found in our draft Eagle Conservation Plan Guidance (Service 2012, Appendix C, p. 18) and in other literature (e.g., Strickland et al. 2011). While it is acceptable to collect data on eagles and other raptors beyond 800 meters (e.g., location, flight height, flight path)—since they may be useful to identify travel corridors and areas of eagle use—the collection of this information should not distract surveyors from collecting data within the 800-meter point count. In addition, because only those data collected within 800 meters will be used in the models to predict eagle fatalities, data collected at distances more than 800 meters should be separated from data collected within 800 meters.*

   Response: Previous long-watch raptor surveys recorded any eagle observed to help identify high use areas per the protocols developed collaboratively between the Service, BLM, and PCW. The analysis of detectability of eagles presented in the Service's comments does not consider that the reason eagle use was higher within 800 meters of previously sampled sites is because those sites were placed on ridgelines and terrain features known to attract or concentrate eagle use, making the likelihood of observing an eagle within 800 meters of a survey site higher than if the point was placed randomly in the landscape where varying terrain features may or may not occur. The implementation of the previous surveys was extremely successful and resulted in the development of Turbine No-Build areas that will avoid impacts to eagles and other avian species in the majority of the high use areas that were identified. To be consistent with with the Service's Draft ECP Guidance, the Service's eagle risk model, and the recommendation made above, all surveys will be conducted using a distance of 800-meters.

5. *Based on recommendations in the draft Eagle Conservation Plan Guidance, the sampling goal should provide a "minimal spatial coverage of at least 30% of the project footprint" (i.e., the total area sampled in any given year should be thirty percent of the total project footprint) (Service 2012, Appendix C, p. 1 8). We recognize that even this level of effort will not provide specific information for seventy percent of the project area; however, it may be assumed that the information is representative of the remaining project area, provided the sample points are appropriately located (e.g., stratified and spatially balanced). To achieve the desired goal of at least 30 percent coverage of the Chokecherry Sierra Madre Proposed Project footprint, we calculate up to 70 survey points are needed, depending on how the project footprint is portrayed.*

   Response: Using the conceptual turbine footprint that PCW provided to the Service, 35% of all turbine locations fall within the 800-meter survey perimeters of the 60 point count sites. As stated above, the entirety of 3 sites and substantial portions of 3 others fall outside of the probable Project footprint in areas where turbines could be placed. These provide adequate coverage of areas outside of the current probable turbine footprint. When combined with the 800-meter radius surveyed areas from previous survey events (2011 and spring/summer 2012), 42% of probable turbine locations are included within the perimeter of 800-meter point count sites.

6. *We recommend sample locations be stratified by features of the landscape that may influence eagle and raptor activity, such as distinct geographic/topographic elements (e.g., escarpments), vegetation (if appropriate), and concentrated prey base. Doing so will allocate sampling points across the project in proportion to their occurrence on the landscape. A common sampling design in use today is the generalized random tessellation stratified sampling design (GRTS). We remain concerned that there is insufficient information about eagle habitat use associated with important eagle use areas including: active nests; concentrated prey base including grouse leks, prairie dog colonies, and reservoirs; as well as topographic features such as Miller Hill. Therefore, we recommend that some sample points be located near these important eagle use areas. Doing so would help with identifying additional avoidance areas or alleviating concerns for increased risk associated with these areas.*

   Response: The spatially balanced design that is discussed in the revised protocols above is reflective of the variability in habitat conditions, terrain features, and turbine numbers and densities. The revised protocols describe the methods used to select sites and the sampling strata and selection criteria that were used to place sites. The 60 sampling sites described in the revised protocols provide coverage in areas that provide some level of foraging, contain sage-grouse leks, and have variable topography that could influence eagle and raptor behavior. Site placement near active eagle nests is difficult because most nests have been avoided and are within the Turbine No-Build areas along the Bolten Rim or North Platte River corridor and, as seen in the data previously collected for the Project, active nests locations change each year.

7. *Based on recommendations in the Service's Eagle Conservation Plan Guidance, count periods should be one to two hours long (Service 2012, Appendix C, p. 18). If longer survey periods are used (e.g., four to six hours), the surveys should be divided into smaller units such as one or two hour blocks (or the actual time of eagle observations recorded), so that the influence of time of day can be evaluated (e.g., in relation to when turbines are inactive).*

   Response: Surveys will be conducted at each site for one hour per guidance in the ECP Technical Appendices (Service 2012b). As stated in the revised protocols, the survey methods follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices to the Draft ECP Guidance, and are consistent with other guidance documents produced by the Service, BLM, and WGFD.

8. *We recommend the protocol include a representative distribution of sampling events across all daylight hours across all point locations and seasons. Collecting data "evenly" across time and space should reduce any potential bias associated with locations, seasons, and time of day. This may also make it possible to evaluate how time of day influences eagle use of the site or when eagles are more likely to use specific topographic features. In addition, surveys should include multiple sampling events in each season per point.*

   Response: As stated in the revised protocols, the survey methods follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices to the Draft ECP Guidance, and are consistent with other guidance documents produced by the Service, BLM, and WGFD. The sampling schedule will provide survey coverage across all daylight hours for each of the 60 sites. The schedule also makes certain that the six raptor count surveys conducted on any given day are separated temporally and spatially to ensure independence of any observations that are made.

9. *We recommend locating survey sampling points at least 800 meters (0.5 mile) from active eagle and ferruginous hawk nests to limit disturbance. It may be possible to reduce this distance if topographic features create a visual barrier between observers and the nest.*

   Response: Should an eagle or ferruginous hawk nest become active within 800 meters of a survey site, PCW will coordinate with the Service and BLM to evaluate the most appropriate methods to take to ensure that survey activities do not disrupt nesting. With PCW's Turbine No-Build areas and Project re-design efforts, most eagle and raptor nests in the Project Site have been avoided by 800 meters or more. However, some survey sites are located within 800 meters of historically active nests. As stated above, sampling locations have been selected in a spatially balanced, stratified manner using methods recommended by the Service. Maintaining the sites that are located within 800 meters of historically active nests is necessary to maintain this spatially balanced design. Since Project survey efforts began in 2008, no active ferruginous hawk nests have been identified.

10. *We recommend data collection include identification of eagle species and their flight minutes within the 800-meter point count. Additional data collection could include, but should not necessarily be limited to (in relative order of importance): age and sex (if possible), flight path, flight behavior (e.g., soaring, kiting), activity (e.g., territory defense, foraging), interactions with other birds, flight height, obvious prey items, time observed outside of the 800-meter point count, and time perched. It is acceptable to record detections beyond 800-meters as these can provide additional information about eagle and raptor use of the project area. However, collecting data beyond 800-meters should not detract from observations made within the 800-meter point count.*

    Response: Only those observations occurring within 800 meters of the survey sites will be recorded. As described in the protocols and illustrated on the data collection forms in Attachment 3, data collection efforts will provide all of the information recommended by the Service.

11. *We recommend collecting data on all raptors to the extent feasible; however, collecting data on other raptors should not preclude the collection of data on eagles.*

    Response: Data on all raptors and other species of interest will be collected in a manner identical as that used for eagles unless those efforts interfere with data collection for eagles.

12. *Based on eagle use data collected between April of 2011 and April of 2012, eagle activity relative to sampling effort appears to be higher in the winter and summer periods (Table 1). Higher eagle activity in the summer likely corresponds to the time during which adults are actively feeding young and when young are learning to fly. Higher eagle activity in the winter may be related to the presence of migrant eagles, or could be due to the location of survey points. Because data were not collected following the above recommendations during the summer of 2012, we recommend the collection of eagle and raptor use data continue through the 2013 nesting season (at least through August of 2013) to evaluate this potential season of higher use.*

    Response: Data will be collected through August of 2013. Our interpretation of eagle use in winter and summer periods differs from the Service's interpretation. The Service's interpretation assumes that each minute of eagle use is independent and evenly distributed across the landscape. Based on the survey data, it is clear that most of the eagle minutes recorded across all seasons are not independent and that the simple statistic of flight minutes per survey minute does not consider that observations are not independent in space or time and therefore mischaracterizes seasonal use and risk. As an example, 72 of the 141 minutes (51%) of winter use observed in the Project Site occurred at two sites on two days. On December 8, 2011, 35 eagle flight minutes were recorded at RM11 and on March 9, 2012 37 minutes of eagle use were recorded at RM14. On both days, field technicians wrote on datasheets that the use was associated with 2-3 individuals who were using the area for a long period of time. If the three eagles at RM14 had not been observed on March 9, no winter use would

have been observed within 800 meters of that sampling site. Similarly, if the use at RM11 would not have been observed on December 8, only 3 minutes of eagle use over would have been observed at that site during winter months and use would have been decreased by 95%. The observed activity on December 8 and March 9 is indicative of short duration, concentrated use by a few individuals rather than of high eagle use of the Project throughout the entire winter period. The data also indicate that for most of the Project Site there is no risk or very low risk to eagles during winter. Summer data are very similar to winter data. During summer 2011, only 71 eagle minutes were recorded. Nearly 60% of these minutes were associated with only 3 observations of individual circle soaring birds at RM14 and RM5. This indicates that the high use the Service cites is not from adults feeding young or young learning to fly. Rather, the behavior observed indicates that this is localized use by individual birds utilizing thermals created by warm summer temperatures.

13. *In several locations, the document states that it was "fully compliant" with recommendations by the U.S. Fish and Wildlife Service (Service). First, it is important to understand that the draft Eagle Conservation Plan Guidance is voluntary; consequently we prefer to use the term "consistent with" rather than "compliant with" when describing recommendations found within the Eagle Conservation Plan Guidance. Second, we do not believe that the protocol provided by PCW is, in fact, consistent with the Eagle Conservation Plan Guidance for numerous reasons, one key reason being that the limited number of 800-meter survey points do not provide the recommended minimum 30 percent coverage of the project footprint. Additionally, we do not believe it is scientifically justifiable to combine survey points from multiple years in order to meet the minimum recommended standard of 30 percent coverage: the minimum 30 percent coverage should occur within each individual year.*

    Response: The recommended changes have been made. The term "compliant" has been changed to "consistent". As stated above, 35% of the probable turbine locations will be surveyed using the revised protocols.

14. *The document makes a definitive statement about "unrealistic projections" concerning eagle risk. This statement is based on several assumptions, including that previous survey efforts correctly identified areas of high eagle use. One of the reasons for increasing the spatial coverage in 2012-2013 is to increase our confidence in understanding eagle and raptor use across the Project area. Because substantial uncertainty exists as a result of the limited amount of spatial and temporal survey coverage used to document impacts and relative risk to eagles, the Service believes our projections concerning risk to eagles are realistic and clearly demonstrate the need for increased coverage. In addition, our letter of August 10, 2012, identified numerous areas of potential high eagle use that are not currently included in the avoidance areas, such as the golden eagle nest in the southwest corner of Sierra Madre. Our letter also identified the presence of high density prey base, proximity of sage grouse leks and other habitat features that are used by eagles. Because these habitat features (and others) are not included in the proposed avoidance areas, the projections of risk and high eagle fatalities identified by the Service are possible.*

Response: The comments made above have been addressed in the revised protocols, the prey-base report submitted to the Service, and the Project ECP. We concur that within the context of the Service's eagle fatality model, the revised protocols will help address uncertainties.

15. *The data sheet attached to the protocol provided by PCW does not appear to have a means of recording flight path in data. It should be clear how flight path data will be collected on the existing data sheet, or additional datasheets should be included if there is more than one.*

    Response: Attachment 2 contains an example figure that is used to record flight paths for eagles and other raptors. Additionally, multiple rows of data are recorded for each eagle observed which results in multiple spatial points per individual bird. Fitting a line between each point for each observed eagle provides another mechanism to create flight paths. The methods used to collect data are described in the revised protocols.

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ATTACHMENT 2

Example Aerial Map Used to Map Flight Paths during 800-meter Raptor Count Surveys

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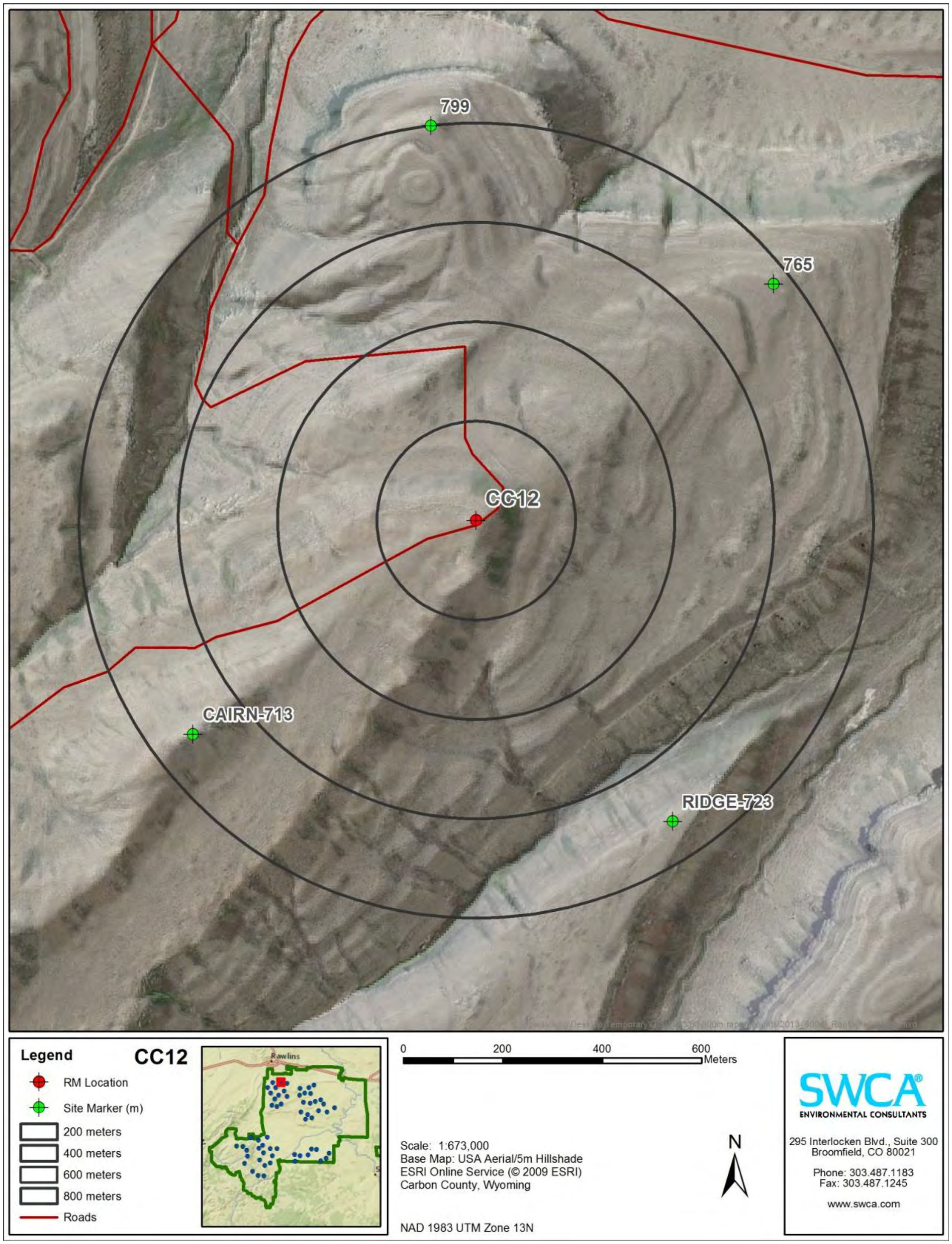

Aerial map example. Numbers next to site markers indicate distance from raptor monitoring location to the site marker location. Concentric rings around raptor monitoring location indicate 200-meter distance intervals to aid in estimation of distance. Other features on the landscape (roads, rock cairns, etc.) are also noted on each map to aid in distance and location estimation.

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ATTACHMENT 3

Data Sheets Used to Collect Data during 800-meter Raptor Count Surveys

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PCW 2012-2013 Raptor Survey

Field Observer: ______________________

Survey Location: ____________

Start time: ____________

End time: ____________

Date: ________________

Page: ____ **of** _____

Target #	Obs #	Species	# Birds	Age	Sex	Behav	Bearing to Bird (°)	Distance to Bird (m)	Angle of Bird (°)	Heading of Bird	0-30	30-150	150+	Time Begin	Time End

PCW 2012-2013 Raptor Survey Notes

Field Observer: ______________________ **Survey Pt:** ____

Date: __________ **Page:** ____ of ____

Other species and Notes.

Weather Conditions

Time	Sky	Wind Dir	Wind Spd	Temp (°F)

Incidental Species Observations
for eagles and raptors note distance and bearing

April 1 through June 21, 2013, Eagle Summary Report

Chokecherry and Sierra Madre Wind Energy Project

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July 2013

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EXECUTIVE SUMMARY

Between April 1 and June 21, 2013, SWCA Environmental Consultants performed raptor count surveys as part of Power Company of Wyoming, LLC's (PCW's) ongoing avian survey program at the Chokecherry and Sierra Madre Wind Energy Project (Project) site. The survey period captures nesting, incubation and chick rearing periods within the Project site. This report documents use during these eagle use periods.

For this survey period, 5 minutes of golden eagle (*Aquila chrysaetos*) use and 1 minute of unknown eagle[1] use were recorded within the Project site during 19,874 survey minutes (331.23 hours) for 0.0003 flight minute per minute of survey[2]. Of the recorded eagle flight minutes, 50.0% were outside the Rotor Swept Zone (RSZ). By altitudinal classification, 33.3% of the eagle flight minutes were below the RSZ (0 to 30 meters above ground), 50.0% of the eagle flight minutes were within the RSZ (30 to 150 meters), and 16.7% of the eagle flight minutes were above the RSZ (above 150 meters).

For the Chokecherry Wind Development Area (WDA), 1 minute of golden eagle use and 1 minute of unknown eagle use were recorded during 10,200 survey minutes (170.0 hours) for 0.0002 flight minute per minute of survey. In total, 170 survey sessions were conducted during which 2 eagle observations were recorded during two of the sessions. The observation time for each observation was one minute, rounded up to the nearest whole minute. Of the recorded use in the Chokecherry WDA, 50% occurred outside the RSZ.

For the Sierra Madre WDA, 4 minutes of golden eagle use were recorded during 9,674 survey minutes (161.23 hours) for 0.0004 flight minute per minute of survey. In total, 162 survey sessions were conducted during which 2 golden eagle observations were recorded during two of the sessions. Observation times ranged between 1 minute and 3 minutes, rounded up to the nearest whole minute. Of the recorded use in the Sierra Madre WDA, 50% occurred outside the RSZ.

During the survey period, there were no observations of bald eagles (*Haliaeetus leucocephalus*).

[1] This eagle observation was unable to be identified to species level due to the individual circling overhead at a very high altitude.
[2] For data analysis purposes, the single unknown eagle observation will be considered along with golden eagle observations recorded during this survey period.

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INTRODUCTION AND PROJECT DESCRIPTION

Surveys described in this report are part of the avian survey program directed towards identifying eagle and raptor use across the Chokecherry and Sierra Madre Wind Energy Project (Project) site. The survey data will be used for modeling eagle collision risk and developing avoidance measures and Best Management Practices to reduce potential Project impacts to eagles, to the extent practicable. All protocols and survey methodologies used to assess avian species in the Project site during surveys in 2011, 2012, and 2013 were developed in consultation with the U.S. Fish and Wildlife Service (Service), and are in accordance with recommendations made by the Service, the Bureau of Land Management (BLM), and the Wyoming Game and Fish Department (WGFD). Appendix A contains the protocols used to collect eagle use data for the period of this report.

This report summarizes the data from the April 1 to June 21, 2013 raptor counts and captures nesting, incubation and chick rearing periods within the Project site. It is one of four reports covering 12 consecutive calendar months from August 2012 to August 2013. Report 1 covers the period of August 20 to November 9, 2012; report 2 covers the period of November 12, 2012, to March 29, 2013; and this report covers the period of April 1 to June 21, 2013. The final report will roughly correspond to fledging and summer use.

In 2012, based on the extensive avian data that have been collected for the Project, Power Company of Wyoming, LLC (PCW) substantially re-designed the Project and identified Turbine No-Build Areas. These designated Turbine No-Build Areas have relatively higher eagle use than other areas of the Project and PCW has committed to not build turbines in these areas. This will substantially contribute to avoiding and minimizing collision risk to eagles. Next, to assess use by eagles and other raptors in the remaining potential wind development areas (WDAs), surveys were initiated during August 2012 at 40, 800-meter (m) survey locations across the probable turbine footprint outside of the Turbine No-Build Areas. After further consultation with the Service, the survey program was increased to 60, 800-m survey locations (Figures 1 and 2) for surveys occurring from mid-November 2012 through August 2013. The increased survey locations achieve coverage of 30% of the probable turbine locations for the Project as recommended by the Service. The addition of 20 survey locations also allowed the inclusion of seven sites that were previously surveyed in 2011 and early 2012 for further analysis.

Selection of the 60, 800-m survey locations was achieved using a spatially balanced sampling design used to capture the variability in habitat conditions, terrain features, and turbine numbers and densities. Minimum convex polygons[3] (MCPs) were placed around potential turbine construction areas in the Project site that are separated by the Turbine No-Build Areas established by PCW (Figures 1 and 2). MCPs were evaluated for differences in habitat characteristics, forage potential, and topography. While differences in habitat characteristics,

[3] MCPs were generated using the ArcGIS Spatial Analyst minimum bounding geometry function with the minimum convex hull option selected.

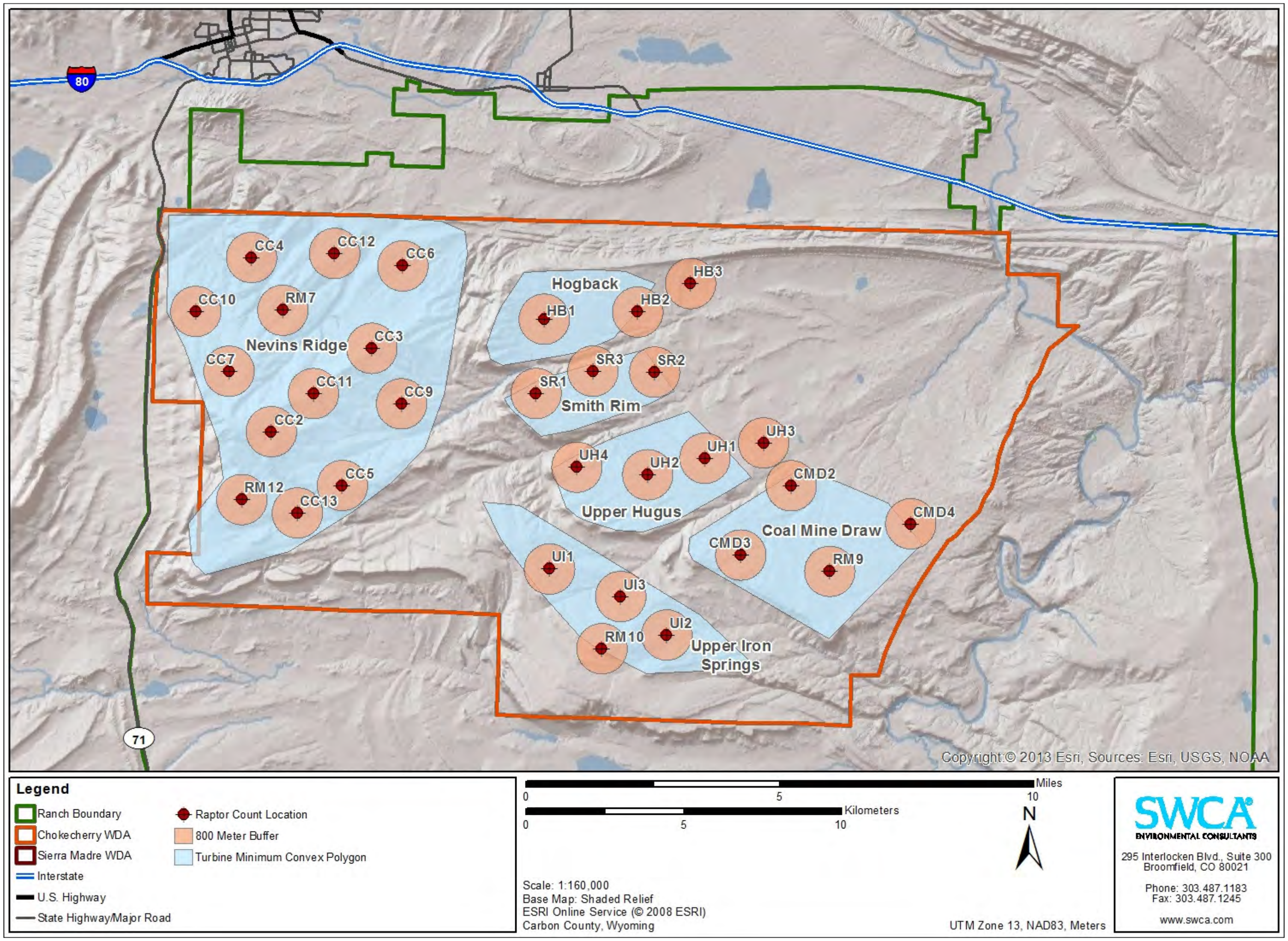

Figure 1.Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Chokecherry.

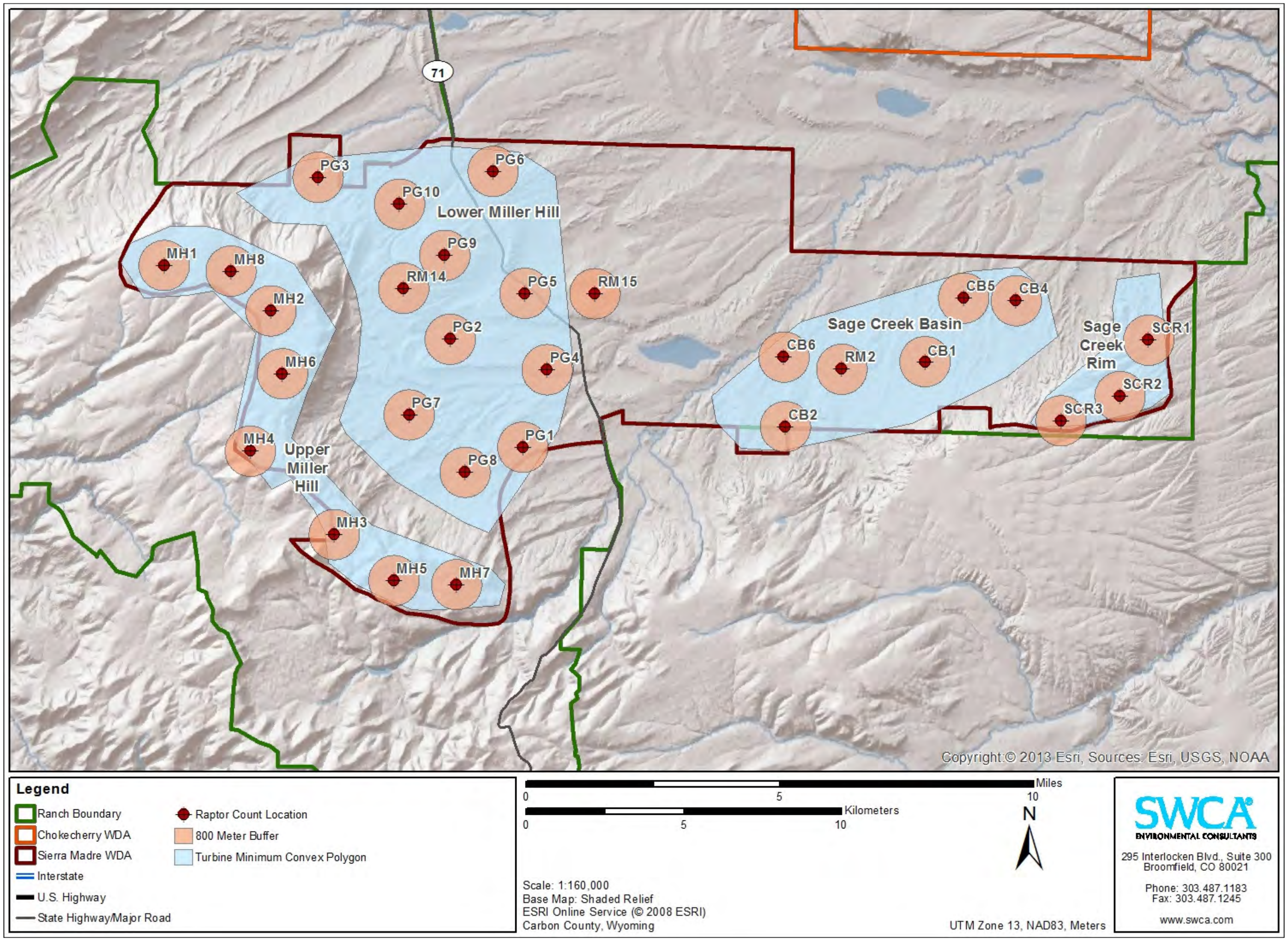

Figure 2. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Sierra Madre.

forage potential, and topography occur among the 10 discrete MCPs, within each MCP these factors are similar and additional stratification beyond the MCP level was not necessary. Using Geostatistical Analyst tools in ArcGIS, spatially balanced survey locations were sequentially selected in a manner that is consistent with the recommendations made by the Service while ensuring that no overlap occurs between survey locations. Total number of sampling locations per MCP was based on the relative surface area, number of turbines, and turbine densities in each MCP.

Raptor surveys documented in this report occurred from April 1 through June 21, 2013. Surveys occurred at 60 survey locations across the Project site, with 31 survey locations in the Chokecherry WDA and 29 survey locations in the Sierra Madre WDA (Figures 1 and 2). Surveys were designed to occur at each of the 60 survey locations for 1 hour per survey date in accordance with guidance from the Service. Three avian technicians each surveyed two survey locations per day resulting in surveys of six survey locations per day and 60 survey locations in a 10-day period. The schedule was designed and implemented to provide survey coverage across all daylight hours for each of the 60 survey locations. The schedule was also designed such that the six raptor count surveys conducted on any given day were separated temporally and spatially to increase the likelihood of independence of any observations made.

Each survey location was scheduled to be surveyed twice per month; however, inclement weather and associated safety concerns occasionally limited the technicians' ability to successfully complete surveys. The majority of the 60 survey locations were visited five to six times during the survey period. All sites were scheduled to be visited six times during this survey period; however, an intense late winter storm in early April caused the cancellation of a full week's surveys due to safety and accessibility concerns.

Surveys were completed across all daylight hours in accordance with the Service's recommendations. Each raptor flight path was recorded by technicians on aerial maps. Additional data collected included species, number of individuals per observation, age, sex, behavior, azimuth to bird, distance to bird, heading of bird, altitude of bird, the beginning and ending time for each observation, interactions with other birds, and hourly weather data among other variables. Appendix A to this report contains the detailed protocols used to collect the data.

RESULTS AND DISCUSSION

During the April 1 to June 21, 2013 survey period, 322 individual surveys were conducted across both WDAs for a total of 19,874 survey minutes (331.23 hours; Tables 1 and 2). Generally, survey minutes were evenly distributed across the 60 survey locations but varied slightly at some survey locations due to safety and accessibility issues caused by inclement weather.

During the April 1 to June 21, 2013 survey period, three golden eagles (*Aquila chrysaetos*) and an unknown eagle were observed in flight for a total of 6 minutes (Tables 1 and 2). Overall eagle use during this survey period was 0.0003 flight minute per minute of survey. This use value is the total use without consideration of flight heights and proportion of time in the Rotor Swept Zone (RSZ). Use in the Chokecherry WDA during this survey period was

0.0002 flight minute per minute of survey while use in the Sierra Madre WDA was 0.0004 flight minute per minute of survey. No bald eagles (*Haliaeetus leucocephalus*) were detected during the April 1 to June 21, 2013 survey period.

All eagle flight minutes recorded during the April 1 to June 21, 2013 survey period were subdivided into altitudinal categories as recorded during field surveys (below RSZ = 0–30 m, within RSZ = 30–150 m, above RSZ = above 150 m) to determine the proportion of time eagles flew through the RSZ (30–150 m) and therefore at risk of collision. These altitudinal categories were developed to reflect the actual turbine heights that will be used for the Project. Of the 6 total eagle flight minutes, 2 minutes (33.3%) were recorded within the 0–30 m bin, 3 minutes (50%) were recorded within the 30–150 m bin, and 1 minute (16.7%) was recorded above 150 m (Tables 1 and 2). When considering observed flight heights, total use across the Project site in the RSZ where collisions could occur was 0.0002 minute of flight time per minute of survey, a decrease of nearly 33.3% compared to total flight minutes.

Results and Discussion of Chokecherry Use Observations

Surveys in the Chokecherry WDA were conducted at 31 locations for a total of 10,200 minutes during the April 1 to June 21, 2013 survey period. During this survey period, eagles were observed in flight at two of the 31 survey locations for a total of 2 minutes (Table 1). Eagle use for the Chokecherry WDA during this survey period was calculated as 0.0002 flight minute per survey minute.

None of the eagle flight minutes occurred within the 0–30 m altitudinal bin, 1 minute (50%) occurred within the 30–150 m bin, and 1 minute (50%) occurred above 150 m (Table 1). In the Chokecherry WDA, 50% of all use occurred outside of the RSZ where eagles are not at risk for collision.

The two sites in the Chokecherry WDA with eagle observations occurred within two of the MCPs: Nevins Ridge and Hogback (Figure 1). Survey locations within the Smith Rim, Upper Hugus, Coal Mine Draw, and Upper Iron Springs MCPs all had zero eagle observations during the April 1 to June 21, 2013 survey period. Within the Nevins Ridge MCP, a golden eagle was observed at CC3; and in the Hogback MCP, an unknown eagle was observed at HB2 (Table 1).

Within the Nevins Ridge MCP, at CC3 one golden eagle was observed on one survey date for a total of 1 flight minute, which occurred in the 30–150 m height category. Over the course of the 1 flight minute, this individual's behavior was recorded as soaring.

Within the Hogback MCP, at HB2 one unknown eagle was observed on one survey date for a total of 1 flight minute, which occurred above 150 m. This individual was not able to be identified to species level due to the high altitude of flight and the short observation time. Over the course of the 1flight minute, this individual's behavior was recorded as both soaring and gliding.

Results and Discussion of Sierra Madre Use Observations

In the Sierra Madre WDA, surveys were conducted for 9,674 minutes during the April 1 to June 21, 2013 survey period. During this survey period, golden eagles were observed in flight at two of 29 survey locations for a total of 4 minutes (Table 2). Golden eagle use for the Sierra Madre WDA during this period was 0.0004 flight minute per survey.

Two of the 4 golden eagle flight minutes (50%) occurred within 0–30 m height category, 2 minutes (50%) occurred within 30–150 m, and 0 minutes occurred above 150 m (Table 2). In the Sierra Madre WDA, 50% of all use occurred outside of the RSZ where eagles are not at risk for collision.

The two sites with eagle observations in the Sierra Madre WDA occurred within two of the MCPs: Lower Miller Hill and Sage Creek Basin (Figure 2). Survey locations within the Upper Miller Hill and Sage Creek Rim MCPs all had zero eagle observations during the April 1 to June 21, 2013 survey period. Within the Lower Miller Hill MCP, one golden eagle was observed at RM14. Within the Sage Creek Basin MCP, only one golden eagle was observed at CB1 (Table 2).

Within the Sage Creek Basin MCP, at CB1 one golden eagle observation was made on one survey date for a total of 3 flight minutes. One flight minute occurred within the 0–30 m height category, and 2 flight minutes occurred within the 30–150 m height category. Over the course of the three flight minutes, this individual's behavior was recorded as gliding and powered flight (Table 4).

Within the Lower Miller Hill MCP, at RM14 one golden eagle was observed on a single date for a total of 1 flight minute. This flight minute occurred in the 0–30 m height category, and the individual's behavior was recorded as foraging (Table 4).

The majority of golden eagle flight minutes recorded within the Sierra Madre WDA during the April 1 to June 21, 2013 survey period are not independent as 75% were generated by a single eagle on one survey date (Table 4, 3 minutes of flight time at CB1 on April 1).

Treatment of these data as independent observations will overstate the expected impacts to eagles. In the case of the data described in the paragraph above, treating the 3 minutes of observed golden eagle use as independent is the equivalent of stating that three golden eagles were observed in flight for one minute each. This assumption of independence is not valid for these data and should be accounted for in future planning efforts and analysis of potential Project impacts to eagles.

COMPARISON TO PREVIOUS RESULTS

As a result of PCW's Project re-design, eagle use in the WDAs was substantially lower during the April 1 to June 21, 2013 survey period than the same periods in 2011 and 2012. Eagle use during the April 1 to June 21, 2013 survey period was 0.0003 flight minute per minute of survey compared with 0.0048 during the April to June 2011 survey period and 0.0047 during the April to June 2012 survey period, a decrease in use of more than 93% from both 2011 and

2012. The reduction in eagle use estimates between the survey periods are due to the establishment of Turbine No-Build Areas where high eagle use was documented from 2011–2012 survey data and demonstrates the avoidance and minimization benefits of PCW's Project re-design. In PCW's Eagle Conservation Plan Supplement submitted to the Service on September 26, 2012, it was demonstrated that the establishment of the Turbine No-Build Areas would substantially reduce observed eagle use. The reduction in use observed during the survey period included in this report is consistent with the findings presented in the September 26, 2012, Eagle Conservation Plan Supplement.

No bald eagle use was recorded during the April 1 to June 21, 2013 survey period compared to 0.0002 flight minute per minute of survey observed during the April to June 2011 survey period, and 0.0017 during the April to June 2012 survey period. This reduction in use between survey periods also demonstrates the avoidance and minimization value of PCW's Project re-design as the observations of bald eagles in 2011–2012 were made within the Turbine No-Build Areas.

Eagle use for the Chokecherry WDA during the April 1 to June 21, 2013 survey period was calculated as 0.0002 flight minute per survey minute compared with 0.0063 during the April to June 2011 survey period and 0.0017 during the April to June 2012 survey period. This represents a 97% and 88% decrease in use, respectively, resulting from PCW's identification of Turbine No-Build Areas in multiple eagle use areas that were identified during the 2008–2009, 2011, and 2012 survey programs.

No bald eagles were observed in the Chokecherry WDA during the April 1 to June 21, 2013 survey period, compared with bald eagle use of 0.0005 flight minute per survey minute during the April to June 2011 survey period and no bald eagle use during the April to June 2012 survey period.

Golden eagle use for the Sierra Madre WDA during the April 1 to June 21, 2013 survey period was 0.0004 flight minute per survey minute compared with 0.0032 during the April to June 2011 survey period and 0.0077 during the April to June 2012 survey period. This represents an 87% and 95% decrease in use, respectively, resulting from PCW's identification of Turbine No-Build Areas in multiple eagle use areas that were identified during 2008–2009, 2011, and 2012 survey efforts.

No bald eagles were observed in the Sierra Madre WDA during either the April 1 to June 21, 2013 survey period or the April to June 2011 survey period; however, bald eagle use during the April to June 2012 survey period was 0.0033 flight minute per survey minute.

Table 1. Number of Survey Minutes, Days, Individuals, Golden and Unknown Eagle Flight Minutes, and Height Categories for all Survey Locations in the Chokecherry WDA.

MCP	Location	Survey Minutes	Number of Individual Eagles	Golden and Unknown Eagle Flight Minutes	Minutes within 0-30 m	Minutes within 30-150 m (RSZ)	Minutes above 150 m
Nevins Ridge	CC2	360	0	0	0	0	0
	CC3	360	1	1	0	1	0
	CC4	300	0	0	0	0	0
	CC5	300	0	0	0	0	0
	CC6	300	0	0	0	0	0
	CC7	360	0	0	0	0	0
	CC9	360	0	0	0	0	0
	CC10	360	0	0	0	0	0
	CC11	360	0	0	0	0	0
	CC12	300	0	0	0	0	0
	CC13	300	0	0	0	0	0
	RM7	300	0	0	0	0	0
	RM12	300	0	0	0	0	0
Coal Mine Draw	CMD2	360	0	0	0	0	0
	CMD3	360	0	0	0	0	0
	CMD4	360	0	0	0	0	0
	RM9	360	0	0	0	0	0
Hogback	HB1	300	0	0	0	0	0
	HB2	300	1	1	0	0	1
	HB3	300	0	0	0	0	0
Smith Rim	SR1	300	0	0	0	0	0
	SR2	360	0	0	0	0	0
	SR3	300	0	0	0	0	0
Upper Hugus Draw	UH1	300	0	0	0	0	0
	UH2	300	0	0	0	0	0
	UH3	360	0	0	0	0	0
	UH4	360	0	0	0	0	0
Iron Springs	UI1	300	0	0	0	0	0
	UI2	360	0	0	0	0	0
	UI3	360	0	0	0	0	0
	RM10	300	0	0	0	0	0
Total	**–**	**10,200**	**2**	**2**	**0**	**1**	**1**

Table 2. Number of Survey Minutes, Days, Individuals, Golden Eagle Flight Minutes, and Height Categories for all Survey Locations in the Sierra Madre WDA.

MCP	Location	Survey Minutes	Number of Individual Eagles	Golden Eagle Flight Minutes	Minutes within 0-30 m	Minutes within 30-150 m (RSZ)	Minutes above 150 m
Sage Creek Basin	CB1	300	1	3	1	2	0
	CB2	270	0	0	0	0	0
	CB4	360	0	0	0	0	0
	CB5	360	0	0	0	0	0
	CB6	360	0	0	0	0	0
	RM2	300	0	0	0	0	0
Upper Miller Hill	MH1	360	0	0	0	0	0
	MH2	360	0	0	0	0	0
	MH3	360	0	0	0	0	0
	MH4	300	0	0	0	0	0
	MH5	300	0	0	0	0	0
	MH6	360	0	0	0	0	0
	MH7	360	0	0	0	0	0
	MH8	300	0	0	0	0	0
Lower Miller Hill	PG1	360	0	0	0	0	0
	PG2	300	0	0	0	0	0
	PG3	360	0	0	0	0	0
	PG4	360	0	0	0	0	0
	PG5	360	0	0	0	0	0
	PG6	300	0	0	0	0	0
	PG7	360	0	0	0	0	0
	PG8	300	0	0	0	0	0
	PG9	300	0	0	0	0	0
	PG10	300	0	0	0	0	0
	RM14	360	1	1	1	0	0
	RM15	360	0	0	0	0	0
Sage Creek Rim	SCR1	360	0	0	0	0	0
	SCR2	360	0	0	0	0	0
	SCR3	284	0	0	0	0	0
Total	**–**	**9,674**	**2**	**4**	**2**	**2**	**0**

Table 3. Summary of Golden and Unknown Eagle Observations in the Chokecherry WDA.

Date and Time of Observation	Location	Number of Golden and Unknown Eagles Observed	Golden and Unknown Eagle Observations per Survey Minute	Golden and Unknown Eagle Flight Minutes	Flight Minutes in RSZ	Flight Behavior (minutes)
04/23/2013 18:05	CC3	1	0.0028	1	1	Soaring (1)
4/30/2013 17:54	HB2	1	0.0033	1	0	Soaring (0.5) Gliding (0.5)

Table 4. Summary of Golden Eagle Observations in the Sierra Madre WDA.

Date and Time of Observation	Location	Number of Golden Eagle Observed	Golden Eagle Observations per Survey Minute	Golden Eagle Flight Minutes	Flight Minutes in RSZ	Flight Behavior (minutes)
4/1/2013 17:58	CB1	1	0.0033	3	2	Gliding (1) Powered Flight (2)
5/23/2013 16:49	RM14	1	0.0028	1	0	Foraging (1)

Appendix A:

Revised 2012-2013 800-meter Raptor Survey Protocols Chokecherry and Sierra Madre Wind Energy Project

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Revised 2012-2013 800-meter Raptor Survey Protocols

Chokecherry and Sierra Madre Wind Energy Project

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November 2012

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The Power Company of Wyoming (PCW) recently initiated revisions to the methodologies currently used to survey for raptors at their Chokecherry and Sierra Madre Wind Energy Project (Project). Based on conversations with U.S. Fish and Wildlife Service (Service) personnel, and in an effort to collect data that are appropriate for use in the Service's model that predicts the potential fatality rate of eagles for wind energy projects (hereafter, the Service's model), raptor survey protocols were revised for the fall 2012 season and for future raptor survey efforts. On August 31, 2012, PCW provided the Service with a revised protocol for conducting eagle and raptor surveys at 40 800-meter point count survey sites throughout the Project. PCW began surveying the 40 locations at the beginning of the autumn 2012 survey season and it is anticipated that those survey efforts will continue through October 2012 at which time the revised protocols discussed in this document will be initiated. On September 28, 2012, the Service issued a letter recommending slight modifications to the August 31, 2012 protocols. This revised protocol addresses the comments made by the Service and specific responses to each comment made are provided in Attachment 1.

These survey methodology revisions are fully consistent with the recommendations for raptor surveys set forth by the Service in their Draft Eagle Conservation Plan Guidance (Draft ECP Guidance), the Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices (Technical Appendices; as received from Kevin Kritz, Service Region 6, on August 4, 2012), and the Land-Based Wind Energy Guidelines, while still maintaining expansive coverage of the Project Site.

Year Two and Year Three long-watch raptor surveys were fully consistent with the recommendations set forth by the Service's Draft ECP Guidance (Service 2011) and Land-Based Wind Energy Guidelines (Service 2012a), the Bureau of Land Management's (BLM's) Wildlife Survey Protocols for Wind Energy Development (BLM 2008), and the Wyoming Game and Fish Department's (WGFD's) Wildlife Protection Recommendations for Wind Energy Development (WGFD 2010). These surveys were very successful in identifying concentrated raptor use areas across the Project that could be used to design avoidance areas to minimize avian impacts. Additionally, long-watch survey data were instructive in showing the Project Site is not a strong migratory corridor for raptors, and the flight paths digitized from these data were used to identify high eagle use areas as recommended by the Service's Technical Appendices (Service 2012b).

The revised raptor count protocols follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices (Service 2012b), and are also in accordance with the aforementioned guidance documents produced by the Service, BLM, and WGFD. PCW also sought consultation with Dr. Joshua Millspaugh (Professor of Wildlife Management, University of Missouri) to ensure the development of a rigorous sampling design that would result in the collection of data appropriate for the analysis methods and fatality model currently being used by the Service.

Based upon agency guidance and logistical considerations, the revised protocols were designed to include 60, 800-meter raptor count survey sites throughout the Chokecherry and Sierra Madre Wind Development Areas (WDAs) where turbine development is likely (Figures 1 and 2). Most of the 60 survey sites are identical to the original 40 sites identified in the August 31, 2012 protocols. However, some of those 40 sites were shifted slightly to

accommodate the placement of the additional 20 survey sites and ensure that no overlap occurs between samples. Seven of the new sites correspond to raptor monitoring locations that were used in 2011 and spring 2012 survey efforts (RM2, RM7, RM9, RM10, RM12, RM14, and RM15). Efforts were made to resample as many of the previous sampling sites as possible. However, because of PCW's Project re-design efforts identified in the Project Eagle Conservation Plan (ECP), many of the previous sampling locations are outside or on the very edge of the current development area and could not be included without violating the spatially balanced design that is critical to these protocols.

A spatially balanced sampling design was used to capture the variability in habitat conditions, terrain features, and turbine numbers and densities. Minimum convex polygons (MCPs) were placed around each of 10 discrete potential development areas that are separated by Turbine No-Build areas, topography, or other factors (Figures 1 and 2). MCPs were evaluated for differences in habitat characteristics, forage potential, and topography. While differences in habitat characteristics, forage potential, and topography occur among the 10 MCPs, within each MCP, these factors are similar and additional stratification beyond the MCP level was not necessary.

Using the "Create Spatially Balanced Points" tool in ArcGIS Geostatistical Analyst, 250 spatially balanced locations were generated within the MCPs. Using the spatially balanced points, survey sites were selected sequentially in a manner that was consistent with the recommendations made by the Service while ensuring that no overlap occurs between survey areas. Total number of sampling sites per MCP was based on the relative surface area and number of turbines in the MCP. Two primary selection criteria were used to select sampling sites. First, no overlap of sampling areas was permitted (sites had to be separated by more than 1,650 meters). Second, because of logistical considerations, sampling sites were required to be reasonably accessible from the existing road network and in a safe location. If a potential sampling location violated either of the selection criteria it was dropped and the next point was evaluated. Tables 1 and 2 provide the locations of each sampling site in the WDAs as well as information specific to the MCPs and sampling sites.

The first 36 survey sites that were selected correspond to locations that were identified in the August 31, 2012 protocols. These were sequentially selected using the spatially balanced points that were generated as part of the process described above while controlling for site overlap and logistical considerations for survey. Of the remaining 24 sites, 4 correspond with the original 40 sites with locations slightly shifted to avoid overlap with new sites, 7 correspond with the long-watch raptor monitoring sites that were surveyed in 2011 and spring/summer 2012, 3 were selected outside of the current probable turbine footprint, and 10 were selected using the remaining spatially balanced points. Some minimal micrositing of the new locations is anticipated to ensure maximum visibility of the survey areas as well as safe and consistent accessibility on the part of field personnel.

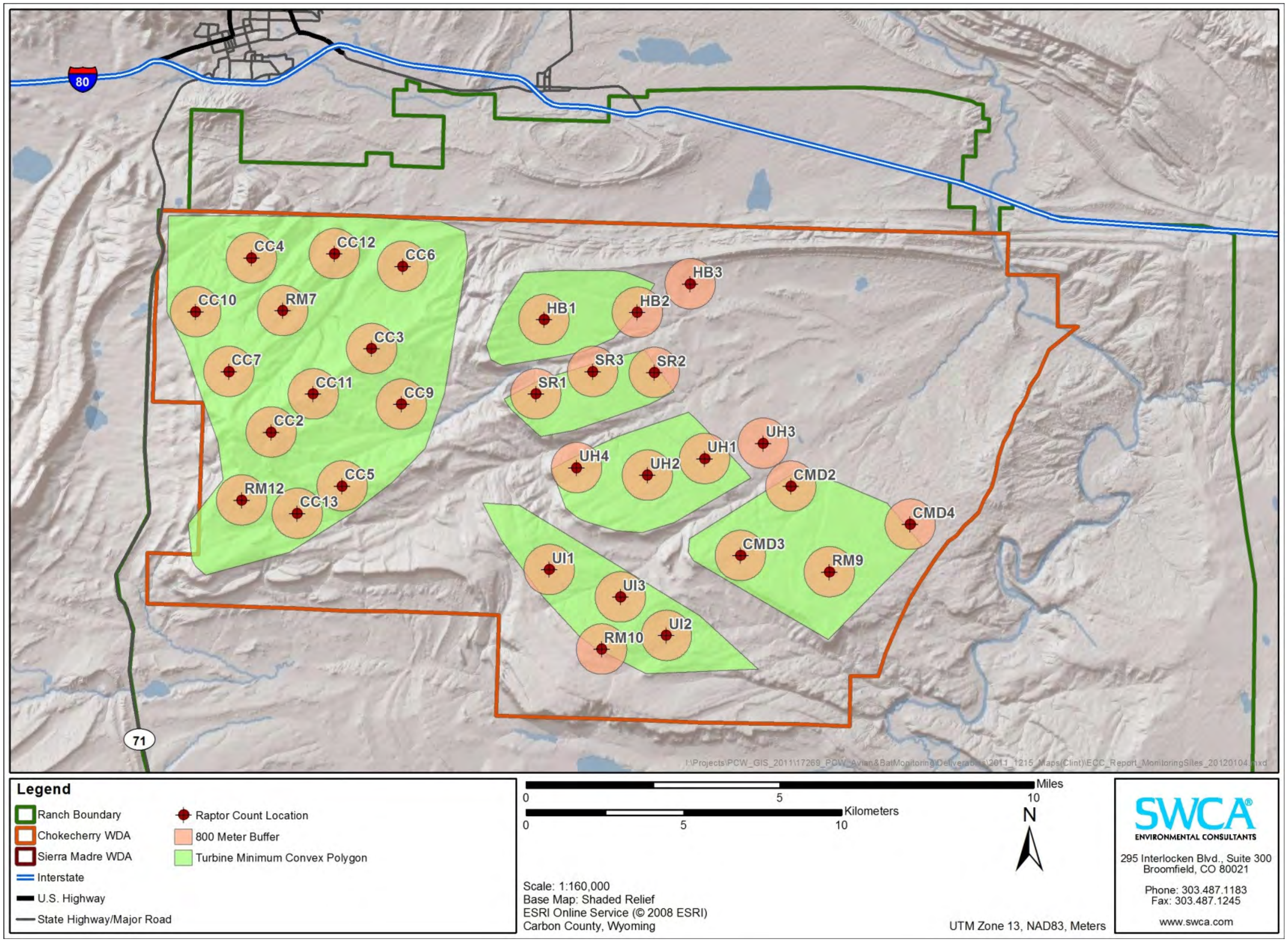

Figure 1. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Chokecherry.

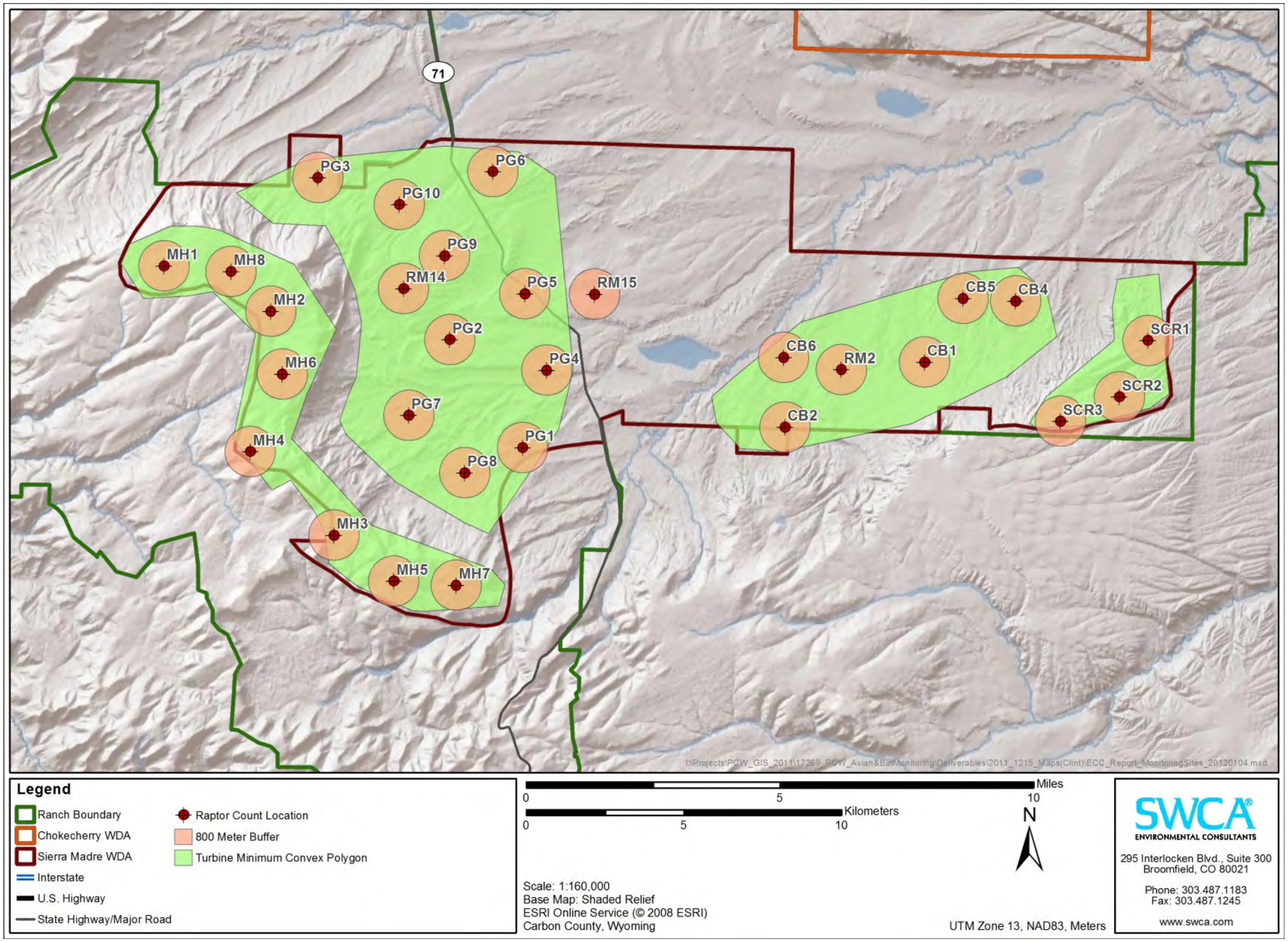

Figure 2. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Sierra Madre.

Table 1. Fall 2012-2013 Avian Monitoring Survey Locations for the Chokecherry WDA.

WDA	MCP	Site Name	Survey Site Status	Easting*	Northing*
Chokecherry	Chokecherry	CC2	Original Fall 2012 Site	315166	4616447
Chokecherry	Chokecherry	CC3	Original Fall 2012 Site	318351	4619090
Chokecherry	Chokecherry	CC4	Original Fall 2012 Site	314539	4621971
Chokecherry	Chokecherry	CC5	Original Fall 2012 Site	317418	4614741
Chokecherry	Chokecherry	CC6	Original Fall 2012 Site	319335	4621702
Chokecherry	Chokecherry	CC7	Original Fall 2012 Site	313825	4618366
Chokecherry	Chokecherry	CC9	Original Fall 2012 Site	319294	4617332
Chokecherry	Chokecherry	CC10	New 2012 Survey Site	312770	4620262
Chokecherry	Chokecherry	CC11	New 2012 Survey Site	316501	4617656
Chokecherry	Chokecherry	CC12	New 2012 Survey Site, original CC1 site shifted north to eliminate overlap with RM7	317170	4622100
Chokecherry	Chokecherry	CC13	New 2012 Survey Site, original CC8 site shifted southeast to eliminate overlap with RM12	315993	4613871
Chokecherry	Chokecherry	RM7	2011-2012 Long-watch Site	315531	4620298
Chokecherry	Chokecherry	RM12	2011-2012 Long-watch Site	314228	4614294
Chokecherry	Coal Mine Draw	CMD2	Original Fall 2012 Site	331648	4614732
Chokecherry	Coal Mine Draw	CMD3	New 2012 Survey Site	330049	4612535
Chokecherry	Coal Mine Draw	CMD4	New 2012 Survey Site, original CMD1 site shifted east to eliminate overlap with RM9	335437	4613524
Chokecherry	Coal Mine Draw	RM9	2011-2012 Long-watch Site	332870	4612018
Chokecherry	Hogback South	HB1	Original Fall 2012 Site	323818	4620014
Chokecherry	Hogback South	HB2	Original Fall 2012 Site	326781	4620243
Chokecherry	Hogback South	HB3	New 2012 Survey Site	328457	4621145
Chokecherry	Smith Rim	SR1	Original Fall 2012 Site	323560	4617658
Chokecherry	Smith Rim	SR2	Original Fall 2012 Site	327318	4618336
Chokecherry	Smith Rim	SR3	New 2012 Survey Site	325362	4618367
Chokecherry	Upper Hugus	UH1	Original Fall 2012 Site	328912	4615606
Chokecherry	Upper Hugus	UH2	Original Fall 2012 Site	327099	4615081
Chokecherry	Upper Hugus	UH3	New 2012 Survey Site	330772	4616091
Chokecherry	Upper Hugus	UH4	New 2012 Survey Site	324853	4615321
Chokecherry	Upper Iron Springs	UI1	Original Fall 2012 Site	323987	4612091
Chokecherry	Upper Iron Springs	UI2	Original Fall 2012 Site	327702	4610001
Chokecherry	Upper Iron Springs	UI3	New 2012 Survey Site	326242	4611221
Chokecherry	Upper Iron Springs	RM10	2011-2012 Long-watch Site	325646	4609568

*UTM Zone 13, NAD83, Meters

Table 2. Fall 2012-2013 Avian Monitoring Survey Locations for the Sierra Madre WDA.

WDA	MCP	Site Name	Survey Site Status	Easting*	Northing*
Sierra Madre	Central Basin	CB1	Original Fall 2012 Site	326414	4597515
		CB2	Original Fall 2012 Site	321986	4595452
		CB4	Original Fall 2012 Site	329306	4599449
		CB5	New 2012 Survey Site	327638	4599529
		CB6	New 2012 Survey Site, original CB3 site shifted west to eliminate overlap with RM2	321942	4597660
		RM2	2011-2012 Long-watch Site	323776	4597273
	Miller Hill	MH1	Original Fall 2012 Site	302291	4600564
		MH2	Original Fall 2012 Site	305677	4599125
		MH3	Original Fall 2012 Site	307684	4592030
		MH4	Original Fall 2012 Site	305024	4594675
		MH5	Original Fall 2012 Site	309573	4590571
		MH6	Original Fall 2012 Site	306043	4597131
		MH7	New 2012 Survey Site	311561	4590443
		MH8	New 2012 Survey Site	304412	4600385
	Pine Grove	PG1	Original Fall 2012 Site	313663	4594801
		PG2	Original Fall 2012 Site	311358	4598224
		PG3	Original Fall 2012 Site	307172	4603361
		PG4	Original Fall 2012 Site	314434	4597259
		PG5	Original Fall 2012 Site	313730	4599682
		PG6	Original Fall 2012 Site	312721	4603547
		PG7	Original Fall 2012 Site	310058	4595825
		PG8	Original Fall 2012 Site	311832	4594006
		PG9	Original Fall 2012 Site	311187	4600886
		PG10	New 2012 Survey Site	309753	4602508
		RM14	2011-2012 Long-watch Site	309884	4599843
		RM15	2011-2012 Long-watch Site	315948	4599668
	Sage Creek Rim	SCR1	Original Fall 2012 Site	333505	4598194
		SCR2	Original Fall 2012 Site	332596	4596407
		SCR3	New 2012 Survey Site	330727	4595638

*UTM Zone 13, NAD83, Meters

Landmarks will be identified and visible stakes will be placed around each survey location perimeter to provide distance references for field personnel completing survey efforts. The 800-meter radius survey areas of the new 60 point count locations provide coverage for approximately 35% of the probable turbine locations, which is greater than the 30% recommendation made by the Service (Service 2012b). Additionally, 46.7% of the raptor monitoring sites that were surveyed in 2011 will be resurveyed as part of the 60 point counts. Resurvey of 50% of all previous survey sites was not possible because many fall outside of the current project layout in Turbine No-Build areas and use of those sites would violate the spatially balanced study design in addition to sampling areas that are already known as high use areas for eagles and other raptors. Additionally, several sites that were only surveyed in spring/summer 2012 do not have a full year of data and would not be appropriate for comparison with ongoing and future data collection efforts. However, many of the 60 new survey sites overlap with areas previously surveyed as part of 2011 and 2012 raptor monitoring efforts. When these areas are included, 50.3% of the area surveyed as part of previous raptor monitoring efforts is within the perimeter of the 60 new point count survey sites.

Surveys will be conducted at each site for one hour per guidance in the ECP Technical Appendices (Service 2012b). Three avian technicians will each survey two locations per day for a total of 6 locations per day and 60 locations in a 10 day period. Each location will be surveyed twice per month. A schedule for all 60 raptor count locations was designed to provide survey coverage across all daylight hours for each of the 60 sites. The schedule was also designed such that the six raptor count surveys conducted on any given day are separated temporally and spatially to ensure independence of any observations that are made.

Avian technicians will be equipped with binoculars, spotting scopes, laser rangefinders, and aerial maps to assist with accurate detection and documentation of all raptors observed within the 800-meter survey area. Each aerial map is displayed with relevant landforms occurring in the area, locations of stakes, and concentric rings at each 200-meter interval to facilitate accurate distance estimation (Attachment 2). Each raptor flight path is recorded by technicians on the provided aerial maps. Additional data collected include species, number of individuals per observation, age, sex, behavior, bearing to bird, distance to bird, heading of bird, altitude of bird, the beginning and ending time for each observation, interactions with other birds, and hourly weather data among other variables (Attachment 3).

Surveys at the 60 800-meter raptor counts will begin in November 2012 and are scheduled to continue bi-weekly at each location through August of 2013. Surveys during winter months will be completed on the same schedule as the remainder of the year and efforts will be made to survey at least 50% of all locations twice per month during winter. However, winter surveys are subject to cancellation or delay based on weather conditions and safety of the field technicians.

REFERENCES

Bureau of Land Management (BLM). 2008. Wildlife Survey Protocols for Wind Energy Development.

U.S. Fish and Wildlife Service (Service). 2011. Draft Eagle Conservation Plan Guidance. Available online at http://www.fws.gov/windenergy/. Accessed December 2011.

———. 2012a. Land Based Wind Energy Guidelines. Wind Turbine Guidelines Advisory Committee. U.S. Fish and Wildlife Service, Department of the Interior, Washington D.C. Available online at http://www.fws.gov/windenergy/docs/WEG_final.pdf. Accessed August 2012.

———. 2012b. Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices. Received from Kevin Kritz, Service Region 6, on August 4, 2012.

Wyoming Game and Fish Department (WGFD). 2010. Wildlife Protection Recommendations for Wind Energy Development in Wyoming. Wyoming Game and Fish Commission Approved November 17, 2010. Wyoming Game and Fish Department, Cheyenne, WY.

ATTACHMENT 1

Response to Survey Recommendations Made in the Service's September 28, 2012 Letter

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The following recommendations were made by the Service in the September 28, 2012 letter to Garry Miller (PCW) regarding Eagle Use Sampling Considerations and Recommendations for the proposed Chokecherry-Sierra Madre Wind Energy Development Project. A response is provided to document how each recommendation has been incorporated into the revised 800-meter point count survey protocols. Recommendations are presented in italics below.

1. *We recommend focusing sampling efforts within the most recently proposed project footprint in order to quantify eagle use in areas where turbines are planned for location. By collecting eagle and raptor use data in areas of likely development, we believe it will be easier to obtain a more reliable estimate of risk to eagles in these areas, from which more informed, site-specific, predictions can be made.*

   Response: The revised protocols and placement of the 60 point count sites are based on the most recent proposed Project footprint and probable turbine locations. The most recent Project footprint reflects PCW's commitment to the Turbine No-Build areas identified in the Project ECP.

2. *Although we recommend concentrating sampling effort within the project footprint as stated above, we believe it also would be prudent to establish additional sample points outside of the currently proposed footprint in areas of potential development. Adding points in areas of possible alternative turbine layouts will provide data to assess the impact of those alternatives, which may be necessary if survey results identify areas of high eagle use within areas currently proposed for development. Without eagle use data outside of the proposed footprint, it would be difficult to show that the relocation of turbines outside of the currently proposed project footprint would avoid and minimize impacts to eagles. Without these data, the only likely alternatives would be a reduction in the total number of turbines, or a reduction in the spacing between turbines in areas where avian and raptors surveys were conducted.*

   Response: Three of the 60 point count survey sites (RM15, HB3, and UH3) are placed outside of the most current probable turbine locations. Several additional locations (e.g., CMD2, HB2, RM10, SR2) have a substantial portion of their survey areas that fall outside of the current probable turbine locations. Each of these sites provides survey coverage in areas of the Project Site where turbines could be located if the current probable turbine location footprint changes.

3. *We recommend resampling at least fifty percent of the raptor point counts from previous years: this will help distinguish between apparent changes in documented eagle use caused by different point locations and associated differences in detectability, versus actual changes in habitat use. This is an important consideration, because the number of eagles and their location on the landscape is likely to vary across years (e.g., not every nest is active every year), making it difficult to account for inter-annual variability, which might lead to inaccurate conclusions about the risk of eagle fatalities. For example, observing fewer eagles at a second set of survey points could be misinterpreted as an area of lower eagle use, when in fact the number of eagles and eagle use across the landscape decreased due to other factors. In this*

example, the use (and hence risk) might have been the same for all survey points, but sampling different points across years would lead to the erroneous conclusion. Resampling some points across years can reduce this uncertainty by creating an index or allow for scaling of observations across years.

Response: Nearly 50% (46.7%) of the raptor monitoring sites that were surveyed in 2011 will be resurveyed as part of the 60 point counts. Resurvey of 50% of previous survey sites is not possible because many fall outside of the current project layout in Turbine No-Build areas. Additionally, several sites that were only surveyed in spring/summer 2012 do not have a full year of data and would not be appropriate for comparison with ongoing and future data collection efforts. Many of the 60 new survey sites overlap with areas previously surveyed as part of 2012 raptor monitoring efforts. When those areas are included, 50.3% of the area surveyed as part of 2012 raptor monitoring efforts is within the perimeter of the 60 new point count survey sites.

4. *Previous long-watch raptor surveys were based on an unlimited radius, and analysis of data from these surveys suggests that the detectability of eagles dropped off after 600 to 800 meters. We recommend using a distance of no more than 800 meters for point counts intended to collect data on eagles and other large raptors. This recommendation is found in our draft Eagle Conservation Plan Guidance (Service 2012, Appendix C, p. 18) and in other literature (e.g., Strickland et al. 2011). While it is acceptable to collect data on eagles and other raptors beyond 800 meters (e.g., location, flight height, flight path)—since they may be useful to identify travel corridors and areas of eagle use—the collection of this information should not distract surveyors from collecting data within the 800-meter point count. In addition, because only those data collected within 800 meters will be used in the models to predict eagle fatalities, data collected at distances more than 800 meters should be separated from data collected within 800 meters.*

   Response: Previous long-watch raptor surveys recorded any eagle observed to help identify high use areas per the protocols developed collaboratively between the Service, BLM, and PCW. The analysis of detectability of eagles presented in the Service's comments does not consider that the reason eagle use was higher within 800 meters of previously sampled sites is because those sites were placed on ridgelines and terrain features known to attract or concentrate eagle use, making the likelihood of observing an eagle within 800 meters of a survey site higher than if the point was placed randomly in the landscape where varying terrain features may or may not occur. The implementation of the previous surveys was extremely successful and resulted in the development of Turbine No-Build areas that will avoid impacts to eagles and other avian species in the majority of the high use areas that were identified. To be consistent with the Service's Draft ECP Guidance, the Service's eagle risk model, and the recommendation made above, all surveys will be conducted using a distance of 800-meters.

5. *Based on recommendations in the draft Eagle Conservation Plan Guidance, the sampling goal should provide a "minimal spatial coverage of at least 30% of the project footprint" (i.e., the total area sampled in any given year should be thirty percent of the total project footprint) (Service 2012, Appendix C, p. 1 8). We recognize that even this level of effort will not provide specific information for seventy percent of the project area; however, it may be assumed that the information is representative of the remaining project area, provided the sample points are appropriately located (e.g., stratified and spatially balanced). To achieve the desired goal of at least 30 percent coverage of the Chokecherry Sierra Madre Proposed Project footprint, we calculate up to 70 survey points are needed, depending on how the project footprint is portrayed.*

   Response: Using the conceptual turbine footprint that PCW provided to the Service, 35% of all turbine locations fall within the 800-meter survey perimeters of the 60 point count sites. As stated above, the entirety of 3 sites and substantial portions of 3 others fall outside of the probable Project footprint in areas where turbines could be placed. These provide adequate coverage of areas outside of the current probable turbine footprint. When combined with the 800-meter radius surveyed areas from previous survey events (2011 and spring/summer 2012), 42% of probable turbine locations are included within the perimeter of 800-meter point count sites.

6. *We recommend sample locations be stratified by features of the landscape that may influence eagle and raptor activity, such as distinct geographic/topographic elements (e.g., escarpments), vegetation (if appropriate), and concentrated prey base. Doing so will allocate sampling points across the project in proportion to their occurrence on the landscape. A common sampling design in use today is the generalized random tessellation stratified sampling design (GRTS). We remain concerned that there is insufficient information about eagle habitat use associated with important eagle use areas including: active nests; concentrated prey base including grouse leks, prairie dog colonies, and reservoirs; as well as topographic features such as Miller Hill. Therefore, we recommend that some sample points be located near these important eagle use areas. Doing so would help with identifying additional avoidance areas or alleviating concerns for increased risk associated with these areas.*

   Response: The spatially balanced design that is discussed in the revised protocols above is reflective of the variability in habitat conditions, terrain features, and turbine numbers and densities. The revised protocols describe the methods used to select sites and the sampling strata and selection criteria that were used to place sites. The 60 sampling sites described in the revised protocols provide coverage in areas that provide some level of foraging, contain sage-grouse leks, and have variable topography that could influence eagle and raptor behavior. Site placement near active eagle nests is difficult because most nests have been avoided and are within the Turbine No-Build areas along the Bolten Rim or North Platte River corridor and, as seen in the data previously collected for the Project, active nests locations change each year.

7. *Based on recommendations in the Service's Eagle Conservation Plan Guidance, count periods should be one to two hours long (Service 2012, Appendix C, p. 18). If longer survey periods are used (e.g., four to six hours), the surveys should be divided into smaller units such as one or two hour blocks (or the actual time of eagle observations recorded), so that the influence of time of day can be evaluated (e.g., in relation to when turbines are inactive).*

   Response: Surveys will be conducted at each site for one hour per guidance in the ECP Technical Appendices (Service 2012b). As stated in the revised protocols, the survey methods follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices to the Draft ECP Guidance, and are consistent with other guidance documents produced by the Service, BLM, and WGFD.

8. *We recommend the protocol include a representative distribution of sampling events across all daylight hours across all point locations and seasons. Collecting data "evenly" across time and space should reduce any potential bias associated with locations, seasons, and time of day. This may also make it possible to evaluate how time of day influences eagle use of the site or when eagles are more likely to use specific topographic features. In addition, surveys should include multiple sampling events in each season per point.*

   Response: As stated in the revised protocols, the survey methods follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices to the Draft ECP Guidance, and are consistent with other guidance documents produced by the Service, BLM, and WGFD. The sampling schedule will provide survey coverage across all daylight hours for each of the 60 sites. The schedule also makes certain that the six raptor count surveys conducted on any given day are separated temporally and spatially to ensure independence of any observations that are made.

9. *We recommend locating survey sampling points at least 800 meters (0.5 mile) from active eagle and ferruginous hawk nests to limit disturbance. It may be possible to reduce this distance if topographic features create a visual barrier between observers and the nest.*

   Response: Should an eagle or ferruginous hawk nest become active within 800 meters of a survey site, PCW will coordinate with the Service and BLM to evaluate the most appropriate methods to take to ensure that survey activities do not disrupt nesting. With PCW's Turbine No-Build areas and Project re-design efforts, most eagle and raptor nests in the Project Site have been avoided by 800 meters or more. However, some survey sites are located within 800 meters of historically active nests. As stated above, sampling locations have been selected in a spatially balanced, stratified manner using methods recommended by the Service. Maintaining the sites that are located within 800 meters of historically active nests is necessary to maintain this spatially balanced design. Since Project survey efforts began in 2008, no active ferruginous hawk nests have been identified.

10. *We recommend data collection include identification of eagle species and their flight minutes within the 800-meter point count. Additional data collection could include, but should not necessarily be limited to (in relative order of importance): age and sex (if possible), flight path, flight behavior (e.g., soaring, kiting), activity (e.g., territory defense, foraging), interactions with other birds, flight height, obvious prey items, time observed outside of the 800-meter point count, and time perched. It is acceptable to record detections beyond 800-meters as these can provide additional information about eagle and raptor use of the project area. However, collecting data beyond 800-meters should not detract from observations made within the 800-meter point count.*

    Response: Only those observations occurring within 800 meters of the survey sites will be recorded. As described in the protocols and illustrated on the data collection forms in Attachment 3, data collection efforts will provide all of the information recommended by the Service.

11. *We recommend collecting data on all raptors to the extent feasible; however, collecting data on other raptors should not preclude the collection of data on eagles.*

    Response: Data on all raptors and other species of interest will be collected in a manner identical as that used for eagles unless those efforts interfere with data collection for eagles.

12. *Based on eagle use data collected between April of 2011 and April of 2012, eagle activity relative to sampling effort appears to be higher in the winter and summer periods (Table 1). Higher eagle activity in the summer likely corresponds to the time during which adults are actively feeding young and when young are learning to fly. Higher eagle activity in the winter may be related to the presence of migrant eagles, or could be due to the location of survey points. Because data were not collected following the above recommendations during the summer of 2012, we recommend the collection of eagle and raptor use data continue through the 2013 nesting season (at least through August of 2013) to evaluate this potential season of higher use.*

    Response: Data will be collected through August of 2013. Our interpretation of eagle use in winter and summer periods differs from the Service's interpretation. The Service's interpretation assumes that each minute of eagle use is independent and evenly distributed across the landscape. Based on the survey data, it is clear that most of the eagle minutes recorded across all seasons are not independent and that the simple statistic of flight minutes per survey minute does not consider that observations are not independent in space or time and therefore mischaracterizes seasonal use and risk. As an example, 72 of the 141 minutes (51%) of winter use observed in the Project Site occurred at two sites on two days. On December 8, 2011, 35 eagle flight minutes were recorded at RM11 and on March 9, 2012 37 minutes of eagle use were recorded at RM14. On both days, field technicians wrote on datasheets that the use was associated with 2-3 individuals who were using the area for a long period of time. If the three eagles at RM14 had not been observed on March 9, no winter use would

have been observed within 800 meters of that sampling site. Similarly, if the use at RM11 would not have been observed on December 8, only 3 minutes of eagle use over would have been observed at that site during winter months and use would have been decreased by 95%. The observed activity on December 8 and March 9 is indicative of short duration, concentrated use by a few individuals rather than of high eagle use of the Project throughout the entire winter period. The data also indicate that for most of the Project Site there is no risk or very low risk to eagles during winter. Summer data are very similar to winter data. During summer 2011, only 71 eagle minutes were recorded. Nearly 60% of these minutes were associated with only 3 observations of individual circle soaring birds at RM14 and RM5. This indicates that the high use the Service cites is not from adults feeding young or young learning to fly. Rather, the behavior observed indicates that this is localized use by individual birds utilizing thermals created by warm summer temperatures.

13. *In several locations, the document states that it was "fully compliant" with recommendations by the U.S. Fish and Wildlife Service (Service). First, it is important to understand that the draft Eagle Conservation Plan Guidance is voluntary; consequently we prefer to use the term "consistent with" rather than "compliant with" when describing recommendations found within the Eagle Conservation Plan Guidance. Second, we do not believe that the protocol provided by PCW is, in fact, consistent with the Eagle Conservation Plan Guidance for numerous reasons, one key reason being that the limited number of 800-meter survey points do not provide the recommended minimum 30 percent coverage of the project footprint. Additionally, we do not believe it is scientifically justifiable to combine survey points from multiple years in order to meet the minimum recommended standard of 30 percent coverage: the minimum 30 percent coverage should occur within each individual year.*

    Response: The recommended changes have been made. The term "compliant" has been changed to "consistent". As stated above, 35% of the probable turbine locations will be surveyed using the revised protocols.

14. *The document makes a definitive statement about "unrealistic projections" concerning eagle risk. This statement is based on several assumptions, including that previous survey efforts correctly identified areas of high eagle use. One of the reasons for increasing the spatial coverage in 2012-2013 is to increase our confidence in understanding eagle and raptor use across the Project area. Because substantial uncertainty exists as a result of the limited amount of spatial and temporal survey coverage used to document impacts and relative risk to eagles, the Service believes our projections concerning risk to eagles are realistic and clearly demonstrate the need for increased coverage. In addition, our letter of August 10, 2012, identified numerous areas of potential high eagle use that are not currently included in the avoidance areas, such as the golden eagle nest in the southwest corner of Sierra Madre. Our letter also identified the presence of high density prey base, proximity of sage grouse leks and other habitat features that are used by eagles. Because these habitat features (and others) are not included in the proposed avoidance areas, the projections of risk and high eagle fatalities identified by the Service are possible.*

Response: The comments made above have been addressed in the revised protocols, the prey-base report submitted to the Service, and the Project ECP. We concur that within the context of the Service's eagle fatality model, the revised protocols will help address uncertainties.

15. *The data sheet attached to the protocol provided by PCW does not appear to have a means of recording flight path in data. It should be clear how flight path data will be collected on the existing data sheet, or additional datasheets should be included if there is more than one.*

    Response: Attachment 2 contains an example figure that is used to record flight paths for eagles and other raptors. Additionally, multiple rows of data are recorded for each eagle observed which results in multiple spatial points per individual bird. Fitting a line between each point for each observed eagle provides another mechanism to create flight paths. The methods used to collect data are described in the revised protocols.

ATTACHMENT 2

Example Aerial Map Used to Map Flight Paths during 800-meter Raptor Count Surveys

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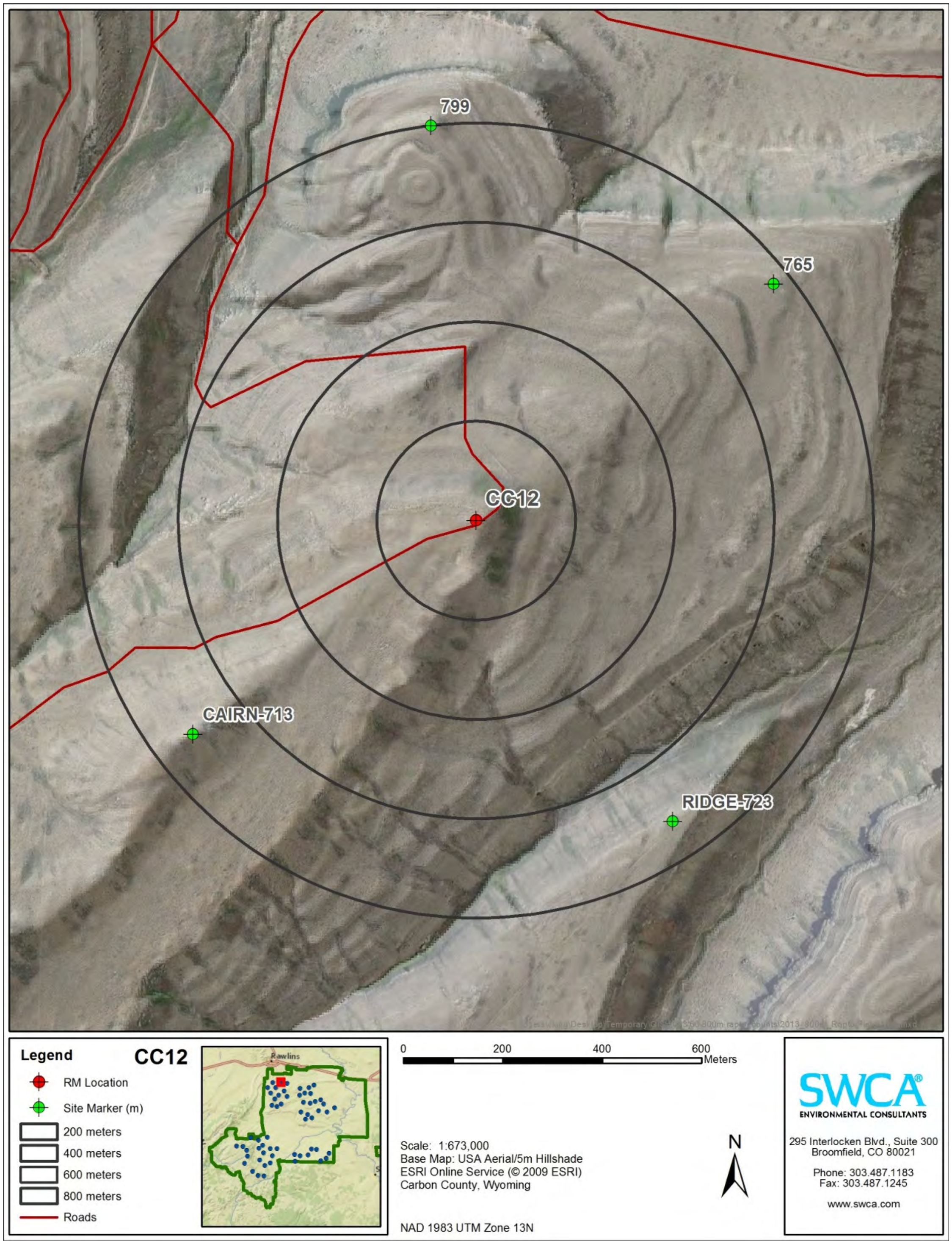

Aerial map example. Numbers next to site markers indicate distance from raptor monitoring location to the site marker location. Concentric rings around raptor monitoring location indicate 200-meter distance intervals to aid in estimation of distance. Other features on the landscape (roads, rock cairns, etc.) are also noted on each map to aid in distance and location estimation.

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ATTACHMENT 3

Data Sheets Used to Collect Data during 800-meter Raptor Count Surveys

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PCW 2012-2013 Raptor Survey

Field Observer: ______________________

Survey Location: ____________

Start time: ____________

End time: ____________

Date: ________________

Page: ____ of _____

Target #	Obs #	Species	# Birds	Age	Sex	Behav	Bearing to Bird (°)	Distance to Bird (m)	Angle of Bird (°)	Heading of Bird	0-30	30-150	150+	Time Begin	Time End

PCW 2012-2013 Raptor Survey Notes

Field Observer: ______________________ Survey Pt: ____

Date: ____________ Page: ____ of ____

Other species and Notes.

Weather Conditions				
		Wind		
Time	Sky	Dir	Spd	Temp (°F)

Incidental Species Observations
for eagles and raptors note distance and bearing

June 24 through August 30, 2013, Eagle Summary Report

Chokecherry and Sierra Madre Wind Energy Project

Prepared for:

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September 2013

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EXECUTIVE SUMMARY

Between June 24 and August 30, 2013, SWCA Environmental Consultants performed raptor count surveys as part of Power Company of Wyoming LLC's (PCW's) ongoing avian survey program at the Chokecherry and Sierra Madre Wind Energy Project (Project) site. The survey period captures fledging and summer use periods within the Project site. This report documents use during these eagle use periods.

For this survey period, 9 minutes of golden eagle (*Aquila chrysaetos*) use were recorded within the Project site during 18,000 survey minutes (300.0 hours) for 0.0005 flight minute per minute of survey. Of the recorded golden eagle flight minutes, 66.7% were outside the Rotor Swept Zone (RSZ). By altitudinal classification, 66.7% of the golden eagle flight minutes were below the RSZ (0 to 30 meters above ground), 33.3% of the golden eagle flight minutes were within the RSZ (30 to 150 meters), and 0 golden eagle flight minutes were recorded above the RSZ (above 150 meters).

For the Chokecherry Wind Development Area (WDA), 5 minutes of golden eagle use were recorded during 9,300 survey minutes (155.0 hours) for 0.0005 flight minute per minute of survey. In total, 155 survey sessions were conducted during which four golden eagle observations were recorded during four of the sessions. Observation times ranged between 1 minute and 2 minutes, rounded up to the nearest whole minute. Of the recorded use in the Chokecherry WDA, 80% occurred outside the RSZ.

For the Sierra Madre WDA, 4 minutes of golden eagle use were recorded during 8,700 survey minutes (145.0 hours) for 0.0005 flight minute per minute of survey. In total, 145 survey sessions were conducted during which three golden eagle observations were recorded during three of the sessions. Observation times ranged between 1 minute and 2 minutes, rounded up to the nearest whole minute. Of the recorded use in the Sierra Madre WDA, 50% occurred outside the RSZ.

During the survey period, there were no observations of bald eagles (*Haliaeetus leucocephalus*).

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Appendices

Appendix A: Revised 2012-2013 800-meter Raptor Survey Protocols

INTRODUCTION AND PROJECT DESCRIPTION

Surveys described in this report are part of the avian survey program directed towards identifying eagle and raptor use across the Chokecherry and Sierra Madre Wind Energy Project (Project) site. The survey data will be used for modeling eagle collision risk and developing avoidance measures and Best Management Practices to reduce potential Project impacts to eagles, to the extent practicable. All protocols and survey methodologies used to assess avian species in the Project site during surveys in 2011, 2012, and 2013 were developed in consultation with the U.S. Fish and Wildlife Service (Service), and are in accordance with recommendations made by the Service, the Bureau of Land Management (BLM), and the Wyoming Game and Fish Department (WGFD). Appendix A contains the protocols used to collect eagle use data for the period of this report.

This report summarizes the data from the June 24 to August 30, 2013 raptor counts and captures fledging and summer use periods within the Project site. It is the final of four reports covering 12 consecutive calendar months from August 2012 to August 2013. Report 1 covers the period of August 20 to November 9, 2012; report 2 covers the period of November 12, 2012, to March 29, 2013; and report 3 covers the period of April 1 to June 21, 2013.

In 2012, based on the extensive avian data that have been collected for the Project, Power Company of Wyoming, LLC (PCW) substantially re-designed the Project and identified Turbine No-Build Areas. These designated Turbine No-Build Areas have relatively higher eagle use than other areas of the Project and PCW has committed to not build turbines in these areas. This will substantially contribute to avoiding and minimizing collision risk to eagles. Next, to assess use by eagles and other raptors in the remaining potential wind development areas (WDAs), surveys were initiated during August 2012 at 40, 800-meter (m) survey locations across the probable turbine footprint outside of the Turbine No-Build Areas. After further consultation with the Service, the survey program was increased to 60, 800-m survey locations (Figures 1 and 2) for surveys occurring from mid-November 2012 through August 2013. The increased survey locations achieve coverage of 30% of the probable turbine locations for the Project as recommended by the Service. The addition of 20 survey locations also allowed the inclusion of seven sites that were previously surveyed in 2011 and early 2012 for further analysis.

Selection of the 60, 800-m survey locations was achieved using a spatially balanced sampling design used to capture the variability in habitat conditions, terrain features, and turbine numbers and densities. Minimum convex polygons[1] (MCPs) were placed around potential turbine construction areas in the Project site that are separated by the Turbine No-Build Areas established by PCW (Figures 1 and 2). MCPs were evaluated for differences in habitat characteristics, forage potential, and topography. While differences in habitat characteristics,

[1] MCPs were generated using the ArcGIS Spatial Analyst minimum bounding geometry function with the minimum convex hull option selected.

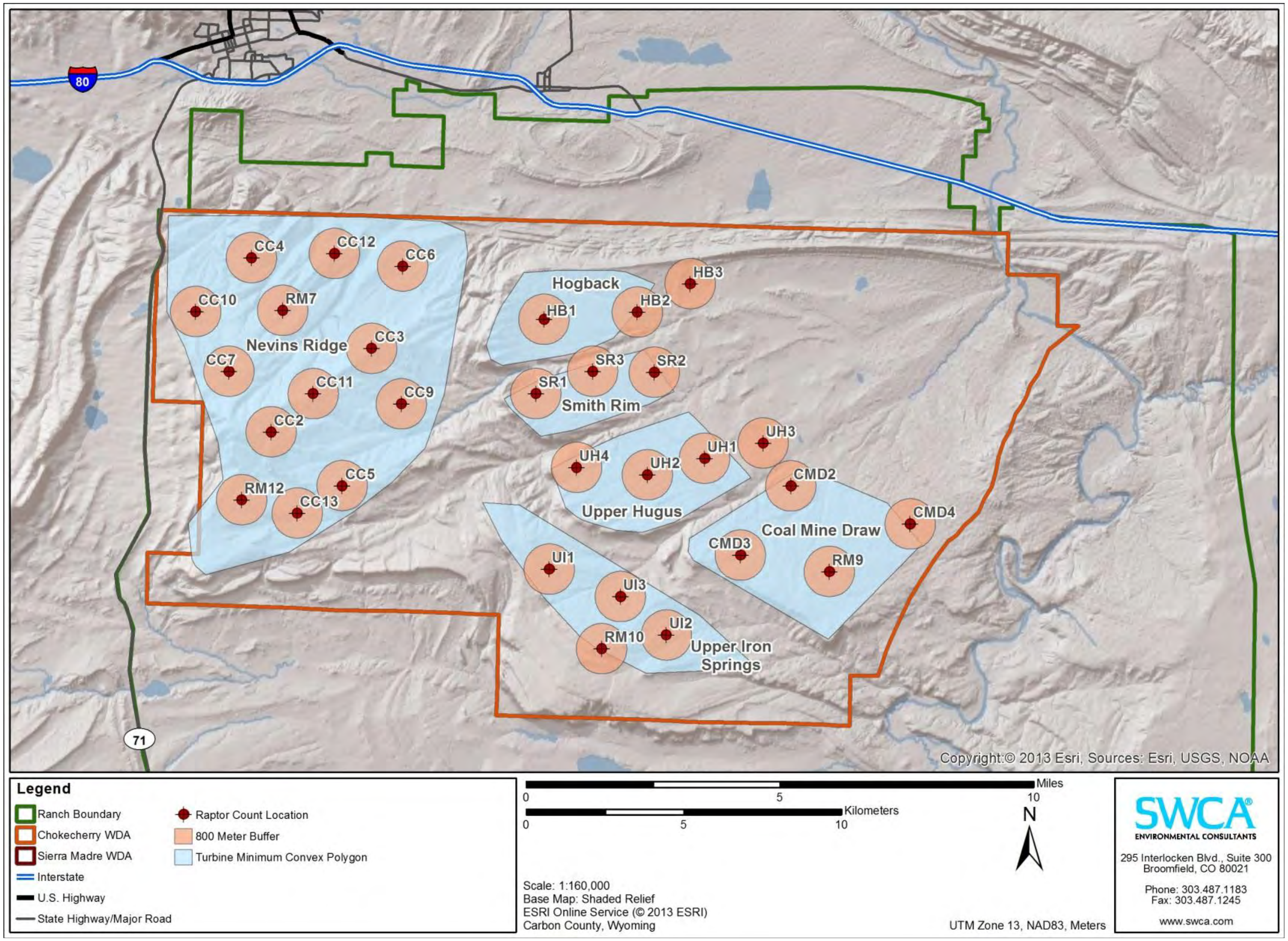

Figure 1.Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Chokecherry.

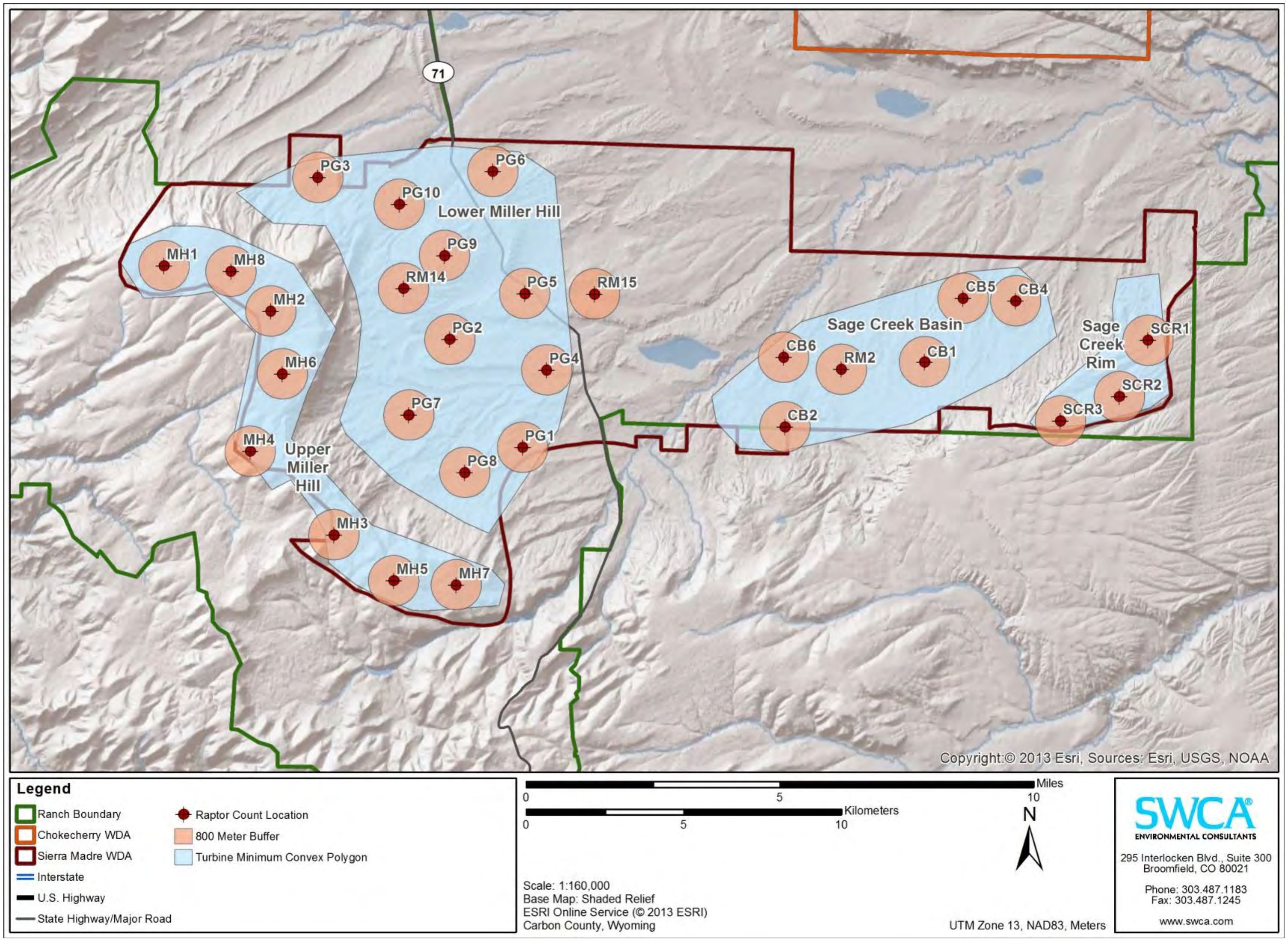

Figure 2. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Sierra Madre.

forage potential, and topography occur among the 10 discrete MCPs, within each MCP these factors are similar and additional stratification beyond the MCP level was not necessary. Using Geostatistical Analyst tools in ArcGIS, spatially balanced survey locations were sequentially selected in a manner that is consistent with the recommendations made by the Service while ensuring that no overlap occurs between survey locations. Total number of sampling locations per MCP was based on the relative surface area, number of turbines, and turbine densities in each MCP.

Raptor surveys documented in this report occurred from June 24 through August 30, 2013. Surveys occurred at 60 survey locations across the Project site, with 31 survey locations in the Chokecherry WDA and 29 survey locations in the Sierra Madre WDA (Figures 1 and 2). Surveys were designed to occur at each of the 60 survey locations for 1 hour per survey date in accordance with guidance from the Service. Three avian technicians each surveyed two survey locations per day resulting in surveys of six survey locations per day and 60 survey locations in a 10-day period. The schedule was designed and implemented to provide survey coverage across all daylight hours for each of the 60 survey locations. The schedule was also designed such that the six raptor count surveys conducted on any given day were separated temporally and spatially to increase the likelihood of independence of any observations made.

Each survey location was scheduled to be surveyed twice per month. The majority of the 60 survey locations were visited five times during the survey period, with only a slight variation at two of the survey locations.

Surveys were completed across all daylight hours in accordance with the Service's recommendations. Each raptor flight path was recorded by technicians on aerial maps. Additional data collected included species, number of individuals per observation, age, sex, behavior, azimuth to bird, distance to bird, heading of bird, altitude of bird, the beginning and ending time for each observation, interactions with other birds, and hourly weather data among other variables. Appendix A to this report contains the detailed protocols used to collect the data.

RESULTS AND DISCUSSION

During the June 24 to August 30, 2013 survey period, 300 individual surveys were conducted across both WDAs for a total of 18,000 survey minutes (300.0 hours; Tables 1 and 2). Generally, survey minutes were evenly distributed across the 60 survey locations, with only a slight variation at two of the survey locations in the Sage Creek Rim survey area.

During the June 24 to August 30, 2013 survey period, seven golden eagles (*Aquila chrysaetos*) were observed in flight for a total of 9 minutes (Tables 1 and 2). Overall golden eagle use during this survey period was 0.0005 flight minute per minute of survey. This use value is the total use without consideration of flight heights and proportion of time in the Rotor Swept Zone (RSZ). Use in both the Chokecherry and Sierra Madre WDAs during this survey period was 0.0005 flight minute per minute of survey. No bald eagles (*Haliaeetus leucocephalus*) were detected during the June 24 to August 30, 2013 survey period.

All golden eagle flight minutes recorded during the June 24 to August 30, 2013 survey period were subdivided into altitudinal categories as recorded during field surveys (below RSZ = 0–30 m, within RSZ = 30–150 m, above RSZ = above 150 m) to determine the proportion of time eagles flew through the RSZ (30–150 m) and therefore at risk of collision. These altitudinal categories were developed to reflect the actual turbine heights that will be used for the Project. Of the 9 total golden eagle flight minutes, 6 minutes (66.7%) were recorded within the 0–30 m bin, 3 minutes (33.3%) were recorded within the 30–150 m bin, and 0 minutes were recorded above 150 m (Tables 1 and 2). When considering observed flight heights, total use across the Project site in the RSZ where collisions could occur was 0.0002 minute of flight time per minute of survey, a decrease of nearly 60.0% compared to total flight minutes.

Results and Discussion of Chokecherry Use Observations

Surveys in the Chokecherry WDA were conducted at 31 locations for a total of 9,700 minutes during the June 24 to August 30, 2013 survey period. During this survey period, golden eagles were observed in flight at four of the 31 survey locations for a total of 5 minutes (Table 1). Golden eagle use for the Chokecherry WDA during this survey period was calculated as 0.0005 flight minute per survey minute.

Four of the golden eagle flight minutes occurred within the 0–30 m altitudinal bin (80%), 1 minute (20%) occurred within the 30–150 m bin, and 0 minutes occurred above 150 m (Table 1). In the Chokecherry WDA, 80% of all use occurred outside of the RSZ where eagles are not at risk for collision.

The four sites in the Chokecherry WDA with golden eagle observations occurred within two of the MCPs: Nevins Ridge and Coal Mine Draw (Figure 1). Survey locations within the Hogback, Smith Rim, Upper Hugus, and Upper Iron Springs MCPs all had zero eagle observations during the June 24 to August 30, 2013 survey period. Within the Nevins Ridge MCP, a golden eagle was observed at CC3, CC5, and CC13; and in the Coal Mine Draw MCP, a golden eagle was observed at CMD3 (Table 1).

Within the Nevins Ridge MCP, at CC3 one golden eagle was observed on one survey date for a total of 1 flight minute, which occurred in the 0–30 m height category. Over the course of the 1 flight minute, this individual's behavior was recorded as powered flight and soaring. At CC5 one golden eagle was observed on one survey date for a total of 1 flight minute, which occurred in the 30–150 m height category. Over the course of the 1 flight minute, this individual's behavior was recorded as soaring and gliding. At CC13 one golden eagle was observed on one survey date for a total of 2 flight minutes, which occurred in the 0–30 m height category. Over the course of the two flight minutes, this individual's behavior was recorded as gliding and powered flight.

Within the Coal Mine Draw MCP, at CMD3 one golden eagle was observed on one survey date for a total of 1 flight minute, which occurred in the 0–30 m height category. Over the course of the 1flight minute, this individual's behavior was recorded as powered flight.

Results and Discussion of Sierra Madre Use Observations

In the Sierra Madre WDA, surveys were conducted for 8,700 minutes during the June 24 to August 30, 2013 survey period. During this survey period, golden eagles were observed in flight at three of 29 survey locations for a total of 4 minutes (Table 2). Golden eagle use for the Sierra Madre WDA during this period was 0.0005 flight minute per survey.

Two of the 4 golden eagle flight minutes (50%) occurred within 0–30 m height category, 2 minutes (50%) occurred within 30–150 m, and 0 minutes occurred above 150 m (Table 2). In the Sierra Madre WDA, 50% of all use occurred outside of the RSZ where eagles are not at risk for collision.

The three sites with eagle observations in the Sierra Madre WDA occurred within two of the MCPs: Sage Creek Basin and Lower Miller Hill (Figure 2). Survey locations within the Upper Miller Hill and Sage Creek Rim MCPs all had zero eagle observations during the June 24 to August 30, 2013 survey period. Within the Sage Creek Basin MCP, only one golden eagle was observed at RM2. Within the Lower Miller Hill MCP, a golden eagle was observed at RM14 and RM15 (Table 2).

Within the Sage Creek Basin MCP, at RM2 one golden eagle observation was made on one survey date for a total of 1 flight minute, which occurred in the 30–150 m height category. Over the course of the 1 flight minute, this individual's behavior was recorded as powered flight (Table 4).

Within the Lower Miller Hill MCP, at RM14 one golden eagle was observed on one survey date for a total of 1 flight minute, which occurred in the 30–150 m height category. Over the course of the 1 flight minute, this individual's behavior was recorded as circle soaring. At RM15 one golden eagle was observed on one survey date for a total of 2 flight minutes, which occurred in the 0–30 m height category. Over the course of the 2 flight minutes, this individual's behavior was recorded as powered flight and soaring.

COMPARISON TO PREVIOUS RESULTS

As a result of PCW's Project re-design, eagle use in the WDAs was substantially lower during the June 24 to August 30, 2013 survey period than similar periods in 2011 and 2012. Golden eagle use during the June 24 to August 30, 2013 survey period was 0.0005 flight minute per minute of survey compared with 0.0059 during the July to August 2011 survey period and 0.0032 during the July 2012 survey period, a decrease in use of more than 91% and 84% from 2011 and 2012, respectively. The reduction in golden eagle use estimates between the survey periods are due to the establishment of Turbine No-Build Areas where areas of relatively high eagle use were documented from 2011–2012 survey data. This reduction demonstrates the avoidance and minimization benefits of PCW's Project re-design and avoidance and minimization efforts. In PCW's Eagle Conservation Plan Supplement submitted to the Service on September 26, 2012, it was demonstrated that the establishment of the Turbine No-Build Areas would substantially reduce observed eagle use. The reduction in use observed during the survey period included in this report is consistent with the findings presented in the September 26, 2012, Eagle Conservation Plan Supplement.

No bald eagle use was recorded during the June 24 to August 30, 2013 survey period, the July to August 2011 survey period, or the July 2012 survey period.

Golden eagle use for the Chokecherry WDA during the June 24 to August 30, 2013 survey period was calculated as 0.0005 flight minute per survey minute compared with 0.0036 during the July to August 2011 survey period. This represents an 86% decrease in use resulting from PCW's identification of Turbine No-Build Areas in multiple eagle use areas that were identified during the 2008–2009, 2011, and 2012 survey programs. No golden eagle use was recorded in the Chokecherry WDA during the July 2012 survey period.

No bald eagles were observed in the Chokecherry WDA during the June 24 to August 30, 2013 survey period, the July to August 2011 survey period, or the July 2012 survey period.

Golden eagle use for the Sierra Madre WDA during the June 24 to August 30, 2013 survey period was 0.0005 flight minute per survey minute compared with 0.0085 during the July to August 2011 survey period and 0.0063 during the July 2012 survey period. This represents a 94% and 92% decrease in use, respectively, resulting from PCW's identification of Turbine No-Build Areas in multiple eagle use areas that were identified during 2008–2009, 2011, and 2012 survey efforts.

No bald eagles were observed in the Sierra Madre WDA during the June 24 to August 30, 2013 survey period, the July to August 2011 survey period, or the July 2012 survey period.

Table 1. Number of Survey Minutes, Days, Individuals, Golden and Unknown Eagle Flight Minutes, and Height Categories for all Survey Locations in the Chokecherry WDA.

MCP	Location	Survey Minutes	Number of Individual Eagles	Golden Eagle Flight Minutes	Minutes within 0-30 m	Minutes within 30-150 m (RSZ)	Minutes above 150 m
Nevins Ridge	CC2	300	0	0	0	0	0
	CC3	300	1	1	1	0	0
	CC4	300	0	0	0	0	0
	CC5	300	1	1	0	1	0
	CC6	300	0	0	0	0	0
	CC7	300	0	0	0	0	0
	CC9	300	0	0	0	0	0
	CC10	300	0	0	0	0	0
	CC11	300	0	0	0	0	0
	CC12	300	0	0	0	0	0
	CC13	300	1	2	2	0	0
	RM7	300	0	0	0	0	0
	RM12	300	0	0	0	0	0
Coal Mine Draw	CMD2	300	0	0	0	0	0
	CMD3	300	1	1	1	0	0
	CMD4	300	0	0	0	0	0
	RM9	300	0	0	0	0	0
Hogback	HB1	300	0	0	0	0	0
	HB2	300	0	0	0	0	0
	HB3	300	0	0	0	0	0
Smith Rim	SR1	300	0	0	0	0	0
	SR2	300	0	0	0	0	0
	SR3	300	0	0	0	0	0
Upper Hugus Draw	UH1	300	0	0	0	0	0
	UH2	300	0	0	0	0	0
	UH3	300	0	0	0	0	0
	UH4	300	0	0	0	0	0
Upper Iron Springs	UI1	300	0	0	0	0	0
	UI2	300	0	0	0	0	0
	UI3	300	0	0	0	0	0
	RM10	300	0	0	0	0	0
Total	**–**	**9,300**	**4**	**5**	**4**	**1**	**0**

Table 2. Number of Survey Minutes, Days, Individuals, Golden Eagle Flight Minutes, and Height Categories for all Survey Locations in the Sierra Madre WDA.

MCP	Location	Survey Minutes	Number of Individual Eagles	Golden Eagle Flight Minutes	Minutes within 0-30 m	Minutes within 30-150 m (RSZ)	Minutes above 150 m
Sage Creek Basin	CB1	300	0	0	0	0	0
	CB2	300	0	0	0	0	0
	CB4	300	0	0	0	0	0
	CB5	300	0	0	0	0	0
	CB6	300	0	0	0	0	0
	RM2	300	1	1	0	1	0
Upper Miller Hill	MH1	300	0	0	0	0	0
	MH2	300	0	0	0	0	0
	MH3	300	0	0	0	0	0
	MH4	300	0	0	0	0	0
	MH5	300	0	0	0	0	0
	MH6	300	0	0	0	0	0
	MH7	300	0	0	0	0	0
	MH8	300	0	0	0	0	0
Lower Miller Hill	PG1	300	0	0	0	0	0
	PG2	300	0	0	0	0	0
	PG3	300	0	0	0	0	0
	PG4	300	0	0	0	0	0
	PG5	300	0	0	0	0	0
	PG6	300	0	0	0	0	0
	PG7	300	0	0	0	0	0
	PG8	300	0	0	0	0	0
	PG9	300	0	0	0	0	0
	PG10	300	0	0	0	0	0
	RM14	300	1	1	0	1	0
	RM15	300	1	2	2	0	0
Sage Creek Rim	SCR1	240	0	0	0	0	0
	SCR2	300	0	0	0	0	0
	SCR3	360	0	0	0	0	0
Total	**–**	**8,700**	**3**	**4**	**2**	**2**	**0**

Table 3. Summary of Golden and Unknown Eagle Observations in the Chokecherry WDA.

Date and Time of Observation	Location	Number of Golden Eagles Observed	Golden Eagle Observations per Survey Minute	Golden Eagle Flight Minutes	Flight Minutes in RSZ	Flight Behavior (minutes)
7/2/2013 19:00	CC3	1	0.0033	1	0	Powered Flight (0.5) Soaring (0.5)
7/9/2013 13:57	CC5	1	0.0033	1	1	Soaring (0.5) Gliding (0.5)
7/13/2013 7:54	CC13	1	0.0033	2	0	Gliding (1) Powered Flight (1)
8/2/2013 9:15	CMD3	1	0.0033	1	0	Powered Flight (1)

Table 4. Summary of Golden Eagle Observations in the Sierra Madre WDA.

Date and Time of Observation	Location	Number of Golden Eagle Observed	Golden Eagle Observations per Survey Minute	Golden Eagle Flight Minutes	Flight Minutes in RSZ	Flight Behavior (minutes)
7/1/2013 17:00	RM15	1	0.0033	2	0	Powered Flight (1) Soaring (1)
7/9/2013 9:50	RM2	1	0.0033	1	1	Powered Flight (1)
7/29/2013 12:34	RM14	1	0.0033	1	1	Circle Soaring (1)

Appendix A:

Revised 2012-2013 800-meter Raptor Survey Protocols
Chokecherry and Sierra Madre Wind Energy Project

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Revised 2012-2013 800-meter Raptor Survey Protocols

Chokecherry and Sierra Madre Wind Energy Project

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November 2012

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The Power Company of Wyoming (PCW) recently initiated revisions to the methodologies currently used to survey for raptors at their Chokecherry and Sierra Madre Wind Energy Project (Project). Based on conversations with U.S. Fish and Wildlife Service (Service) personnel, and in an effort to collect data that are appropriate for use in the Service's model that predicts the potential fatality rate of eagles for wind energy projects (hereafter, the Service's model), raptor survey protocols were revised for the fall 2012 season and for future raptor survey efforts. On August 31, 2012, PCW provided the Service with a revised protocol for conducting eagle and raptor surveys at 40 800-meter point count survey sites throughout the Project. PCW began surveying the 40 locations at the beginning of the autumn 2012 survey season and it is anticipated that those survey efforts will continue through October 2012 at which time the revised protocols discussed in this document will be initiated. On September 28, 2012, the Service issued a letter recommending slight modifications to the August 31, 2012 protocols. This revised protocol addresses the comments made by the Service and specific responses to each comment made are provided in Attachment 1.

These survey methodology revisions are fully consistent with the recommendations for raptor surveys set forth by the Service in their Draft Eagle Conservation Plan Guidance (Draft ECP Guidance), the Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices (Technical Appendices; as received from Kevin Kritz, Service Region 6, on August 4, 2012), and the Land-Based Wind Energy Guidelines, while still maintaining expansive coverage of the Project Site.

Year Two and Year Three long-watch raptor surveys were fully consistent with the recommendations set forth by the Service's Draft ECP Guidance (Service 2011) and Land-Based Wind Energy Guidelines (Service 2012a), the Bureau of Land Management's (BLM's) Wildlife Survey Protocols for Wind Energy Development (BLM 2008), and the Wyoming Game and Fish Department's (WGFD's) Wildlife Protection Recommendations for Wind Energy Development (WGFD 2010). These surveys were very successful in identifying concentrated raptor use areas across the Project that could be used to design avoidance areas to minimize avian impacts. Additionally, long-watch survey data were instructive in showing the Project Site is not a strong migratory corridor for raptors, and the flight paths digitized from these data were used to identify high eagle use areas as recommended by the Service's Technical Appendices (Service 2012b).

The revised raptor count protocols follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices (Service 2012b), and are also in accordance with the aforementioned guidance documents produced by the Service, BLM, and WGFD. PCW also sought consultation with Dr. Joshua Millspaugh (Professor of Wildlife Management, University of Missouri) to ensure the development of a rigorous sampling design that would result in the collection of data appropriate for the analysis methods and fatality model currently being used by the Service.

Based upon agency guidance and logistical considerations, the revised protocols were designed to include 60, 800-meter raptor count survey sites throughout the Chokecherry and Sierra Madre Wind Development Areas (WDAs) where turbine development is likely (Figures 1 and 2). Most of the 60 survey sites are identical to the original 40 sites identified in the August 31, 2012 protocols. However, some of those 40 sites were shifted slightly to

accommodate the placement of the additional 20 survey sites and ensure that no overlap occurs between samples. Seven of the new sites correspond to raptor monitoring locations that were used in 2011 and spring 2012 survey efforts (RM2, RM7, RM9, RM10, RM12, RM14, and RM15). Efforts were made to resample as many of the previous sampling sites as possible. However, because of PCW's Project re-design efforts identified in the Project Eagle Conservation Plan (ECP), many of the previous sampling locations are outside or on the very edge of the current development area and could not be included without violating the spatially balanced design that is critical to these protocols.

A spatially balanced sampling design was used to capture the variability in habitat conditions, terrain features, and turbine numbers and densities. Minimum convex polygons (MCPs) were placed around each of 10 discrete potential development areas that are separated by Turbine No-Build areas, topography, or other factors (Figures 1 and 2). MCPs were evaluated for differences in habitat characteristics, forage potential, and topography. While differences in habitat characteristics, forage potential, and topography occur among the 10 MCPs, within each MCP, these factors are similar and additional stratification beyond the MCP level was not necessary.

Using the "Create Spatially Balanced Points" tool in ArcGIS Geostatistical Analyst, 250 spatially balanced locations were generated within the MCPs. Using the spatially balanced points, survey sites were selected sequentially in a manner that was consistent with the recommendations made by the Service while ensuring that no overlap occurs between survey areas. Total number of sampling sites per MCP was based on the relative surface area and number of turbines in the MCP. Two primary selection criteria were used to select sampling sites. First, no overlap of sampling areas was permitted (sites had to be separated by more than 1,650 meters). Second, because of logistical considerations, sampling sites were required to be reasonably accessible from the existing road network and in a safe location. If a potential sampling location violated either of the selection criteria it was dropped and the next point was evaluated. Tables 1 and 2 provide the locations of each sampling site in the WDAs as well as information specific to the MCPs and sampling sites.

The first 36 survey sites that were selected correspond to locations that were identified in the August 31, 2012 protocols. These were sequentially selected using the spatially balanced points that were generated as part of the process described above while controlling for site overlap and logistical considerations for survey. Of the remaining 24 sites, 4 correspond with the original 40 sites with locations slightly shifted to avoid overlap with new sites, 7 correspond with the long-watch raptor monitoring sites that were surveyed in 2011 and spring/summer 2012, 3 were selected outside of the current probable turbine footprint, and 10 were selected using the remaining spatially balanced points. Some minimal micrositing of the new locations is anticipated to ensure maximum visibility of the survey areas as well as safe and consistent accessibility on the part of field personnel.

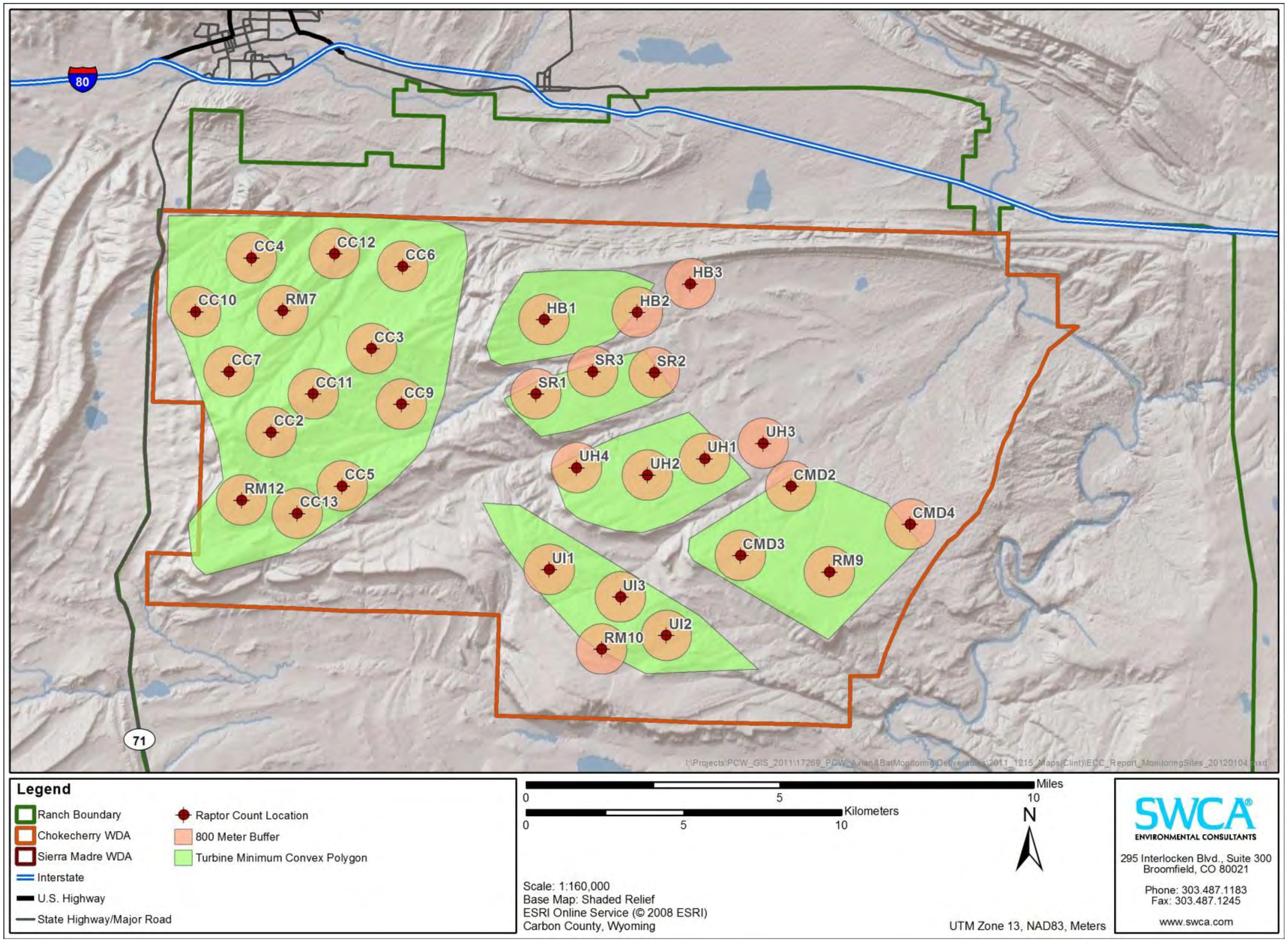

Figure 1. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Chokecherry.

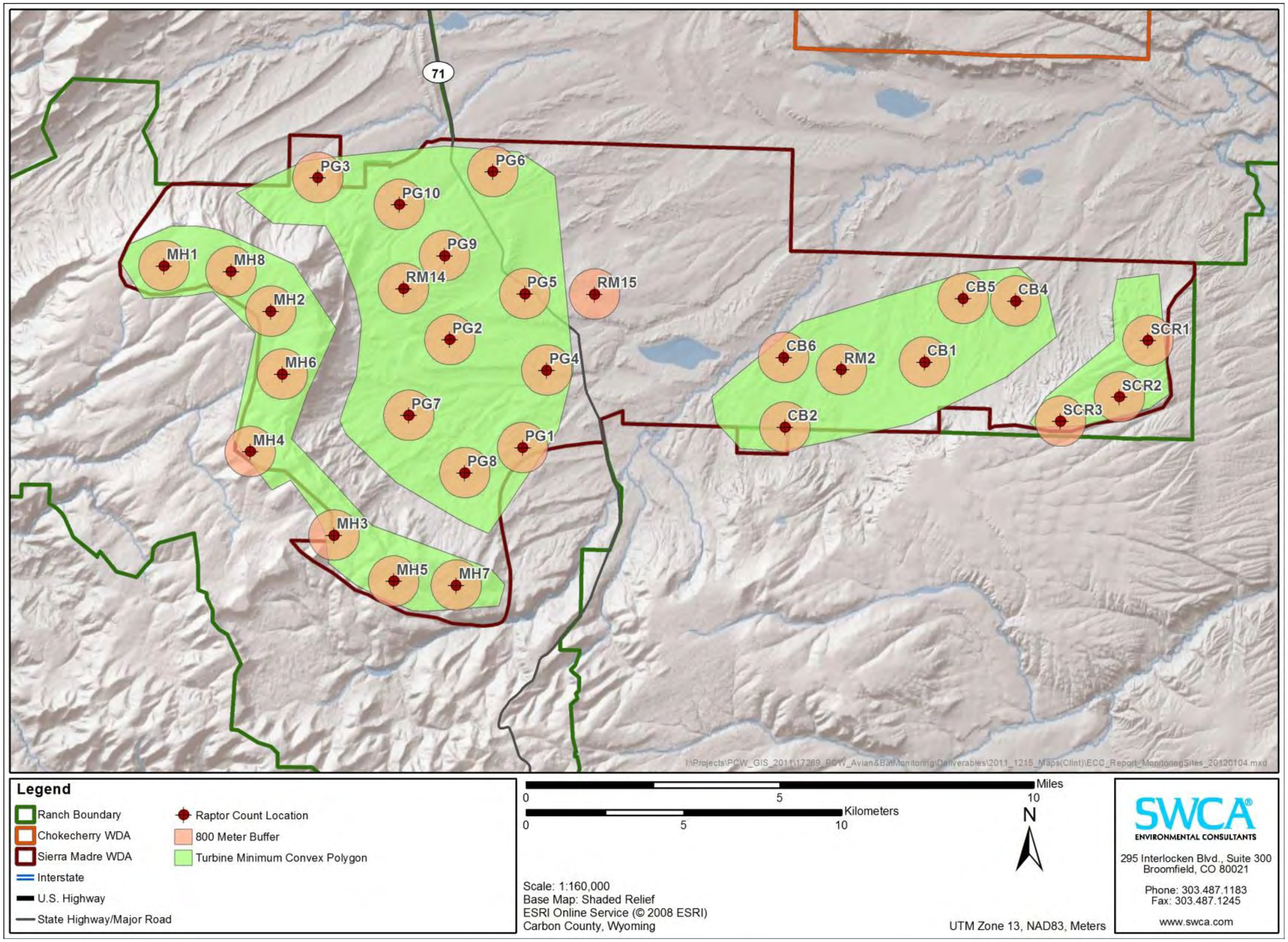

Figure 2. Minimum Convex Polygons, 800-meter raptor count locations and survey perimeters for Sierra Madre.

Table 1. Fall 2012-2013 Avian Monitoring Survey Locations for the Chokecherry WDA.

WDA	MCP	Site Name	Survey Site Status	Easting*	Northing*
Chokecherry	Chokecherry	CC2	Original Fall 2012 Site	315166	4616447
		CC3	Original Fall 2012 Site	318351	4619090
		CC4	Original Fall 2012 Site	314539	4621971
		CC5	Original Fall 2012 Site	317418	4614741
		CC6	Original Fall 2012 Site	319335	4621702
		CC7	Original Fall 2012 Site	313825	4618366
		CC9	Original Fall 2012 Site	319294	4617332
		CC10	New 2012 Survey Site	312770	4620262
		CC11	New 2012 Survey Site	316501	4617656
		CC12	New 2012 Survey Site, original CC1 site shifted north to eliminate overlap with RM7	317170	4622100
		CC13	New 2012 Survey Site, original CC8 site shifted southeast to eliminate overlap with RM12	315993	4613871
		RM7	2011-2012 Long-watch Site	315531	4620298
		RM12	2011-2012 Long-watch Site	314228	4614294
	Coal Mine Draw	CMD2	Original Fall 2012 Site	331648	4614732
		CMD3	New 2012 Survey Site	330049	4612535
		CMD4	New 2012 Survey Site, original CMD1 site shifted east to eliminate overlap with RM9	335437	4613524
		RM9	2011-2012 Long-watch Site	332870	4612018
	Hogback South	HB1	Original Fall 2012 Site	323818	4620014
		HB2	Original Fall 2012 Site	326781	4620243
		HB3	New 2012 Survey Site	328457	4621145
	Smith Rim	SR1	Original Fall 2012 Site	323560	4617658
		SR2	Original Fall 2012 Site	327318	4618336
		SR3	New 2012 Survey Site	325362	4618367
	Upper Hugus	UH1	Original Fall 2012 Site	328912	4615606
		UH2	Original Fall 2012 Site	327099	4615081
		UH3	New 2012 Survey Site	330772	4616091
		UH4	New 2012 Survey Site	324853	4615321
	Upper Iron Springs	UI1	Original Fall 2012 Site	323987	4612091
		UI2	Original Fall 2012 Site	327702	4610001
		UI3	New 2012 Survey Site	326242	4611221
		RM10	2011-2012 Long-watch Site	325646	4609568

*UTM Zone 13, NAD83, Meters

Table 2. Fall 2012-2013 Avian Monitoring Survey Locations for the Sierra Madre WDA.

WDA	MCP	Site Name	Survey Site Status	Easting*	Northing*
Sierra Madre	Central Basin	CB1	Original Fall 2012 Site	326414	4597515
		CB2	Original Fall 2012 Site	321986	4595452
		CB4	Original Fall 2012 Site	329306	4599449
		CB5	New 2012 Survey Site	327638	4599529
		CB6	New 2012 Survey Site, original CB3 site shifted west to eliminate overlap with RM2	321942	4597660
		RM2	2011-2012 Long-watch Site	323776	4597273
	Miller Hill	MH1	Original Fall 2012 Site	302291	4600564
		MH2	Original Fall 2012 Site	305677	4599125
		MH3	Original Fall 2012 Site	307684	4592030
		MH4	Original Fall 2012 Site	305024	4594675
		MH5	Original Fall 2012 Site	309573	4590571
		MH6	Original Fall 2012 Site	306043	4597131
		MH7	New 2012 Survey Site	311561	4590443
		MH8	New 2012 Survey Site	304412	4600385
	Pine Grove	PG1	Original Fall 2012 Site	313663	4594801
		PG2	Original Fall 2012 Site	311358	4598224
		PG3	Original Fall 2012 Site	307172	4603361
		PG4	Original Fall 2012 Site	314434	4597259
		PG5	Original Fall 2012 Site	313730	4599682
		PG6	Original Fall 2012 Site	312721	4603547
		PG7	Original Fall 2012 Site	310058	4595825
		PG8	Original Fall 2012 Site	311832	4594006
		PG9	Original Fall 2012 Site	311187	4600886
		PG10	New 2012 Survey Site	309753	4602508
		RM14	2011-2012 Long-watch Site	309884	4599843
		RM15	2011-2012 Long-watch Site	315948	4599668
	Sage Creek Rim	SCR1	Original Fall 2012 Site	333505	4598194
		SCR2	Original Fall 2012 Site	332596	4596407
		SCR3	New 2012 Survey Site	330727	4595638

*UTM Zone 13, NAD83, Meters

Landmarks will be identified and visible stakes will be placed around each survey location perimeter to provide distance references for field personnel completing survey efforts. The 800-meter radius survey areas of the new 60 point count locations provide coverage for approximately 35% of the probable turbine locations, which is greater than the 30% recommendation made by the Service (Service 2012b). Additionally, 46.7% of the raptor monitoring sites that were surveyed in 2011 will be resurveyed as part of the 60 point counts. Resurvey of 50% of all previous survey sites was not possible because many fall outside of the current project layout in Turbine No-Build areas and use of those sites would violate the spatially balanced study design in addition to sampling areas that are already known as high use areas for eagles and other raptors. Additionally, several sites that were only surveyed in spring/summer 2012 do not have a full year of data and would not be appropriate for comparison with ongoing and future data collection efforts. However, many of the 60 new survey sites overlap with areas previously surveyed as part of 2011 and 2012 raptor monitoring efforts. When these areas are included, 50.3% of the area surveyed as part of previous raptor monitoring efforts is within the perimeter of the 60 new point count survey sites.

Surveys will be conducted at each site for one hour per guidance in the ECP Technical Appendices (Service 2012b). Three avian technicians will each survey two locations per day for a total of 6 locations per day and 60 locations in a 10 day period. Each location will be surveyed twice per month. A schedule for all 60 raptor count locations was designed to provide survey coverage across all daylight hours for each of the 60 sites. The schedule was also designed such that the six raptor count surveys conducted on any given day are separated temporally and spatially to ensure independence of any observations that are made.

Avian technicians will be equipped with binoculars, spotting scopes, laser rangefinders, and aerial maps to assist with accurate detection and documentation of all raptors observed within the 800-meter survey area. Each aerial map is displayed with relevant landforms occurring in the area, locations of stakes, and concentric rings at each 200-meter interval to facilitate accurate distance estimation (Attachment 2). Each raptor flight path is recorded by technicians on the provided aerial maps. Additional data collected include species, number of individuals per observation, age, sex, behavior, bearing to bird, distance to bird, heading of bird, altitude of bird, the beginning and ending time for each observation, interactions with other birds, and hourly weather data among other variables (Attachment 3).

Surveys at the 60 800-meter raptor counts will begin in November 2012 and are scheduled to continue bi-weekly at each location through August of 2013. Surveys during winter months will be completed on the same schedule as the remainder of the year and efforts will be made to survey at least 50% of all locations twice per month during winter. However, winter surveys are subject to cancellation or delay based on weather conditions and safety of the field technicians.

REFERENCES

Bureau of Land Management (BLM). 2008. Wildlife Survey Protocols for Wind Energy Development.

U.S. Fish and Wildlife Service (Service). 2011. Draft Eagle Conservation Plan Guidance. Available online at http://www.fws.gov/windenergy/. Accessed December 2011.

———. 2012a. Land Based Wind Energy Guidelines. Wind Turbine Guidelines Advisory Committee. U.S. Fish and Wildlife Service, Department of the Interior, Washington D.C. Available online at http://www.fws.gov/windenergy/docs/WEG_final.pdf. Accessed August 2012.

———. 2012b. Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Technical Appendices. Received from Kevin Kritz, Service Region 6, on August 4, 2012.

Wyoming Game and Fish Department (WGFD). 2010. Wildlife Protection Recommendations for Wind Energy Development in Wyoming. Wyoming Game and Fish Commission Approved November 17, 2010. Wyoming Game and Fish Department, Cheyenne, WY.

ATTACHMENT 1

Response to Survey Recommendations Made in the Service's September 28, 2012 Letter

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The following recommendations were made by the Service in the September 28, 2012 letter to Garry Miller (PCW) regarding Eagle Use Sampling Considerations and Recommendations for the proposed Chokecherry-Sierra Madre Wind Energy Development Project. A response is provided to document how each recommendation has been incorporated into the revised 800-meter point count survey protocols. Recommendations are presented in italics below.

1. *We recommend focusing sampling efforts within the most recently proposed project footprint in order to quantify eagle use in areas where turbines are planned for location. By collecting eagle and raptor use data in areas of likely development, we believe it will be easier to obtain a more reliable estimate of risk to eagles in these areas, from which more informed, site-specific, predictions can be made.*

   Response: The revised protocols and placement of the 60 point count sites are based on the most recent proposed Project footprint and probable turbine locations. The most recent Project footprint reflects PCW's commitment to the Turbine No-Build areas identified in the Project ECP.

2. *Although we recommend concentrating sampling effort within the project footprint as stated above, we believe it also would be prudent to establish additional sample points outside of the currently proposed footprint in areas of potential development. Adding points in areas of possible alternative turbine layouts will provide data to assess the impact of those alternatives, which may be necessary if survey results identify areas of high eagle use within areas currently proposed for development. Without eagle use data outside of the proposed footprint, it would be difficult to show that the relocation of turbines outside of the currently proposed project footprint would avoid and minimize impacts to eagles. Without these data, the only likely alternatives would be a reduction in the total number of turbines, or a reduction in the spacing between turbines in areas where avian and raptors surveys were conducted.*

   Response: Three of the 60 point count survey sites (RM15, HB3, and UH3) are placed outside of the most current probable turbine locations. Several additional locations (e.g., CMD2, HB2, RM10, SR2) have a substantial portion of their survey areas that fall outside of the current probable turbine locations. Each of these sites provides survey coverage in areas of the Project Site where turbines could be located if the current probable turbine location footprint changes.

3. *We recommend resampling at least fifty percent of the raptor point counts from previous years: this will help distinguish between apparent changes in documented eagle use caused by different point locations and associated differences in detectability, versus actual changes in habitat use. This is an important consideration, because the number of eagles and their location on the landscape is likely to vary across years (e.g., not every nest is active every year), making it difficult to account for inter-annual variability, which might lead to inaccurate conclusions about the risk of eagle fatalities. For example, observing fewer eagles at a second set of survey points could be misinterpreted as an area of lower eagle use, when in fact the number of eagles and eagle use across the landscape decreased due to other factors. In this*

example, the use (and hence risk) might have been the same for all survey points, but sampling different points across years would lead to the erroneous conclusion. Resampling some points across years can reduce this uncertainty by creating an index or allow for scaling of observations across years.

Response: Nearly 50% (46.7%) of the raptor monitoring sites that were surveyed in 2011 will be resurveyed as part of the 60 point counts. Resurvey of 50% of previous survey sites is not possible because many fall outside of the current project layout in Turbine No-Build areas. Additionally, several sites that were only surveyed in spring/summer 2012 do not have a full year of data and would not be appropriate for comparison with ongoing and future data collection efforts. Many of the 60 new survey sites overlap with areas previously surveyed as part of 2012 raptor monitoring efforts. When those areas are included, 50.3% of the area surveyed as part of 2012 raptor monitoring efforts is within the perimeter of the 60 new point count survey sites.

4. *Previous long-watch raptor surveys were based on an unlimited radius, and analysis of data from these surveys suggests that the detectability of eagles dropped off after 600 to 800 meters. We recommend using a distance of no more than 800 meters for point counts intended to collect data on eagles and other large raptors. This recommendation is found in our draft Eagle Conservation Plan Guidance (Service 2012, Appendix C, p. 18) and in other literature (e.g., Strickland et al. 2011). While it is acceptable to collect data on eagles and other raptors beyond 800 meters (e.g., location, flight height, flight path)—since they may be useful to identify travel corridors and areas of eagle use—the collection of this information should not distract surveyors from collecting data within the 800-meter point count. In addition, because only those data collected within 800 meters will be used in the models to predict eagle fatalities, data collected at distances more than 800 meters should be separated from data collected within 800 meters.*

   Response: Previous long-watch raptor surveys recorded any eagle observed to help identify high use areas per the protocols developed collaboratively between the Service, BLM, and PCW. The analysis of detectability of eagles presented in the Service's comments does not consider that the reason eagle use was higher within 800 meters of previously sampled sites is because those sites were placed on ridgelines and terrain features known to attract or concentrate eagle use, making the likelihood of observing an eagle within 800 meters of a survey site higher than if the point was placed randomly in the landscape where varying terrain features may or may not occur. The implementation of the previous surveys was extremely successful and resulted in the development of Turbine No-Build areas that will avoid impacts to eagles and other avian species in the majority of the high use areas that were identified. To be consistent with the Service's Draft ECP Guidance, the Service's eagle risk model, and the recommendation made above, all surveys will be conducted using a distance of 800-meters.

5. *Based on recommendations in the draft Eagle Conservation Plan Guidance, the sampling goal should provide a "minimal spatial coverage of at least 30% of the project footprint" (i.e., the total area sampled in any given year should be thirty percent of the total project footprint) (Service 2012, Appendix C, p. 1 8). We recognize that even this level of effort will not provide specific information for seventy percent of the project area; however, it may be assumed that the information is representative of the remaining project area, provided the sample points are appropriately located (e.g., stratified and spatially balanced). To achieve the desired goal of at least 30 percent coverage of the Chokecherry Sierra Madre Proposed Project footprint, we calculate up to 70 survey points are needed, depending on how the project footprint is portrayed.*

   Response: Using the conceptual turbine footprint that PCW provided to the Service, 35% of all turbine locations fall within the 800-meter survey perimeters of the 60 point count sites. As stated above, the entirety of 3 sites and substantial portions of 3 others fall outside of the probable Project footprint in areas where turbines could be placed. These provide adequate coverage of areas outside of the current probable turbine footprint. When combined with the 800-meter radius surveyed areas from previous survey events (2011 and spring/summer 2012), 42% of probable turbine locations are included within the perimeter of 800-meter point count sites.

6. *We recommend sample locations be stratified by features of the landscape that may influence eagle and raptor activity, such as distinct geographic/topographic elements (e.g., escarpments), vegetation (if appropriate), and concentrated prey base. Doing so will allocate sampling points across the project in proportion to their occurrence on the landscape. A common sampling design in use today is the generalized random tessellation stratified sampling design (GRTS). We remain concerned that there is insufficient information about eagle habitat use associated with important eagle use areas including: active nests; concentrated prey base including grouse leks, prairie dog colonies, and reservoirs; as well as topographic features such as Miller Hill. Therefore, we recommend that some sample points be located near these important eagle use areas. Doing so would help with identifying additional avoidance areas or alleviating concerns for increased risk associated with these areas.*

   Response: The spatially balanced design that is discussed in the revised protocols above is reflective of the variability in habitat conditions, terrain features, and turbine numbers and densities. The revised protocols describe the methods used to select sites and the sampling strata and selection criteria that were used to place sites. The 60 sampling sites described in the revised protocols provide coverage in areas that provide some level of foraging, contain sage-grouse leks, and have variable topography that could influence eagle and raptor behavior. Site placement near active eagle nests is difficult because most nests have been avoided and are within the Turbine No-Build areas along the Bolten Rim or North Platte River corridor and, as seen in the data previously collected for the Project, active nests locations change each year.

7. *Based on recommendations in the Service's Eagle Conservation Plan Guidance, count periods should be one to two hours long (Service 2012, Appendix C, p. 18). If longer survey periods are used (e.g., four to six hours), the surveys should be divided into smaller units such as one or two hour blocks (or the actual time of eagle observations recorded), so that the influence of time of day can be evaluated (e.g., in relation to when turbines are inactive).*

   Response: Surveys will be conducted at each site for one hour per guidance in the ECP Technical Appendices (Service 2012b). As stated in the revised protocols, the survey methods follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices to the Draft ECP Guidance, and are consistent with other guidance documents produced by the Service, BLM, and WGFD.

8. *We recommend the protocol include a representative distribution of sampling events across all daylight hours across all point locations and seasons. Collecting data "evenly" across time and space should reduce any potential bias associated with locations, seasons, and time of day. This may also make it possible to evaluate how time of day influences eagle use of the site or when eagles are more likely to use specific topographic features. In addition, surveys should include multiple sampling events in each season per point.*

   Response: As stated in the revised protocols, the survey methods follow the 800-meter radius point count methodology recommended by the Service's Technical Appendices to the Draft ECP Guidance, and are consistent with other guidance documents produced by the Service, BLM, and WGFD. The sampling schedule will provide survey coverage across all daylight hours for each of the 60 sites. The schedule also makes certain that the six raptor count surveys conducted on any given day are separated temporally and spatially to ensure independence of any observations that are made.

9. *We recommend locating survey sampling points at least 800 meters (0.5 mile) from active eagle and ferruginous hawk nests to limit disturbance. It may be possible to reduce this distance if topographic features create a visual barrier between observers and the nest.*

   Response: Should an eagle or ferruginous hawk nest become active within 800 meters of a survey site, PCW will coordinate with the Service and BLM to evaluate the most appropriate methods to take to ensure that survey activities do not disrupt nesting. With PCW's Turbine No-Build areas and Project re-design efforts, most eagle and raptor nests in the Project Site have been avoided by 800 meters or more. However, some survey sites are located within 800 meters of historically active nests. As stated above, sampling locations have been selected in a spatially balanced, stratified manner using methods recommended by the Service. Maintaining the sites that are located within 800 meters of historically active nests is necessary to maintain this spatially balanced design. Since Project survey efforts began in 2008, no active ferruginous hawk nests have been identified.

10. *We recommend data collection include identification of eagle species and their flight minutes within the 800-meter point count. Additional data collection could include, but should not necessarily be limited to (in relative order of importance): age and sex (if possible), flight path, flight behavior (e.g., soaring, kiting), activity (e.g., territory defense, foraging), interactions with other birds, flight height, obvious prey items, time observed outside of the 800-meter point count, and time perched. It is acceptable to record detections beyond 800-meters as these can provide additional information about eagle and raptor use of the project area. However, collecting data beyond 800-meters should not detract from observations made within the 800-meter point count.*

    Response: Only those observations occurring within 800 meters of the survey sites will be recorded. As described in the protocols and illustrated on the data collection forms in Attachment 3, data collection efforts will provide all of the information recommended by the Service.

11. *We recommend collecting data on all raptors to the extent feasible; however, collecting data on other raptors should not preclude the collection of data on eagles.*

    Response: Data on all raptors and other species of interest will be collected in a manner identical as that used for eagles unless those efforts interfere with data collection for eagles.

12. *Based on eagle use data collected between April of 2011 and April of 2012, eagle activity relative to sampling effort appears to be higher in the winter and summer periods (Table 1). Higher eagle activity in the summer likely corresponds to the time during which adults are actively feeding young and when young are learning to fly. Higher eagle activity in the winter may be related to the presence of migrant eagles, or could be due to the location of survey points. Because data were not collected following the above recommendations during the summer of 2012, we recommend the collection of eagle and raptor use data continue through the 2013 nesting season (at least through August of 2013) to evaluate this potential season of higher use.*

    Response: Data will be collected through August of 2013. Our interpretation of eagle use in winter and summer periods differs from the Service's interpretation. The Service's interpretation assumes that each minute of eagle use is independent and evenly distributed across the landscape. Based on the survey data, it is clear that most of the eagle minutes recorded across all seasons are not independent and that the simple statistic of flight minutes per survey minute does not consider that observations are not independent in space or time and therefore mischaracterizes seasonal use and risk. As an example, 72 of the 141 minutes (51%) of winter use observed in the Project Site occurred at two sites on two days. On December 8, 2011, 35 eagle flight minutes were recorded at RM11 and on March 9, 2012 37 minutes of eagle use were recorded at RM14. On both days, field technicians wrote on datasheets that the use was associated with 2-3 individuals who were using the area for a long period of time. If the three eagles at RM14 had not been observed on March 9, no winter use would

have been observed within 800 meters of that sampling site. Similarly, if the use at RM11 would not have been observed on December 8, only 3 minutes of eagle use over would have been observed at that site during winter months and use would have been decreased by 95%. The observed activity on December 8 and March 9 is indicative of short duration, concentrated use by a few individuals rather than of high eagle use of the Project throughout the entire winter period. The data also indicate that for most of the Project Site there is no risk or very low risk to eagles during winter. Summer data are very similar to winter data. During summer 2011, only 71 eagle minutes were recorded. Nearly 60% of these minutes were associated with only 3 observations of individual circle soaring birds at RM14 and RM5. This indicates that the high use the Service cites is not from adults feeding young or young learning to fly. Rather, the behavior observed indicates that this is localized use by individual birds utilizing thermals created by warm summer temperatures.

13. *In several locations, the document states that it was "fully compliant" with recommendations by the U.S. Fish and Wildlife Service (Service). First, it is important to understand that the draft Eagle Conservation Plan Guidance is voluntary; consequently we prefer to use the term "consistent with" rather than "compliant with" when describing recommendations found within the Eagle Conservation Plan Guidance. Second, we do not believe that the protocol provided by PCW is, in fact, consistent with the Eagle Conservation Plan Guidance for numerous reasons, one key reason being that the limited number of 800-meter survey points do not provide the recommended minimum 30 percent coverage of the project footprint. Additionally, we do not believe it is scientifically justifiable to combine survey points from multiple years in order to meet the minimum recommended standard of 30 percent coverage: the minimum 30 percent coverage should occur within each individual year.*

    Response: The recommended changes have been made. The term "compliant" has been changed to "consistent". As stated above, 35% of the probable turbine locations will be surveyed using the revised protocols.

14. *The document makes a definitive statement about "unrealistic projections" concerning eagle risk. This statement is based on several assumptions, including that previous survey efforts correctly identified areas of high eagle use. One of the reasons for increasing the spatial coverage in 2012-2013 is to increase our confidence in understanding eagle and raptor use across the Project area. Because substantial uncertainty exists as a result of the limited amount of spatial and temporal survey coverage used to document impacts and relative risk to eagles, the Service believes our projections concerning risk to eagles are realistic and clearly demonstrate the need for increased coverage. In addition, our letter of August 10, 2012, identified numerous areas of potential high eagle use that are not currently included in the avoidance areas, such as the golden eagle nest in the southwest corner of Sierra Madre. Our letter also identified the presence of high density prey base, proximity of sage grouse leks and other habitat features that are used by eagles. Because these habitat features (and others) are not included in the proposed avoidance areas, the projections of risk and high eagle fatalities identified by the Service are possible.*

Response: The comments made above have been addressed in the revised protocols, the prey-base report submitted to the Service, and the Project ECP. We concur that within the context of the Service's eagle fatality model, the revised protocols will help address uncertainties.

15. *The data sheet attached to the protocol provided by PCW does not appear to have a means of recording flight path in data. It should be clear how flight path data will be collected on the existing data sheet, or additional datasheets should be included if there is more than one.*

    Response: Attachment 2 contains an example figure that is used to record flight paths for eagles and other raptors. Additionally, multiple rows of data are recorded for each eagle observed which results in multiple spatial points per individual bird. Fitting a line between each point for each observed eagle provides another mechanism to create flight paths. The methods used to collect data are described in the revised protocols.

ATTACHMENT 2

Example Aerial Map Used to Map Flight Paths during 800-meter Raptor Count Surveys

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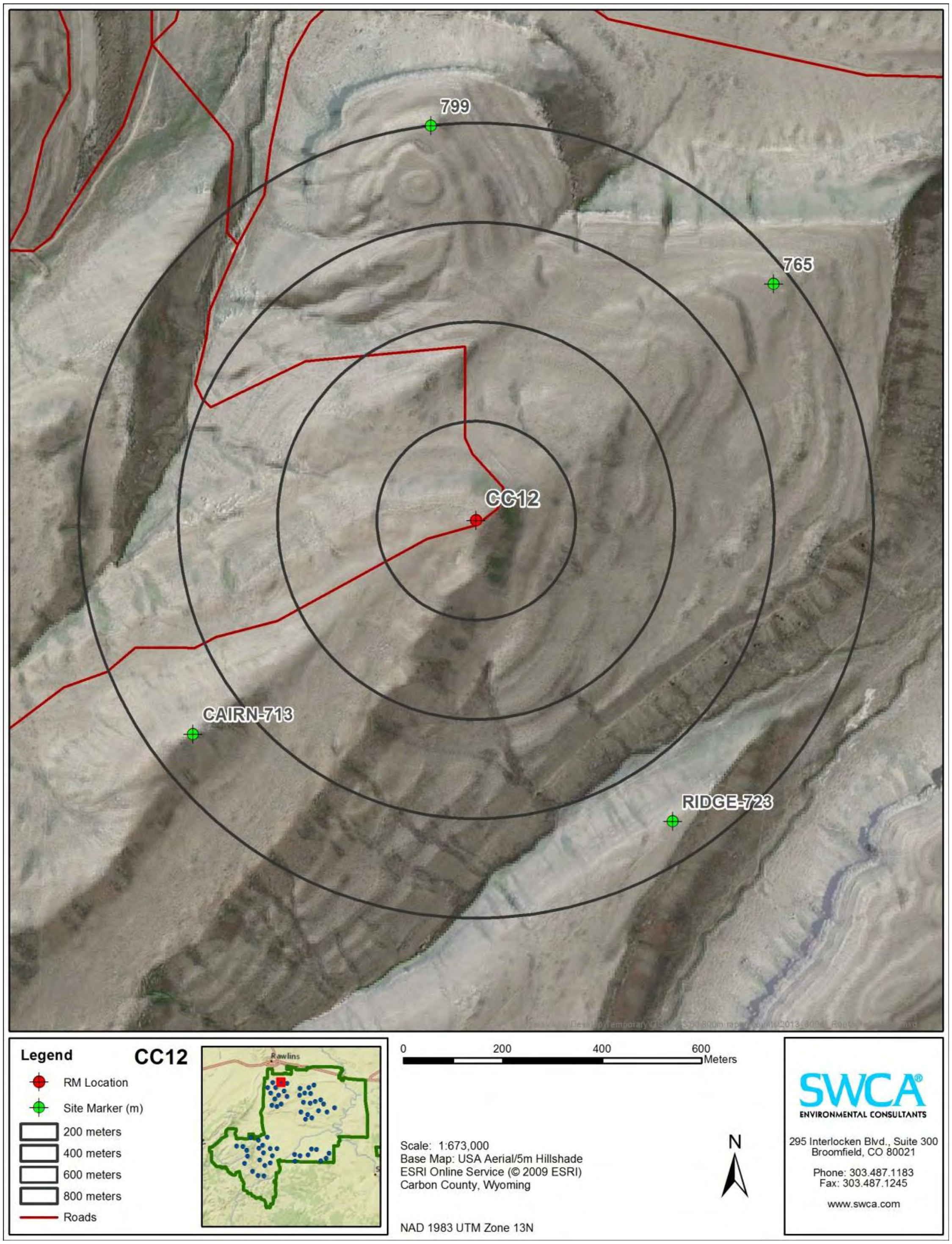

Aerial map example. Numbers next to site markers indicate distance from raptor monitoring location to the site marker location. Concentric rings around raptor monitoring location indicate 200-meter distance intervals to aid in estimation of distance. Other features on the landscape (roads, rock cairns, etc.) are also noted on each map to aid in distance and location estimation.

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ATTACHMENT 3

Data Sheets Used to Collect Data during 800-meter Raptor Count Surveys

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PCW 2012-2013 Raptor Survey

Field Observer: ______________________

Survey Location: ____________

Start time: ____________

End time: ____________

Date: ______________

Page: ____ of _____

Target #	Obs #	Species	# Birds	Age	Sex	Behav	Bearing to Bird (°)	Distance to Bird (m)	Angle of Bird (°)	Heading of Bird	0-30	30-150	150+	Time Begin	Time End

PCW 2012-2013 Raptor Survey Notes

Field Observer: ____________________ **Survey Pt:** ____

Date: ____________ **Page:** ____ of ____

Other species and Notes.

Weather Conditions

Time	Sky	Wind Dir	Wind Spd	Temp (°F)

Incidental Species Observations
for eagles and raptors note distance and bearing

Appendix D

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FINAL REPORT

Raptor Nest Surveys for the Chokecherry and Sierra Madre Wind Resource Areas Carbon County, Wyoming

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INTRODUCTION AND BACKGROUND

The Power Company of Wyoming has proposed a wind-energy facility in Carbon County, Wyoming, capable of producing 2,000 megawatts (MW) of energy with 1,000 wind turbines. The wind-energy facility will be constructed in two project areas, referred to as the Chokecherry and Sierra Madre Wind Resource Areas (WRAs; Figure 1). Both WRAs are a mixture of Bureau of Land Management (BLM), State of Wyoming, and private lands.

In the preferred alternative of the Environmental Impact Statement (EIS) prepared for the new Resource Management Plan for the Rawlins District (BLM 2008), the "no surface occupancy" buffer for raptor nests is 1,200 feet (ft; 0.23 miles; 0.37 kilometers [km]) for ferruginous hawks (*Buteo regalis*) and 825 ft (0.16 miles; 0.25 km) for all other raptor species. In addition, no construction activities are allowed within one mile (1.61 km) of active golden eagle (*Aquila chrysaetos*) and ferruginous hawk nests or within 0.75 miles (1.20 km) of all other raptor species during the nesting season. Depending on species, the seasonal timing restrictions to protect nesting raptors covers the period February 1 to July 31. The objectives of this study were to locate and map raptor nests in and within one mile of the WRAs so that nest locations can be considered when siting wind energy facilities, planning construction activities, and characterizing use of the WRAs by nesting raptors.

STUDY AREA

The proposed WRAs are located in Carbon County (Figure 1) approximately four miles (6.4 kilometers [km]) south of Rawlins, Wyoming, within T 16 N – T 18N, R 88 W – R 89W and T 19 N – T21N, R 85 W – R 88W. The Chokecherry WRA is dominated by sagebrush steppe and mixed grass prairie. Topography in the area is rolling hills throughout much of the WRA, with topography becoming more varied in the southern portion (Figure 1). A distinct rim with a steep cliff face dominates the southern boundary of the WRA. The general land practice is cattle grazing.

The Sierra Madre WRA is dominated by sagebrush steppe with pockets of quaking aspen (*Populus tremuloides*). Topography in the WRA ranges from gently rolling plains in the northern portion to rolling hills in the southern portion. The escarpment of Miller Hill dominates the northern boundary of the WRA. Drainages in the southern portion are dominated by willow (*Salix* spp.). The general land practice is also cattle grazing.

METHODS

The goal of the nesting raptor survey was to gather information on nesting species visible from the air, locations of the nests, and timing of nesting by raptor species in the WRAs. The nest search area included each WRA and an approximate one-mile (1.6 km) buffer, which totaled approximately 183.2 square miles (mi^2; 474.5 square kilometers [km^2]) for the Chokecherry WRA and 86.2 mi^2 (223.3 km^2) for the Sierra Madre WRA. The survey was conducted by helicopter from May 14 to May 30, 2008.

Raptor nests were surveyed for by flying in a helicopter and searching suitable habitat (stands of trees, rocky areas and cliffs) for nests. Surveys were conducted while flying at a maximum altitude of 250 ft (76.2 meters [m]) and an approximate airspeed of 30 miles per hour (mph; 48.3 kilometers per hour [kph]). If a nest was observed, the helicopter was moved to a position where it could be determined if the nest was occupied and what species was using the nest. Efforts were made to minimize disturbance to breeding raptors, including keeping the helicopter at a maximum distance from the nest in which the species could be determined. Locations of inactive nests were also recorded as they may become occupied during subsequent years. All nests, whether active or inactive, were given a unique identification number and the Universal Transverse Mercator (UTM) location was recorded with a global positioning system (GPS). In addition to the aerial surveys, raptor nests observed while conducting other study activities at the WRAs (e.g., burrowing owl [*Athene cunicularia*]) were recorded and mapped.

To supplement data collected during the 2008 nesting season, all raptor nest records for the Chokecherry and Sierra Madre WRAs maintained by the BLM were obtained. These records include nests located since 1980 (a 28–year period) and therefore do not reflect expected raptor nesting activity for any given year. Prior to 1996, the BLM mapped raptor nest locations opportunistically. Since 1996, specific surveys have been conducted to map raptor nests in the Rawlins Field Office. These records have been supplemented with raptor nests located as part of the permitting process for development activities such as pipelines and oil and gas developments (Heath Cline, Wildlife Biologist, BLM Rawlins Field Office, personal communication 10-22-08).

RESULTS

Twenty-four active raptor nests, consisting of 11 nests of red-tailed hawk (*Buteo jamaicensis*), five of prairie falcon (*Falco mexicanus*), five of great horned owl (*Bubo virginianus*), and three of golden eagle were located during 2008 aerial surveys of the WRAs (Table 1). Two burrowing owls were also observed from the ground on the Chokecherry WRA, and it is assumed the burrowing owls were nesting in the area.

Twelve of the active raptor nests were found in or within one mile (1.6 km) of the Chokecherry WRA, and 12 were found in or within one mile of the Sierra Madre WRA (Figure 2). Fourteen (58%) of the active raptor nests were located in trees while the remaining 10 (42%) were located on cliffs (Table 1). Three of the four great horned owl and 10 of the 11 red-tailed hawk nests were in trees, whereas one great horned owl, one red-tailed hawk, and all golden eagle and prairie falcon nests were located on cliffs. Either eggs or chicks were observed in all active nests (Table 1).

A total of 110 inactive nests were also located, with 55 in or within one mile (1.6 km) of the Chokecherry WRA and 55 in or within one mile of the Sierra Madre WRA (Figure 3). Forty-eight percent of the inactive nests were on cliffs, 51% were in trees and 1% was on rock. All inactive nests were classified as being in good condition.

Most of the active and inactive raptor nests on the Chokecherry WRA were located along the extreme southern end of the WRA, although several also occurred along a ridgeline that runs east-west through the northern end of the project area (Figures 2 and 3). Very few active or inactive nests were located within the project boundary of the Sierra Madre WRA; the vast majority were located just outside the project boundary along steep, wooded slopes that lead away from the WRA (Figures 2 and 3).

In addition to raptors, seven active common raven (*Corvus corax*) nests and one active Canada goose (*Branta canadensis*) nest were located during aerial surveys (Table 2; Figure 2). Three of the common raven nests were in trees and four were on cliffs. The Canada goose nest was located in a tree along the North Platte River just east of the Chokecherry WRA.

Since 1980, the BLM has mapped 141 active raptor nests in or within one mile (1.6 km) of the WRAs, including 132 nests at the Chokecherry WRA, and nine at the Sierra Madre WRA (Figure 4). Over this 28-year period, golden eagle nests have been most common, with 42 active nests documented, followed by red-tailed hawk (31), ferruginous hawk (25), and prairie falcon (23). Other raptor nests located included three Cooper's hawks (*Accipiter cooperii*), three great horned owls, three American kestrels (*Falco americanus*), and one Swainson's hawk. The nest records also include two unidentified buteos and seven unidentified raptors. Most of the nests at the Chokecherry WRA occurred along the southern boundary of the WRA, although several nests were located throughout the WRA. Most of the nests found at the Sierra Madre WRA occur along the northern and eastern boundaries.

DISCUSSION

Active raptor nest density was 0.07 nests/mi^2 within the Chokecherry WRA and the one-mile (1.6-km) buffer, and 0.14 nests/mi^2 within the Sierra Madre WRA and the one-mile buffer. This is low to moderate in comparison to 16 other WRAs evaluated in the western U.S., where active raptor nest density ranged from 0.03 to 0.43 nests/mi^2 and averaged 0.22 nests/mi^2 (Table 3). The low active raptor nest density of the Chokecherry and Sierra Madre WRAs will minimize the potential impact on nesting raptors. Since few raptor species targeted during nest surveys have been observed as fatalities at newer wind-energy facilities, correlations are very low between the number of collision fatalities and raptor nest density within one-mile of the wind-energy facility. Raptors nesting closest to turbines likely have higher probabilities of being impacted from collision with turbines, but data on nests very close to turbines (e.g., within a half-mile [0.8 km]) are currently inadequate to determine the level of these impacts. The existing wind-energy facility with the highest reported nest density is the Foote Creek Rim wind-energy facility in Wyoming, which lies approximately 60 miles (96.6 km) east of Rawlins. Most of the nests within two miles (3.2 km) of the wind-energy facility are of red-tailed hawk (Johnson et al. 2000b), but no red-tailed hawk fatalities have been documented at this site (Young et al. 2003d, 2003e).

In addition to possible direct effects on raptors within the WRAs through collision mortality, indirect effects caused by disturbance-type impacts, such as construction activity near an active nest, also have a potential impact on raptors. Birds displaced from wind-energy facilities might move to areas with fewer disturbances, but with lower habitat quality, and therefore possibly reducing breeding success. Most studies on raptor displacement at wind-energy facilities, however, indicate effects to be negligible (Howell and Noone 1992; Johnson et al. 2000a, 2003; Madders and Whitfield 2006). At a wind-energy facility in eastern Washington, based on extensive monitoring using helicopter flights and ground observations, raptors still nested in the area at approximately the same levels after construction, and several nests were located within a half-mile (0.80 km) of turbines (Erickson et al. 2004). At the Foote Creek Rim wind-energy facility in southern Wyoming, one pair of red-tailed hawks nested within 0.3 miles (0.78 km) of the turbine strings, and seven red-tailed hawk nests, one great horned owl nest, and one golden eagle nest located within one mile (1.6 km) of the wind-energy facility successfully fledged young (Johnson et al. 2000b). The golden eagle pair successfully nested a half-mile from the wind-energy facility for three different years after it became operational. A Swainson's hawk also nested within a quarter-mile (0.4 km) of a turbine string at the Klondike I wind-energy facility in Oregon after the facility was operational (Johnson et al. 2003).

Notable exceptions to this include a study in Scotland that described territorial golden eagles avoiding the entire wind-energy facility area, except when intercepting non-territorial birds (Walker et al. 2005). The only published report of avoidance of wind turbines by nesting raptors occurred at Buffalo Ridge, Minnesota, where raptor nest density on 101 mi^2 (261.6 km^2) of land surrounding a wind-energy facility was 5.94 nests/39 mi^2 (5.94 nests/101.0 km^2), yet no nests were present in the 12 mi^2 (31.1 km^2) wind-energy facility itself, even though habitat was similar (Usgaard et al. 1997). However, this analysis assumed that raptor nests are uniformly distributed across the landscape, an unlikely event, and even though no nests were found, only two nests would be expected for an area 12 mi^2 in size if the nests were distributed uniformly. A subsequent study at the Buffalo Ridge wind-energy facility in Minnesota found evidence of northern harriers (*Circus cyaneus*) avoiding turbines on both a small scale (< 328 ft [100 m] from turbines) and a larger scale (344-17,958 ft [105–5,364 m] from the nearest turbine) in the year following construction (Johnson et al. 2000a). Two years following construction, however, no large-scale displacement of northern harriers was detected. These observations suggest that there will be limited nesting displacement of raptors at the Chokecherry and Sierra Madre WRAs, although the creation of a buffer surrounding known nests when siting turbines will further reduce any potential impact.

LITERATURE CITED

Bonneville Power Administration. 1995. Proposed Columbia Wind Farm #1. Joint NEPA/SEPA Final Environmental Impact Statement. DOE/EIS-0206. Proposed by the Conservation and Renewable Energy System. Lead Agencies: Bonneville Power Administration and Klickitat County, Washington. September 1995.

Bureau of Land Management (BLM). 2008. Proposed resource management plan and final environmental impact statement for public lands administered by the Bureau of Land Management Rawlins Field Office, Rawlins, Wyoming. US Department of the Interior Bureau of Land Management, Rawlins Field Office, Rawlins, Wyoming.

Erickson, W.P., J. Jeffrey, K. Kronner, and K. Bay. 2004. Stateline Wind Project Wildlife Monitoring Final Report: July 2001 - December 2003. Technical report for and peer-reviewed by FPL Energy, Stateline Technical Advisory Committee, and the Oregon Energy Facility Siting Council, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and Walla Walla, Washington, and Northwest Wildlife Consultants (NWC), Pendleton, Oregon. December 2004.

Erickson, W., J. Jeffrey, D. Young, K. Bay, R. Good, K. Sernka, and K. Kronner. 2003a. Wildlife Baseline Study for the Kittitas Valley Wind Project: Summary of Results from 2002 Wildlife Surveys. Final Report February 2002– November 2002. Prepared for Zilkha Renewable Energy, Portland, Oregon, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and Northwest Wildlife Consultants, Inc. (NWC), Pendleton, Oregon. January 2003.

Erickson, W.P., G.D. Johnson, M.D. Strickland, K. Kronner, P.S. Becker, and S. Orloff. 1999. Baseline Avian Use and Behavior at the CARES Wind Plant Site, Klickitat County, Washington. NREL/SR-500-26902. Final report prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and IBIS Environmental Services, San Rafael, California.

Erickson, W., K. Kronner, and B. Gritski. 2005. Nine Canyon Phase II Wind Power Project, Fall 2004 Avian and Bat Monitoring Report: July 2004 – October 2004. Prepared for the Nine Canyon Technical Advisory Committee, Energy Northwest, by Western Ecosystems Technology, Inc. (WEST), Cheyenne, Wyoming and Northwest Wildlife Consultants, Inc. (NWC), Pendleton, Oregon. March 2005.

Erickson, W., D. Young, G. Johnson, J. Jeffrey, K. Bay, R. Good, and H. Sawyer. 2003b. Wildlife Baseline Study for the Wild Horse Wind Project. Summary of Results from 2002-2003 Wildlife Surveys May 10, 2002- May 22, 2003. Draft report prepared for Zilkha Renewable Energy, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. November 2003.

Howell, J.A. and J. Noone. 1992. Examination of Avian Use and Mortality at a U.S. Windpower Wind Energy Development Site, Montezuma Hills, Solano County, California. Final

Report to Solano County Department of Environmental Management, Fairfield, California. 41pp.

Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, and D.A. Shepherd. 2000a. Avian Monitoring Studies at the Buffalo Ridge Wind Resource Area, Minnesota: Results of a 4-Year Study. Final report prepared for Northern States Power Company, Minneapolis, Minnesota, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. September 22, 2000. 212 pp. http://www.west-inc.com

Johnson, G.D., W.P. Erickson, J. White, and R. McKinney. 2003. Avian and Bat Mortality During the First Year of Operation at the Klondike Phase I Wind Project, Sherman County, Oregon. Technical report prepared for Northwestern Wind Power, Goldendale, Washington, by WEST, Inc., Cheyenne, Wyoming. March 2003. http://www.west-inc.com

Johnson, G.D., Young, D. P. Jr., W.P. Erickson, C.E. Derby, M.D. Strickland, and R.E. Good. 2000b. Wildlife Monitoring Studies, SeaWest Windpower Plant, Carbon County, Wyoming, 1995-1999. Final report prepared for SeaWest Energy Corporation, San Diego, California, and the Bureau of Land Management, Rawlins, Wyoming, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. August 9, 2000. http://www.west-inc.com

Kerlinger, P., R. Curry, and R. Ryder. 2000. Ponnequin Wind Energy Project: Reference Site Avian Study, January 1, 1998 - December 31, 1998. NREL/SR-500-27546.

Mabee, T.J., B.A. Cooper, C.M. Grinnell, and J.B. Barna. 2005. Baseline Avian Use at the Proposed Klondike III Wind Power Project, Oregon, Winter 2004 - Spring 2005. Final Report. Prepared for David Evans and Associates Inc., Portland Oregon, by ABR, Inc. Environmental Research and Services, Forest Grove, Oregon. June 2005.

Madders, M. and D.P. Whitfield. 2006. Upland Raptors and the Assessment of Wind Farm Impacts. Ibis 148: 43-56.

Northwest Wildlife Consultants, Inc. (NWC) and Western Ecosystems Technology, Inc. (WEST). 2005. Wildlife Baseline Study for the Leaning Juniper Wind Power Project, Gilliam County, Oregon. Prepared for PPM Energy, Portland, Oregon and CH2M HILL, Portland, Oregon by NWC, Pendleton, Oregon, and WEST, Inc., Cheyenne, Wyoming. November 3, 2005.

URS Corporation and Western EcoSystems Technology, Inc. (WEST). 2001. Avian Baseline Study for the Stateline Project, Vansycle Ridge, Oregon and Washington. Technical report prepared for ESI Vansycle Partners, L.P.

Usgaard, R.E., D.E. Naugle, R.G. Osborn, and K.F. Higgins. 1997. Effects of Wind Turbines on Nesting Raptors at Buffalo Ridge in Southwestern Minnesota. Proceedings of the South Dakota Academy of Science 76: 113-117.

Walker, D., M. McGrady, A. McCluskie, M. Madders, and D.R.A. McLeod. 2005. Resident Golden Eagle Ranging Behaviour Before and After Construction of a Windfarm in Argyll. Scottish Birds 25: 24-40.

Western EcoSystems Technology, Inc. (WEST). 2005. Wildlife and Habitat Baseline Study for the Proposed Biglow Canyon Wind Power Project, Sherman County, Oregon. March 2004 - August 2005. Prepared for Orion Energy LLC., Oakland, California. October, 2005. WEST. Cheyenne, Wyoming.

Western EcoSystems Technology, Inc. (WEST) and Northwest Wildlife Consultants, Inc. (NWC). 2002a. Baseline Avian Studies for the Proposed Maiden Wind Farm, Yakima and Benton Counties, Washington. Final Report, April 2001-April 2002. Prepared for Bonneville Power Administration, Portland, Oregon, by WEST, Cheyenne, Wyoming, and NWC, Inc., Pendleton, Oregon. November 20, 2002. WEST. Cheyenne, Wyoming. http://www.west-inc.com

Western EcoSystems Technology, Inc. (WEST) and Northwest Wildlife Consultants, Inc. (NWC). 2002b. In Prep. Ecological Baseline Study for the Zintel Canyon Wind Project. Technical report prepared for Energy Northwest. WEST, Cheyenne, Wyoming, and NWC, Pendleton, Oregon.

Young, D. P. Jr., W.P. Erickson, K.J. Bay, J.D. Jeffrey, B.G. Lack, R.E. Good, and H.H. Sawyer. 2003a. Baseline Avian Studies for the Proposed Hopkins Ridge Wind Project, Columbia County, Washington. Final Report, March 2002 - March 2003. Prepared for RES North America, LLC., Portland, Oregon, by Western EcoSystems Technology, Inc.(WEST), Cheyenne, Wyoming. April 30, 2003.

Young, D. P. Jr., W.P. Erickson, K.J. Bay, J.D. Jeffrey, B.G. Lack, and H.H. Sawyer. 2003b. Baseline Avian Studies for the Proposed Desert Claim Wind Power Project, Kittitas County, Washington. Final Report. Prepared for Desert Claim Wind Power, LLC, Ellensburg, Washington, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. July 2003.

Young, D. P. Jr., W.P. Erickson, J.D. Jeffrey, K. Bay, R.E. Good, and E.G. Lack. 2003c. Avian and Sensitive Species Baseline Study Plan and Final Report. Eurus Combine Hills Turbine Ranch, Umatilla County, Oregon. Technical report prepared for Eurus Energy America Corporation, San Diego, California and Aeropower Services, Inc., Portland, Oregon, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. March 10, 2003.

Young, D. P. Jr., W.P. Erickson, R.E. Good, M.D. Strickland, and G.D. Johnson. 2003d. Avian and Bat Mortality Associated with the Initial Phase of the Foote Creek Rim Windpower Project, Carbon County, Wyoming, Final Report, November 1998 - June 2002. Prepared for PacifiCorp, Inc. Portland, Oregon, SeaWest Windpower Inc. San Diego, California, and Bureau of Land Management, Rawlins District Office, Rawlins, Wyoming.

Young, D.P., Jr., W.P. Erickson, M.D. Strickland, R.E. Good, and K.J. Sernka. 2003e. Comparison of Avian Responses to UV-Light-Reflective Paint on Wind Turbines. Subcontract Report July 1999 – December 2000. NREL/SR-500-32840. Prepared for National Renewable Energy Laboratory, Golden, Colorado, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. Foote Creek Rim Wind Plant, Carbon County, Wyoming. January 2003. http://www.west-inc.com

Table 1. Composition and description of active raptor nests on the Chokecherry and Sierra Madre Wind Resource Areas in Carbon County, Wyoming, Spring 2008.

Species	Nest Status	Nest Condition	Nest Substrate
Chokecherry WRA			
great horned owl	Active-chicks	Good	Tree
great horned owl	Active-chicks	Good	Tree
great horned owl	Active-chicks	Good	Cliff
red-tailed hawk	Active-eggs	Good	Cliff
golden eagle	Active-chicks	Good	Cliff
golden eagle	Active-chicks	Good	Cliff
golden eagle	Active-chicks	Good	Cliff
prairie falcon	Active-eggs	Good	Cliff
prairie falcon	Active-eggs	Good	Cliff
prairie falcon	Active-eggs	Good	Cliff
prairie falcon	Active-eggs	Good	Cliff
prairie falcon	Active-eggs	Good	Cliff
Subtotal	12 nests		
Sierra Madre WRA			
great horned owl	Active-chicks	Good	Tree
great horned owl	Active-chicks	Good	Tree
red-tailed hawk	Active-eggs	Good	Tree
red-tailed hawk	Active-eggs	Good	Tree
red-tailed hawk	Active-eggs	Good	Tree
red-tailed hawk	Active-eggs	Good	Tree
red-tailed hawk	Active-eggs	Good	Tree
red-tailed hawk	Active-eggs	Good	Tree
red-tailed hawk	Active-eggs	Good	Tree
red-tailed hawk	Active-eggs	Good	Tree
red-tailed hawk	Active-eggs	Good	Tree
red-tailed hawk	Active-eggs	Good	Tree
Subtotal	12 nests		
Total	24 nests		

Table 2. Composition and description of active non-raptor nests on the Chokecherry and Sierra Madre Wind Resource Areas in Carbon County, Wyoming, Spring 2008.

Species	Nest Status	Nest Condition	Nest Substrate
Chokecherry WRA			
common raven	Active-chicks	Good	Cliff
common raven	Active-eggs	Good	Cliff
common raven	Active-chicks	Good	Cliff
common raven	Active-chicks	Good	Cliff
Canada goose	Active-eggs	Good	Tree
Sierra Madre WRA			
common raven	Active-chicks	Good	Tree
common raven	Active-eggs	Good	Tree
common raven	Active-chicks	Good	Tree
Total	**8 nests**		

Table 3. Estimated raptor nest densities from other proposed and existing wind-energy facilities located primarily in the western U.S.

Wind Resource Area	Density (# nests/mi^2)
Chokecherry, Wyoming	0.07
Sierra Madre, Wyoming	0.14
Biglow, Oregon	0.15
Klondike III,Oregon	0.16
Leaning Juniper, Oregon	0.41
Stateline, Oregon-Washington	0.21
Nine Canyon, Washington	0.03
Zintel Canyon, Washington	0.08
Buffalo Ridge, Minnesota	0.15
Klickitat County, Washington	0.12
Combine Hills, Oregon	0.24
Columbia Hills, Washington	0.30
Ponnequin, Colorado	0.06
Hopkins Ridge, Washington	0.43
Maiden, Washington	0.18
Wild Horse, Washington	0.16
Kittitas Valley, Washington	0.09
Desert Claim, Washington	0.34
Average	**0.19**

Biglow, OR	WEST 2005	Combine Hills, OR	Young et al. 2003c
Klondike III, OR	Mabee et al. 2005	Columbia Hills, WA	BPA 1995
Leaning Juniper, OR	NWC and WEST 2005	Ponnequin, CO	Kerlinger et al. 2000
Stateline, OR/WA	URS and WEST 2001	Hopkins Ridge, WA	Young et al. 2003a
Nine Canyon, WA	Erickson et al. 2005	Maiden, WA	WEST and NWC 2002a
Zintel Canyon, WA	WEST and NWC 2002b	Wild Horse, WA	Erickson et al. 2003b
Buffalo Ridge, MN	Johnson et al. 2000	Kittitas Valley, WA	Erickson et al. 2003a
Klickitat County, WA	Erickson et al. 1999	Desert Claim, WA	Young et al. 2003b

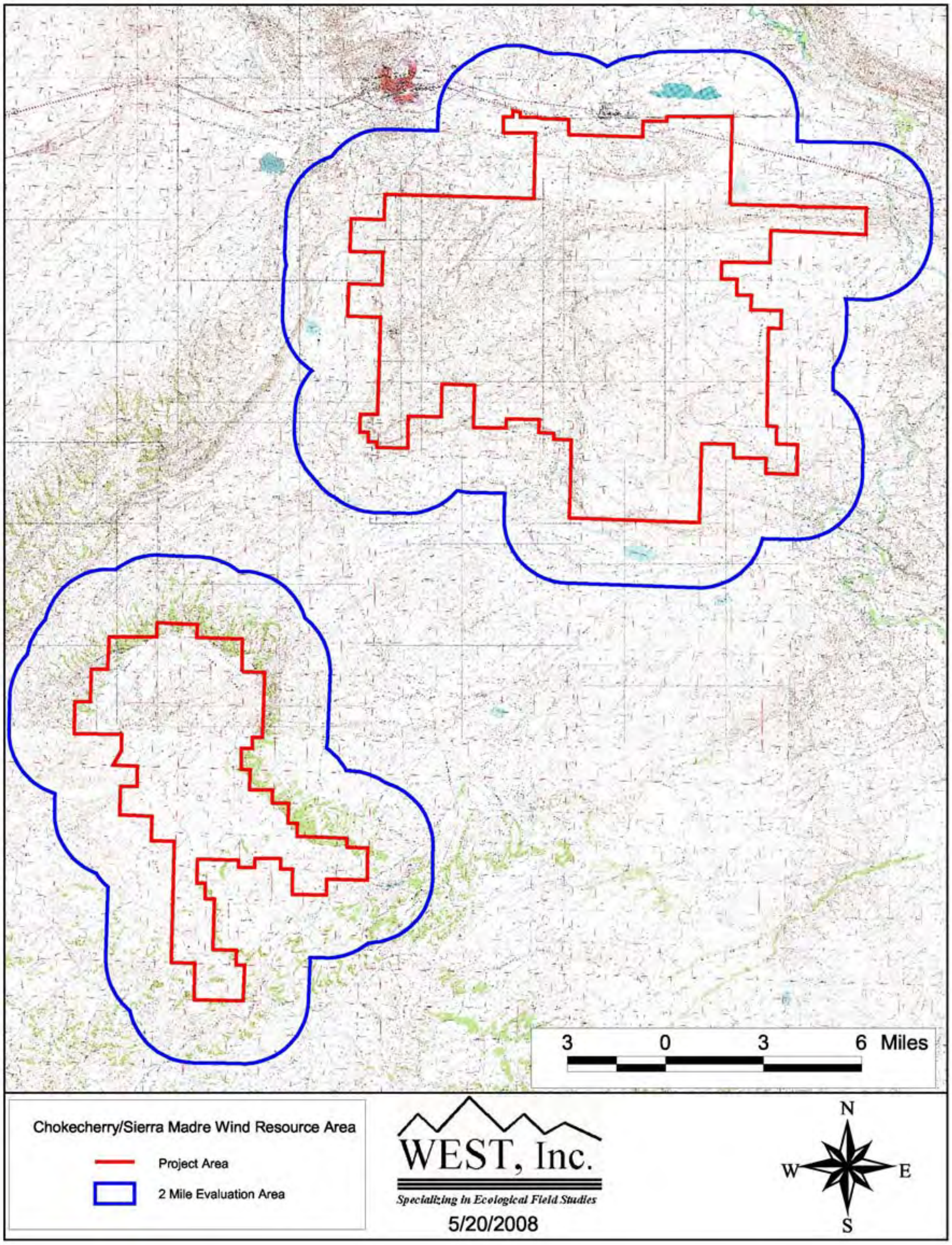

Figure 1. Location of the Chokecherry and Sierra Madre Wind Resource Areas in Carbon County, Wyoming.

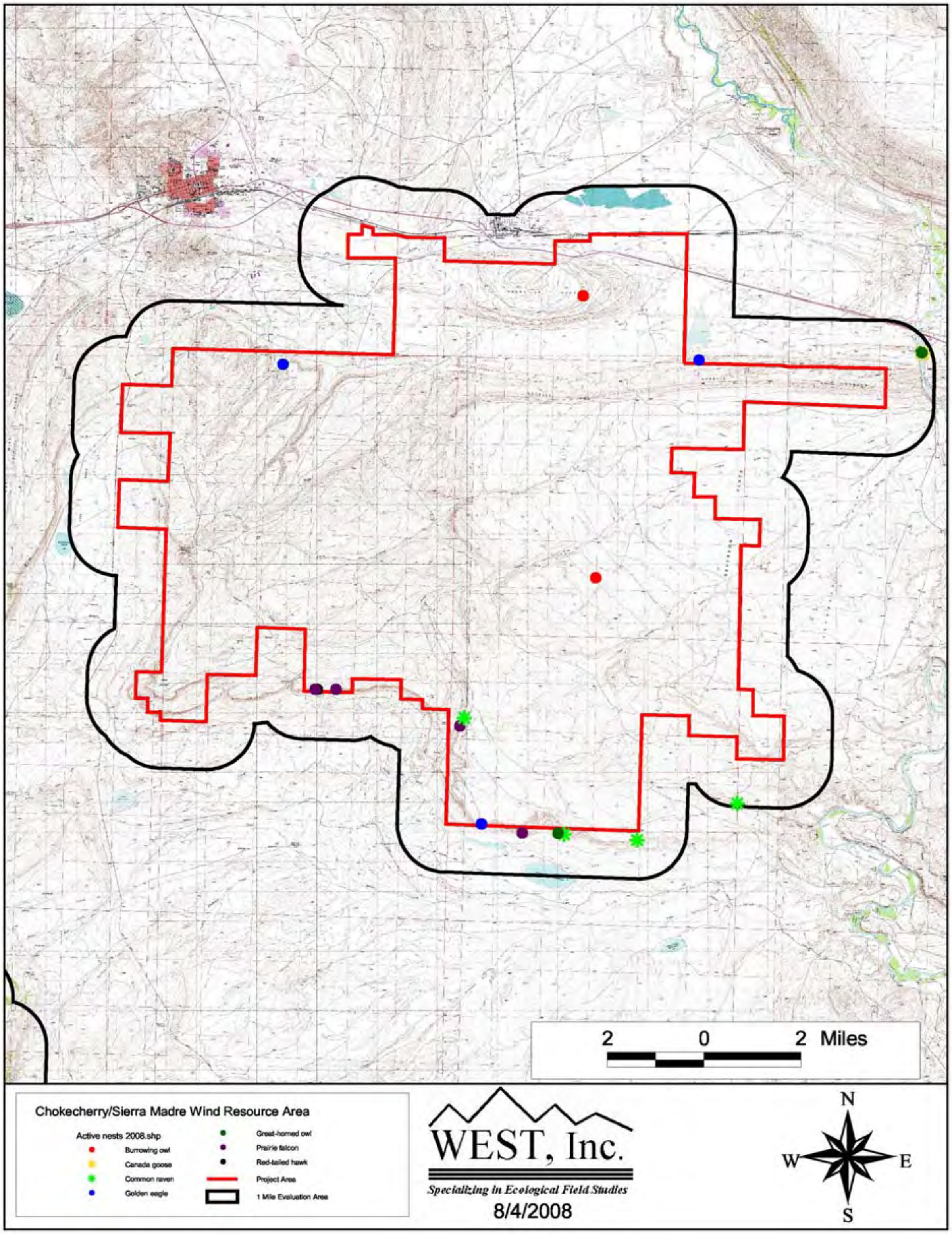

Figure 2a. Locations of active raptor nests at the Chokecherry WRA in Carbon County, Wyoming, April 2008.

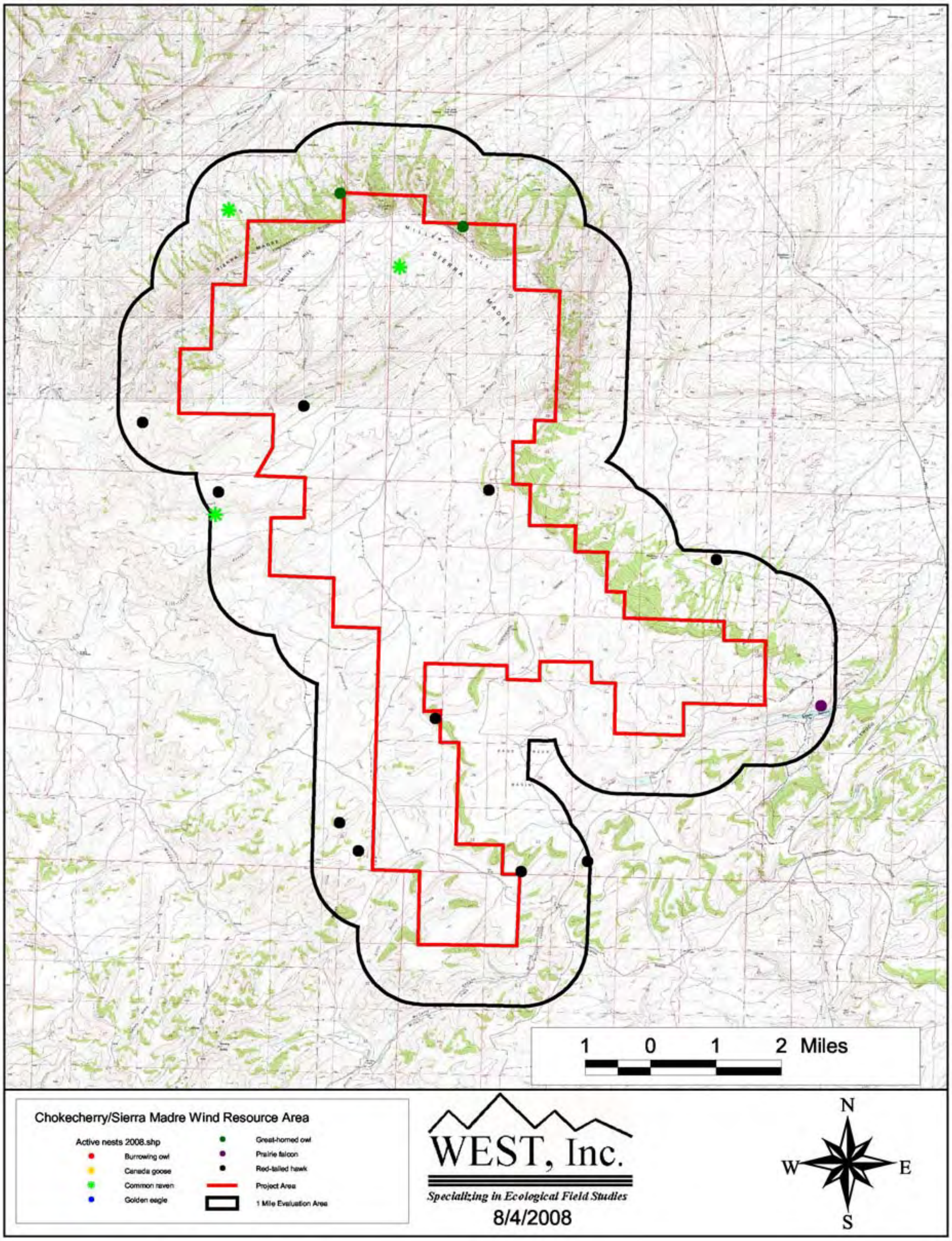

Figure 2b. Locations of active raptor nests at the Sierra Madre WRA in Carbon County, Wyoming, April 2008.

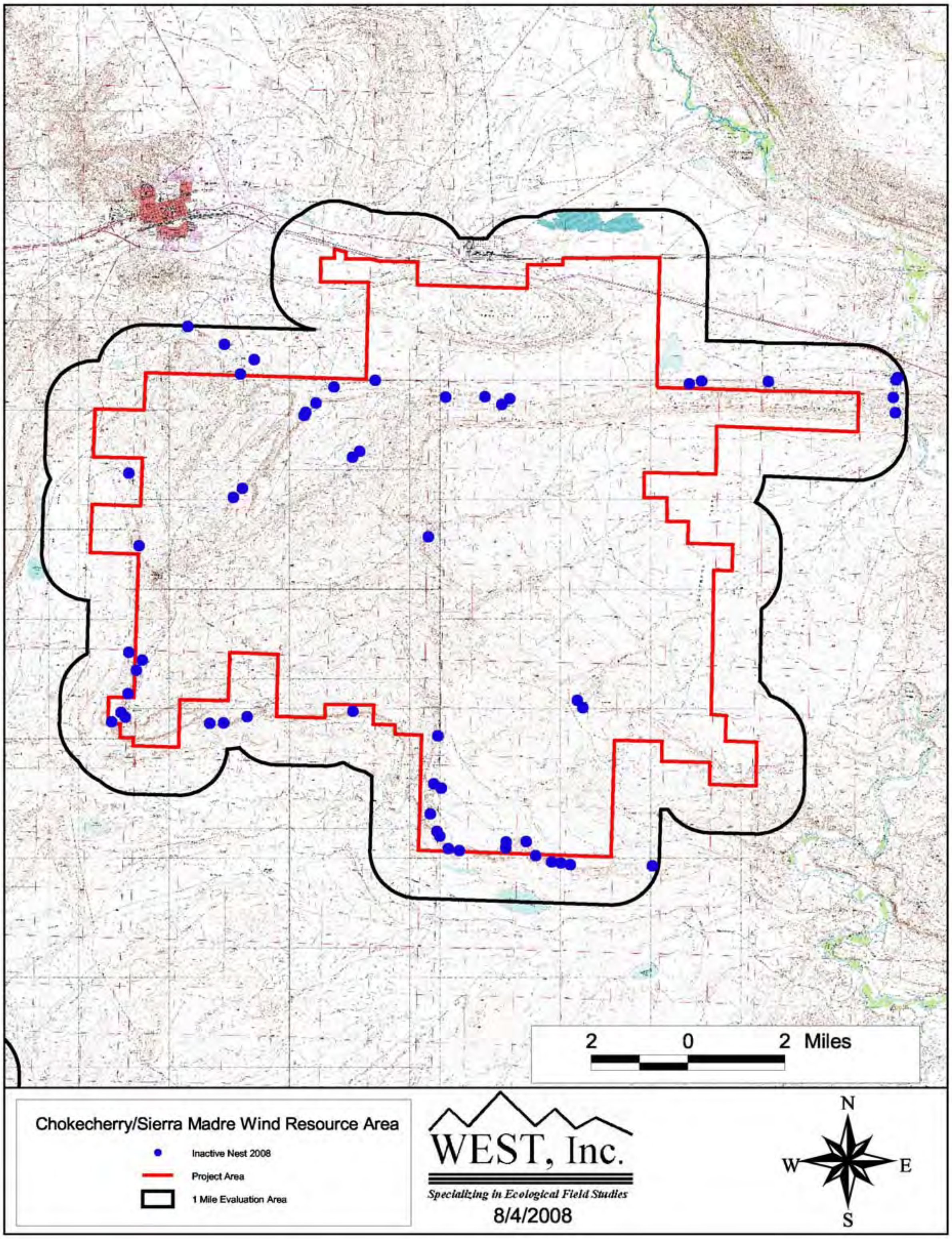

Figure 3a. Locations of inactive raptor nests at the Chokecherry WRA in Carbon County, Wyoming, April 2008.

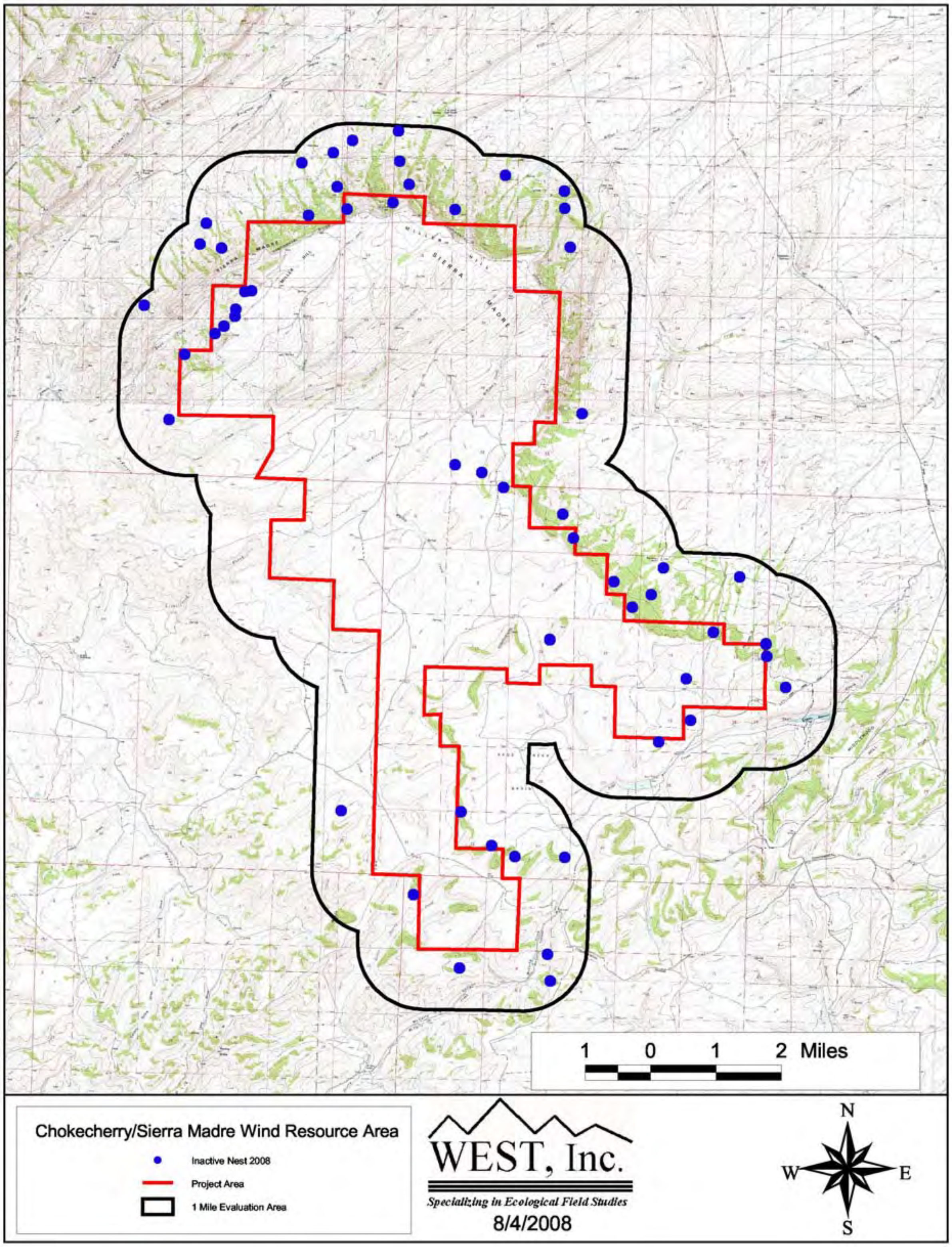

Figure 3b. Locations of inactive raptor nests at the Sierra Madre WRA in Carbon County, Wyoming, April 2008.

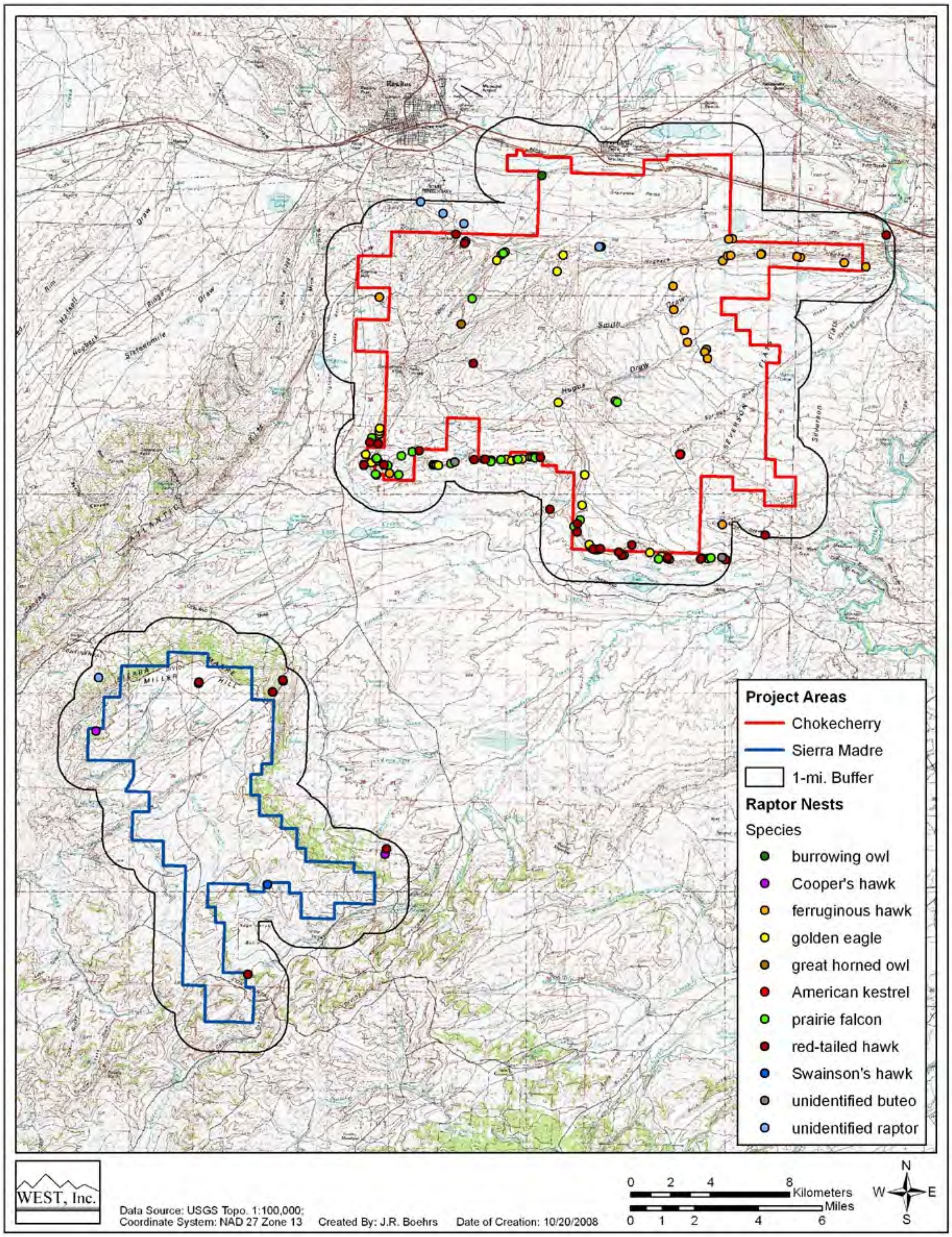

Figure 4. Locations of active raptor nests from BLM records at the Chokecherry and Sierra Madre Wind Resource Areas in Carbon County, Wyoming.

Summary Report for 2011 Nest Surveys
Chokecherry and Sierra Madre Wind Energy Project

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INTRODUCTION

In May and June 2011, SWCA Environmental Consultants (SWCA) conducted raptor nest surveys within the Chokecherry and Sierra Madre Wind Energy Project (Project) development footprint and in suitable nesting habitats within a 5-mile buffer (approximately 700 square miles) surrounding the Project. The selection of a 5-mile turbine buffer was made through consultation with the U.S. Fish and Wildlife Service (USFWS) and the Bureau of Land Management (BLM). This buffer was agreed upon since the existing BLM raptor nest database could be used as a basis for where to search for nests, and because terrain features that had high potential for nesting raptors were well known and established. A 5-mile turbine buffer was also deemed acceptable due to the robust avian monitoring efforts already underway within the Project area, which could also assist in identifying potential nesting raptors. Additionally, BLM regularly conducts raptor nest monitoring in areas that fall outside of the 5-mile turbine buffer. Data from those BLM monitoring efforts will be considered during development of the Avian Protection Plan and Eagle Conservation Plan.

Three types of survey methods were used to identify nests, determine nest condition and activity, and assess nesting success. Helicopter surveys were used to evaluate all known nests and all potential nesting habitats along cliff bands, on steep slopes, and along the North Platte River corridor. Ground surveys were used to identify nests not readily identified from helicopter surveys and to assess nests that were not identified or observable during the helicopter survey flight path. All ferruginous hawk (*Buteo regalis*) nests in the Project footprint were visited to assess current condition. Multiple nest monitoring visits were made to all active eagle nests and many of the active *Buteo* nests identified during helicopter and ground surveys. Nest monitoring visits were made until fledging was confirmed or until juveniles were no longer present on the nest. All nest survey and monitoring activities were conducted in accordance with the protocols submitted to and accepted by the USFWS.

AERIAL SURVEYS

During aerial nest surveys, two biologists and a pilot flew in a Bell 206B3 helicopter on May 25 and June 10. Surveys on May 25 were completed primarily for the Chokecherry portion of the Project and the North Platte River corridor. Surveys on June 10 were completed for the Sierra Madre portion of the Project area as well as the Atlantic Rim. During the June 10 flight, several of the active nests identified during the May 25 surveys were revisited to assess nest activity and the development stage of the chick(s) on the nest.

Nineteen hours were spent flying the Project area and associated buffer. SWCA biologists used historic nest locations provided by the BLM Rawlins Field Office (RFO) for guidance in surveying existing and undocumented nest locations. Aerial surveys focused on known and potential nesting habitat for golden eagle (*Aquila chrysaetos*), bald eagle (*Haliaeetus leucocephalus*), and ferruginous hawk, as well as previously documented nest locations for these species and other large *Buteos*, falcons, and accipiters. These habitat types included cliff bands, rock outcrops and promenades, steep slopes, riparian zones and river corridors, and forested areas with large trees capable of supporting large nest structures. While the focus of the nest flights was on the three previously mentioned species, any active raptor nest that was encountered during the course of the flights was documented. Additionally, all inactive or historic nests in poor condition that were observed during aerial surveying efforts were recorded. Data collected at each nest site included documentation of the nest substrate and location, nest condition, nest status (e.g., active or inactive, number of nestlings, etc.), global positioning system (GPS) location, and photo documentation of the nest when feasible and safe.

GROUND SURVEYS

Ground surveys were used to evaluate potential nesting habitat that could not be surveyed or readily observed during aerial flights. Ground surveys focused on treed habitats with known nesting structures that could not be observed during helicopter surveys as well as selected known *Buteo* and accipter nests in the Project area. Ground surveys also identified a previously unknown bald eagle nest. Due to an abundance of late season snowpack, areas around the base of Miller Hill were inaccessible until late spring, at which time the groves of quaking aspen (*Populus tremuloides*) had fully leafed out. While locating nests in these groves proved mostly unsuccessful, any raptor activity occurring in these areas would be captured by the four raptor monitoring points located around Miller Hill. Ground surveys also included visits to all historic ferruginous hawk nests in the Project area to evaluate current nest condition and determine when the nest had last been active. All ferruginous hawk nests in the survey area were inactive in 2011 and many of the historic nests identified in the BLM datasets were no longer viable for nesting activities (Appendix A). All ground survey locations were accessed on foot or with trucks and all-terrain vehicles. Data collected during ground surveys were identical to the data recorded during aerial surveys.

In total, 23 active raptor nests were located within the Project area and associated 5-mile buffer (Figure 1). The species composition of the active raptor nests were as follows: eight golden eagle, four bald eagle, six red-tailed hawk (*Buteo jamaicensis*), three prairie falcon (*Falco mexicanus*), one unknown *Buteo* (likely red-tailed hawk), and one American kestrel (*Falco sparverius*). An additional three active non-raptor nests were located during the flights and included one turkey vulture (*Cathartes aura*), one common raven (*Corvus corax*), and one unknown large species. The unknown large species nest was a medium-sized stick nest in a crevice of a cliff band, and was likely either a *Buteo* species or a common raven. All active golden eagle and bald eagle nests were located outside of the wind development footprint although three of the eagle nests (two golden eagle and one bald eagle) were located within 1 mile of potential turbine locations. Most active eagle nests were located east and southeast of the Chokecherry portion of the Project along cliff bands on the Bolten Rim and the North Platte River. One active eagle nest was located on the Sierra Madre portion of the Project. The remaining active eagle nests were located south of Middlewood Hill along Jack Creek and in the south Sage Creek Basin. All of the active golden eagle and bald eagle nests were observed to have one to two nestlings present, while the majority of the other active raptor nests appeared to be in the incubation or brooding stages. Appendix B contains representative photographs of the types of active and inactive nests that were observed during surveys.

NEST MONITORING

Follow-up ground surveys were completed to document nest activity and fledging success for all eagle nests and many other raptor nests in the Project area between July 5 and August 2. By July 20, four golden eagle and two bald eagle nests were confirmed as fledged or inactive. Additionally, three other *Buteo* and falcon nests were confirmed as fledged or inactive. As of August 2, the final four golden eagle and two bald eagle nests were confirmed as fledged or inactive. Of the remaining active *Buteo* and falcon nests, four were confirmed as fledged or inactive. Two red-tailed hawk nests remained active as of August 2, and two falcon nests were unable to be relocated during ground surveys due to the nests being built into cavities and tight crevasses along cliff bands.

SUMMARY

In addition to the 23 active raptor nests, 158 inactive nests were also located and documented during the nest flights and other nest searching activities. These nests were located across the Project area and associated buffer; however, the vast majority were located along the Bolten Rim and around the perimeter of the Chokecherry plateau. While all nests observed during the nest flights were documented, it is possible that nests of certain species (e.g., American kestrel, prairie falcon, common raven, etc.) were not able to be located due to the nature of aerial surveys, and because of the way their nests are structured (i.e., oftentimes built in cavities or tight crevasses along cliff bands). All of the inactive nests marked were large in size and were considered potential raptor nests; however, as these nests were inactive, it is not possible to know exactly what species built and/or used the nest.

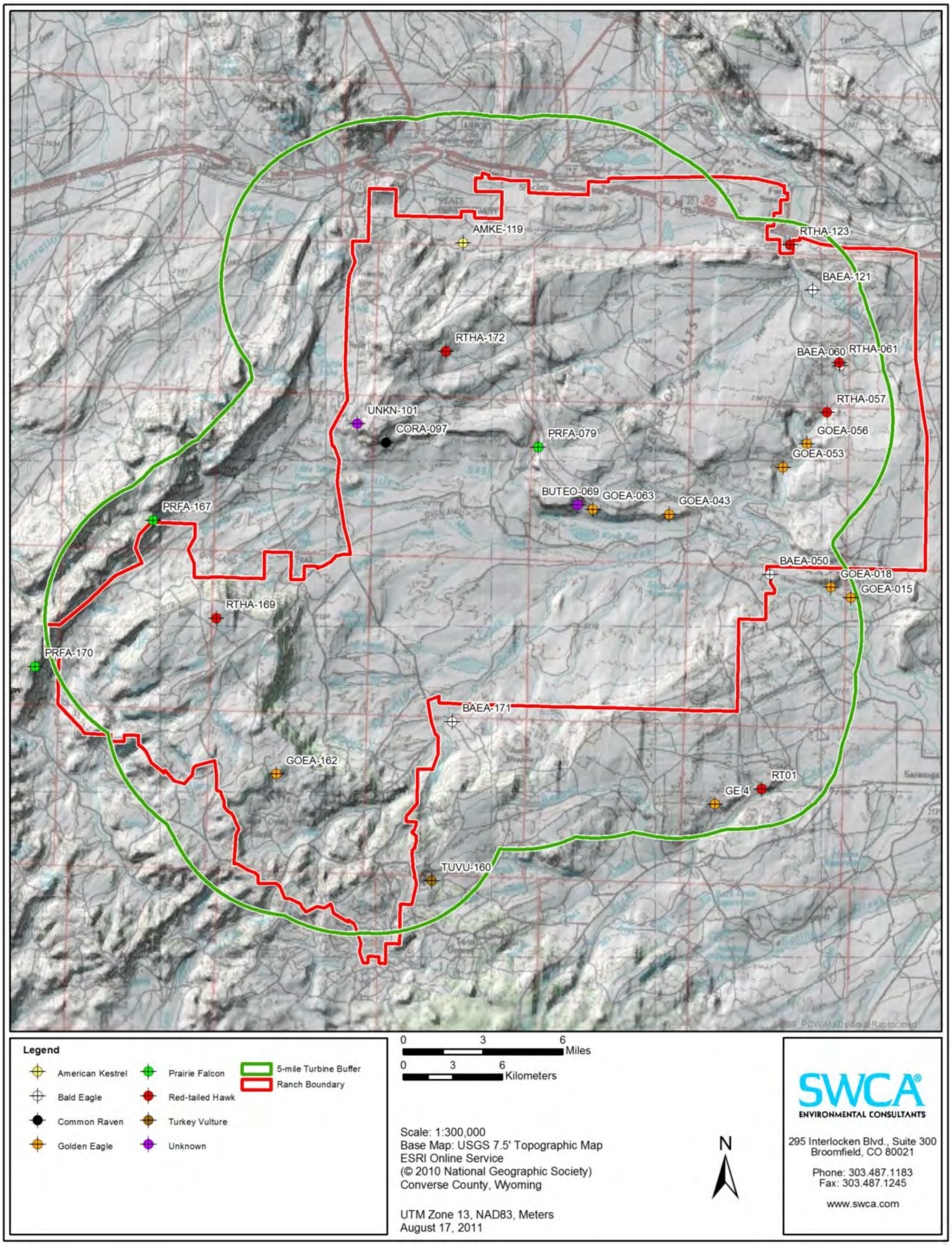

Figure 1. Project area boundary, 5-mile turbine buffer, and all active nests located within the 5-mile turbine buffer in 2011.

APPENDIX A

BLM Ferruginous Hawk Dataset

BLM FERRUGINOUS HAWK DATASET

In May and June 2011, SWCA Environmental Consultants (SWCA) conducted raptor nest surveys within the Chokecherry and Sierra Madre Wind Energy Project (Project) development footprint and in suitable nesting habitats within a 5-mile buffer (approximately 700 square miles) surrounding the Project. As part of SWCA's nest survey and monitoring effort, ground surveys were conducted to determine the status and condition of all ferruginous hawk (*Buteo regalis*) nests documented by the Bureau of Land Management (BLM) within the Project footprint. Forty ferruginous hawk nest sites were identified in the Project area from data shared by the BLM, and each of these nest sites was visited during 2011 ground surveys (Figure A-1). Data collected included presence/absence of a nest at each site; a description of the state of the nest (if a nest was detected); a description of the habitat surrounding the site; photographs of the nest and surrounding habitat (photographs are provided in Appendix B); and the presence of other features that could suggest recent ferruginous hawk activity (e.g., feathers, whitewash, fresh nesting materials, etc.). Of the 40 nest sites identified from the BLM data, 15 nest structures in various stages of condition and quality were located, some with almost no structure remaining. Additionally, seven historic sites were observed that may have once supported a nest; however, now only a few deteriorated sticks remain. Few of these nest structures were located at the BLM sites; however, SWCA surveyed at minimum 100 meters (m) around each of the BLM sites for nest structures as they were likely marked during aerial surveys, which can lead to some degree of inaccuracy in each location. Results for each BLM ferruginous hawk nest site are listed below.

<u>FH18851701</u>: No nest was detected at this site, which is located on a rocky hilltop (Appendix B, Photo 14). An historic nest site is located approximately 22 m northwest of the BLM site (Universal Transverse Mercator [UTM] 13T 0334724, 4599927). The nest is in extremely poor condition with only a few sticks on a small rock outcrop (Appendix B, Photo 15). There were no signs of recent ferruginous hawk activity.

<u>FH18870101</u>: This site contains the remnants of an historic nest, mainly consisting of a few deteriorated sticks and a small amount of old whitewash, but no remaining nest structure (Appendix B, Photo 16). No signs of recent ferruginous hawk activity were observed.

<u>FH18870201</u>: This site is located in a drainage with no evidence of active or historic nests within 100 m of the site (Appendix B, Photo 17). No signs of recent ferruginous hawk activity were observed.

<u>FH18870202</u>: No nest was detected at this site. The site is located on a hillslope, and no signs of recent ferruginous hawk activity were present (Appendix B, Photo 18). A nest is located approximately 64 m north of the BLM site (UTM 13T 0320037, 4603851). This nest is located on a hillslope and is in fair condition; however, there were no other signs of recent ferruginous hawk activity (Appendix B, Photo 19).

<u>FH19860301</u>: A nest is located approximately 15 m east of this site (UTM 13T 0327708, 4612200). The nest is in good condition, likely used in the recent past (Appendix B, Photo 20), with a small amount of whitewash observed around the nest. This nest was also recorded during SWCA's flights across the Project area (nest FEHA-153).

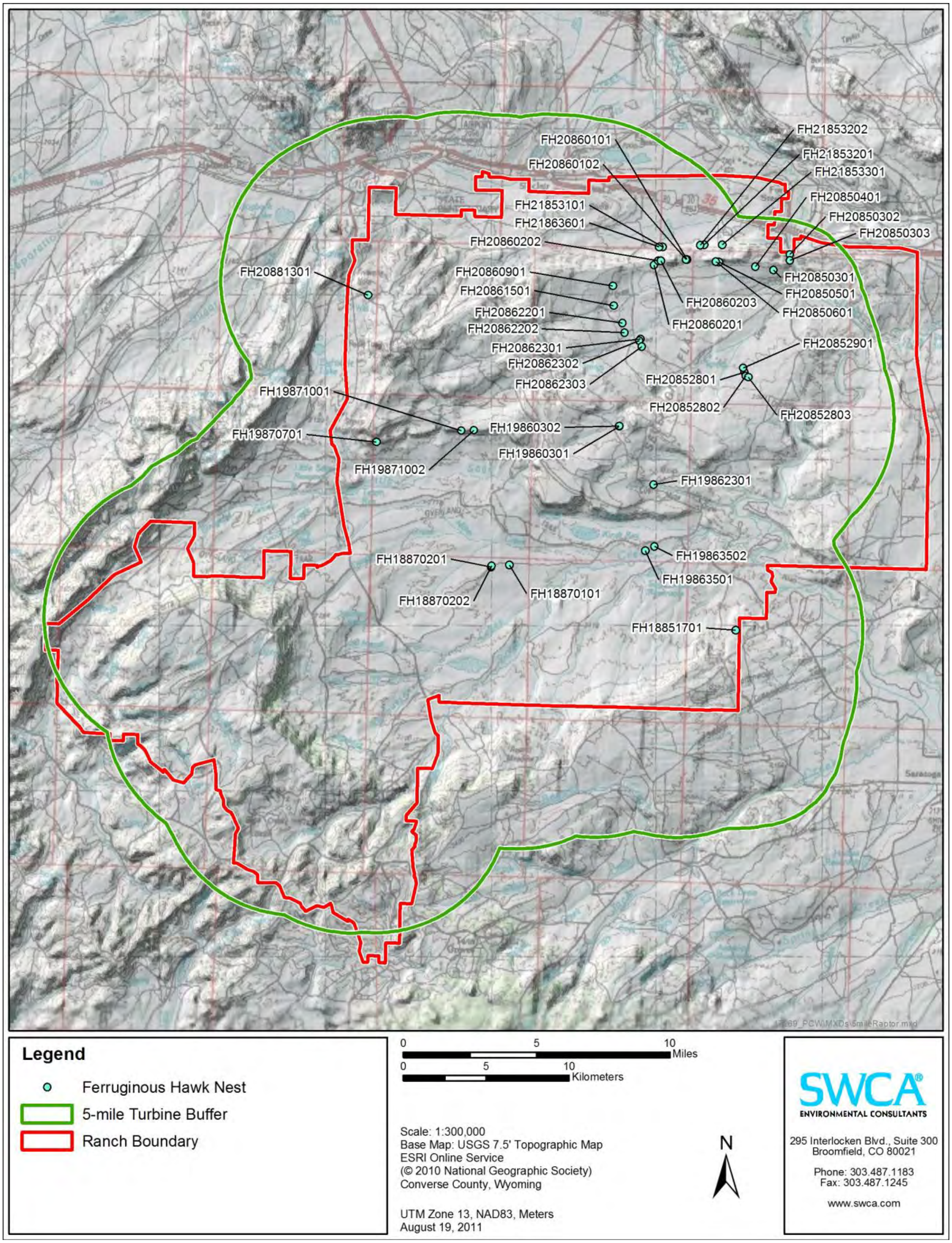

Figure A-1. Project area boundary, 5-mile turbine buffer, and all BLM ferruginous hawk nest sites within the Project area.

FH19860302: No nest was detected at this site. The site is on a rocky hilltop (Appendix B, Photo 21) and is located approximately 35 m north of FH1986031. The area surrounding both of these sites was searched, but no additional nests were detected. No signs of recent ferruginous hawk activity were observed.

FH19862301: No nest was detected at this site. This site is located in sagebrush and bare ground on a hillslope below a cliff band (Appendix B, Photo 22). There were no signs of active or historic nests within 100 m of the site, nor was there evidence of recent ferruginous hawk activity.

FH19863501: A nest was detected approximately 20 m north of the BLM site (UTM 13T 0329290, 4604725). The nest is located on a hilltop and is in fair condition, likely having been used in recent years (Appendix B, Photo 23). No other signs of recent ferruginous hawk activity were observed. This nest was also recorded during SWCA's flights across the Project area (nest FEHA-154).

FH19863502: This site contains the remnants of an historic nest, mainly consisting of a few deteriorated sticks, but no remaining nest structure (Appendix B, Photo 24). No signs of recent ferruginous hawk activity were observed.

FH19870701: No nest was detected at this site, which is located partway down a cliff band (Appendix B, Photo 25). There were no signs of active or historic nests within 100 m of the site; however, some signs of recent whitewash were observed along the cliff wall.

FH19871001: No nest was detected at this site, which is located at the base of a cliff band above a rock outcrop (Appendix B, Photo 26). There were no signs of active or historic nests within 100 m of the site; however, some signs of recent whitewash were observed along the cliff wall.

FH19871002: No nest was detected at this site. The site is located at the base of a cliff band (Appendix B, Photo 27) with signs of recent whitewash along the cliff band. A nest is located approximately 84 m northwest of the BLM site (UTM 13T 0318857, 4612023). The nest is located at the base of the cliff band on a rock outcrop and is in poor condition (Appendix B, Photo 28). No other signs of recent ferruginous hawk activity were observed.

FH20850301: No nest was detected at this site. The site is located in sagebrush and a bare ground drainage at the base of a small hillslope (Appendix B, Photo 29). There were no signs of active or historic nests within 100 m of the site; however, some signs of recent whitewash were observed on a perch 70 m to the north.

FH20850302: This site contains a large nest on a rock outcrop near the North Platte River (Appendix B, Photo 30). The nest is in good condition with relatively fresh grass woven into the inner bowl of the nest; the nest was likely used in the recent past. No feathers, whitewash, or other signs of recent ferruginous hawk activity were observed.

FH20850303: A nest was detected approximately 25 m south of the BLM site. The nest is located on a rock outcrop near the North Platte River. The nest is in poor condition and appeared to be falling off the rock shelf on which it was originally built, which led to the structure being compromised (Appendix B, Photo 31). No signs of recent ferruginous hawk activity were observed.

<u>FH20850401</u>: No nest was detected at this site. The nest site is located on bare ground at the base of a hillslope (Appendix B, Photo 32). There were no signs of active or historic nests within 100 m of the site, nor was there evidence of recent ferruginous hawk activity.

<u>FH20850501</u>: No nest was detected at this site. The nest site is located in sagebrush and bare ground on a hillslope (Appendix B, Photo 33). There were no signs of active or historic nests within 100 m of the site, nor was there evidence of recent ferruginous hawk activity.

<u>FH20850601</u>: No nest was detected at this site. The nest site is located in sagebrush and bare ground on a hillslope (Appendix B, Photo 34). There were no signs of active or historic nests within 100 m of the site, nor was there evidence of recent ferruginous hawk activity.

<u>FH20852801</u>: The remnants of an historic nest are located approximately 16 m west of the BLM nest site at the base of a rock outcrop. The site mainly consists of a few deteriorated sticks, but there is no remaining nest structure (Appendix B, Photo 35). A small amount of old whitewash was observed on the rock outcrop, but there were no signs of recent ferruginous hawk activity.

<u>FH20852802</u>: A nest is located approximately 18 m north of the BLM site (UTM 13T 0335323, 4615247) on a rock outcrop. The nest is in fair to good condition with good structure, but is slightly collapsed (Appendix B, Photo 36). There were no signs of recent ferruginous hawk activity.

<u>FH20852803</u>: No nest was detected at this site, which is located on bare ground in a basin (Appendix B, Photo 37). The remnants of an historic nest are located approximately 95 m east of the BLM site (UTM 13T 0335585, 4615203) on a rock outcrop. The nest is in very poor condition and is mainly a pile of deteriorated sticks (Appendix B, Photo 38). No signs of recent ferruginous hawk activity were observed.

<u>FH20852901</u>: No nest was detected at this site. The site is located on bare ground near saltbush and next to a creek bed (Appendix B, Photo 39). A nest is located approximately 200 m north of the BLM site (UTM 13T 0335189, 4615940) on a rock outcrop. The nest is in fair condition and has potential for reuse in the future (Appendix B, Photo 40). Old whitewash is present at the site, but no other signs of recent ferruginous hawk activity.

<u>FH20860101</u>: No nest was detected at this site, which is located on rocky ground on a hilltop (Appendix B, Photo 41). There were no signs of active or historic nests within 100 m of the site, nor was there evidence of recent ferruginous hawk activity.

<u>FH20860102</u>: No nest was detected at this site, which is located on rocky ground on a hillslope (Appendix B, Photo 42). There were no signs of active or historic nests within 100 m of the site, nor was there evidence of recent ferruginous hawk activity.

FH20860201: No nest was detected at this site, which is located on a rocky hillslope (Appendix B, Photo 43). A nest is located approximately 80 m northeast of the BLM site (UTM 13T 0329868, 4622032) on a small rock outcrop. The nest is in fair to good condition and has potential for reuse in the future (Appendix B, Photo 44). There were no signs of recent ferruginous hawk activity.

FH20860202: No nest was detected at this site, which is located on rocky ground on a hillslope (Appendix B, Photo 45). There were no signs of active or historic nests within 100 m of the site, nor was there evidence of recent ferruginous hawk activity.

FH20860203: No nest was detected at this site, which is located on a rock outcrop on a hilltop (Appendix B, Photo 46). There were no signs of active or historic nests within 100 m of the site, nor was there evidence of recent ferruginous hawk activity.

FH20860901: No nest was detected at this site, which is located in a sagebrush basin (Appendix B, Photo 47). There are signs of an historic nest on a rock outcrop located approximately 45 m northeast of the BLM site; however, the site mainly consists of a few deteriorated sticks. This site was also recorded during SWCA's flights across the Project area (nest FEHA-151). There were no signs of other nests or recent ferruginous hawk activity within 100 m of the site.

FH20861501: No nest was detected at this site, which is located in a sagebrush basin (Appendix B, Photo 48). There are signs of an historic nest on a rock outcrop located approximately 110 m south of the BLM site; however, the site mainly consists of a few deteriorated sticks. This site was also recorded during SWCA's flights across the Project area (nest FEHA-150). There were no signs of other nests or recent ferruginous hawk activity within 100 m of the site.

FH20862201: No nest was detected at this site, which is located in a sagebrush basin (Appendix B, Photo 49). There were no signs of active or historic nests within 100 m of the site, nor was there evidence of recent ferruginous hawk activity.

FH20862202: No nest was detected at this site, which is located in sagebrush at the bottom of a small hillslope (no photo available). There were no signs of active or historic nests within 100 m of the site, nor was there evidence of recent ferruginous hawk activity.

FH20862301: No nest was detected at this site, which is located in sagebrush at the base of a small rock outcrop. There are signs of an historic nest on a rock outcrop located approximately 78 m northwest of the BLM site. The nest is in very poor condition and consists a pile of sticks with no cohesive structure (Appendix B, Photo 50). This site was also recorded during SWCA's flights across the Project area (nest FEHA-149). There were no signs of other nests or recent ferruginous hawk activity within 100 m of the site.

FH20862302: This site contains a large nest beside a rock outcrop. The nest is in good condition with a discernable inner bowl, and was likely used in the recent past (Appendix B, Photo 51). Newer whitewash was observed on the outcrop near the nest, but no other signs of recent ferruginous hawk activity were observed. This nest was also recorded during SWCA's flights across the project area (nest FEHA-148).

<u>FH20862303</u>: No nest was detected at this site, which is located at the bottom of a small hillslope/rock outcrop (no photo available). There were no signs of active or historic nests within 100 m of the site, nor was there evidence of recent ferruginous hawk activity.

<u>FH20881301</u>: No nest was detected at this site, which is located in sagebrush at the bottom of a hillslope (Appendix B, Photo 52). A nest is located approximately 75 m southeast of the BLM site (UTM 13T 0312604, 4620081). The nest is in good condition and built on a small rock outcrop on a hillslope and has potential for reuse in the future (Appendix B, Photo 53). Old whitewash was observed around the nest; however, no other signs of recent ferruginous hawk activity were observed.

<u>FH21853101</u>: No nest was detected at this site, which is located on a rock outcrop on a hilltop (Appendix B, Photo 54). A nest is located approximately 329 m east of the BLM site (UTM 13T 0330639, 4623027). The nest is in good condition and built along the side of a rock outcrop, and likely has been used in the recent past (Appendix B, Photo 55). Some old whitewash was observed along the rock outcrop; however, no other signs of recent ferruginous hawk activity were observed.

<u>FH21853201</u>: No nest was detected at this site, which is located on the side of a hillslope/rock outcrop. A nest is located approximately 115 m east of the BLM site (UTM 13T 0332949, 4623131). The nest is in fair condition and built along a rock outcrop and has potential for reuse in the future (Appendix B, Photo 56). This site was likely recorded during SWCA's flights across the Project area (nest GOEA-125). Some old whitewash was observed along the rock outcrop; however, no other signs of recent ferruginous hawk activity were observed.

<u>FH21853202</u>: No nest was detected at this site, which is located along the side of a rock outcrop (no photo available). There were no signs of active or historic nests within 100 m of the site, nor was there evidence of recent ferruginous hawk activity.

<u>FH21853301</u>: No nest was detected at this site, which is located on the side of a hillslope. A nest is located approximately 100 m southwest of the BLM site (UTM 13T 0333852, 4623124). The nest is in poor condition, mostly deteriorated, and built on the top of a rock outcrop (Appendix B, Photo 57). Some old whitewash was observed along the rock outcrop; however, no other signs of recent ferruginous hawk activity were observed.

<u>FH21863601</u>: No nest was detected at this site, which is located on rocky ground on a hilltop (Appendix B, Photo 58). There were no signs of active or historic nests within 100 m of the site, nor was there evidence of recent ferruginous hawk activity.

APPENDIX B

Photographs

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Photo 1. Active golden eagle nest GOEA-018. Adult and downy nestling are present.

Photo 2. Active golden eagle nest GOEA-043. One downy nestling is present.

Photo 3. Active golden eagle nest GOEA-053. One downy nestling is present.

Photo 4. Active golden eagle nest GOEA-056. One downy nestling is present and a smaller dummy nest is located just right of the active nest.

Photo 5. Active golden eagle nest GOEA-063. Adult is brooding a downy nestling.

Photo 6. Active golden eagle nest GOEA-162. One downy nestling is present.

Photo 7. Active bald eagle nest BAEA-171. One fully feathered nestling is present.

Photo 8. Inactive stick nest, classified as fair condition.

Photo 9. Inactive stick nest, classified as poor condition.

Photo 10. Inactive stick nest, classified as good condition.

Photo 11. Inactive stick nests. The upper nest is classified as fair to poor condition, the lower nest is classified as good condition.

Photo 12. Inactive stick nest, classified as good condition.

Photo 13. Inactive stick nest, classified as good condition.

Photo 14. BLM nest site FH18851701. No nest is located at this site.

Photo 15. Remnants of a nest located 22 meters northwest of FH18851701.

Photo 16. BLM nest site FH18870101. Site consists of a small amount of deteriorated sticks, but no remaining nest structure.

Photo 17. BLM nest site FH18870201. No nest is located at or near this site.

Photo 18. BLM nest site FH18870202. No nest is located at this site.

Photo 19. Nest located 64 meters north of FH18870202.

Photo 20. A nest located 15 meters east of BLM nest site FH19860301.

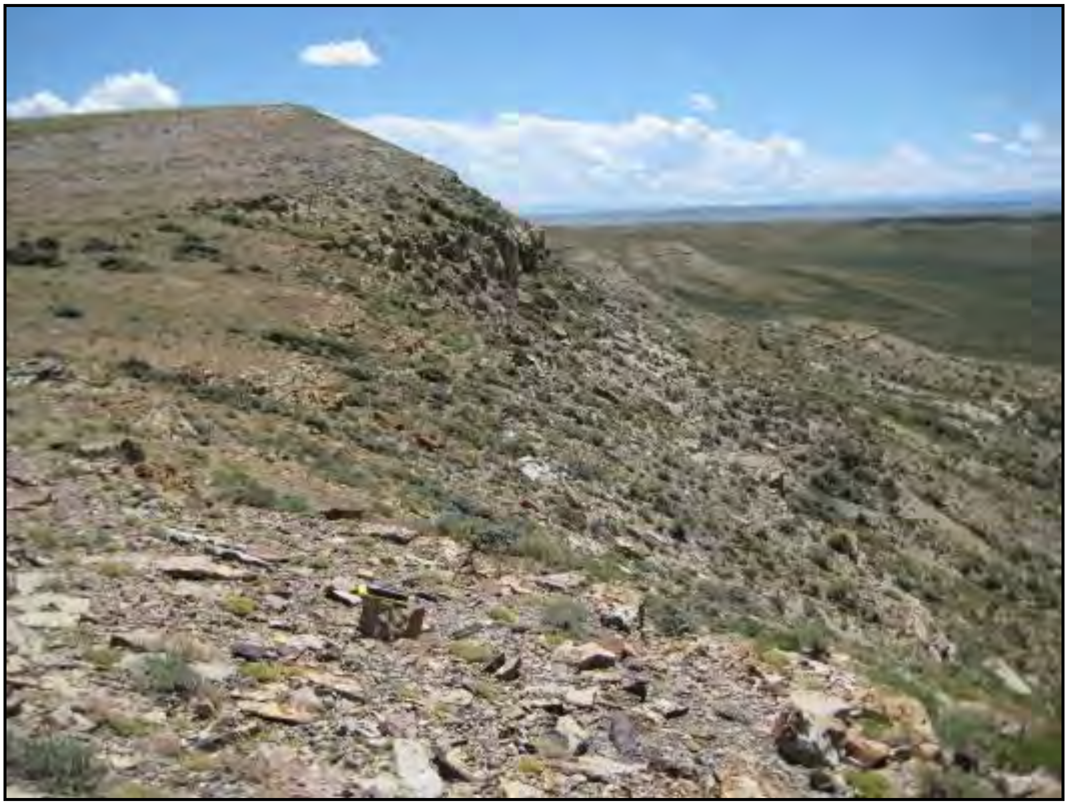

Photo 21. BLM nest site FH19860302. No nest is located at this site.

Photo 22. BLM nest site FH19862301. No nest is located at or near this site.

Photo 23. A nest located 20 meters north of BLM nest site FH19863501.

Photo 24. BLM nest site FH19863502. Site consists of a small amount of deteriorated sticks, but no remaining nest structure.

Photo 25. BLM nest site FH19870701. No nest is located at or near this site.

Photo 26. BLM nest site FH19871001. No nest is located at or near this site.

Photo 27. BLM nest site FH19871002. No nest is located at this site.

Photo 28. Nest located 84 meters northwest of FH19871002.

Photo 29. BLM nest site FH20850301. No nest is located at or near this site.

Photo 30. Nest located at BLM site FH20850302. Nest is in good condition and was likely used in the recent past.

Photo 31. Remnants of a nest located at BLM site FH20850303. Nest is in poor condition and falling off of the rock shelf on which it was built.

Photo 32. BLM nest site FH20850401. No nest is located at or near this site.

Photo 33. BLM nest site FH20850501. No nest is located at or near this site.

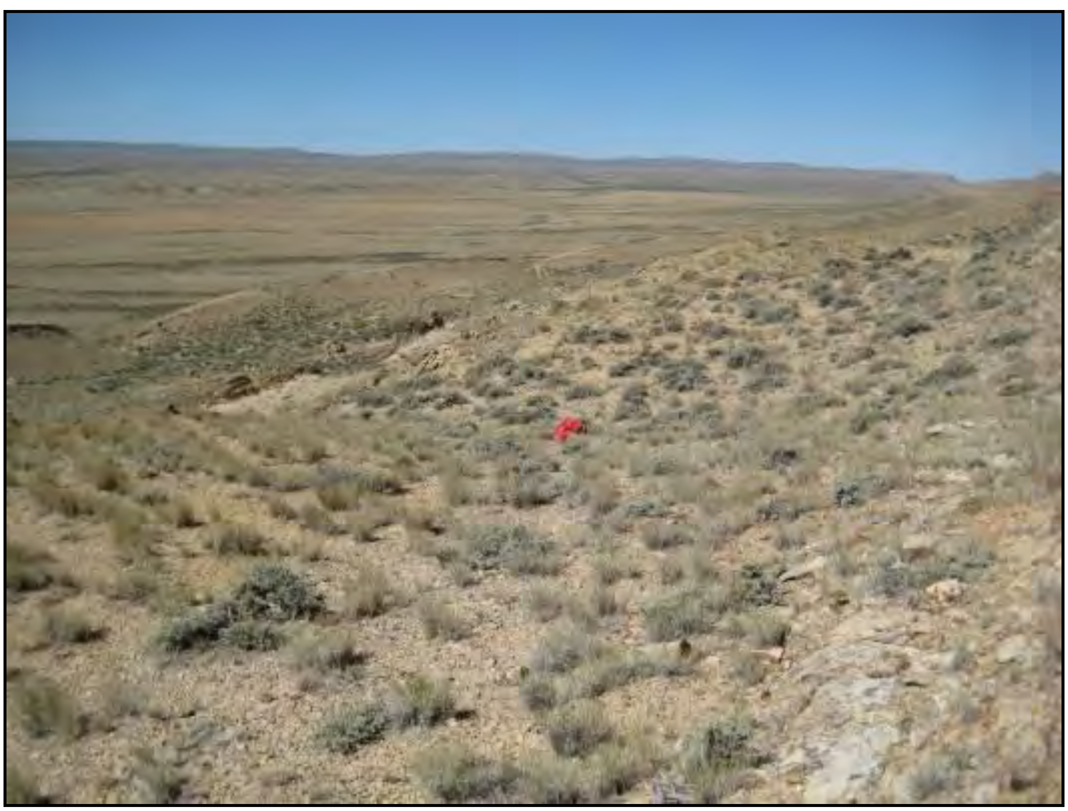

Photo 34. BLM nest site FH20850601. No nest is located at or near this site.

Photo 35. Remnants of a nest located 16 meters west of BLM site FH20852801. Site consists of some deteriorated sticks, but no remaining nest structure.

Photo 36. Nest located 18 meters north of FH20852802.

Photo 37. BLM nest site FH20852803. No nest is located at this site.

Photo 38. Remnants of a nest located 95 meters east of FH20852803.

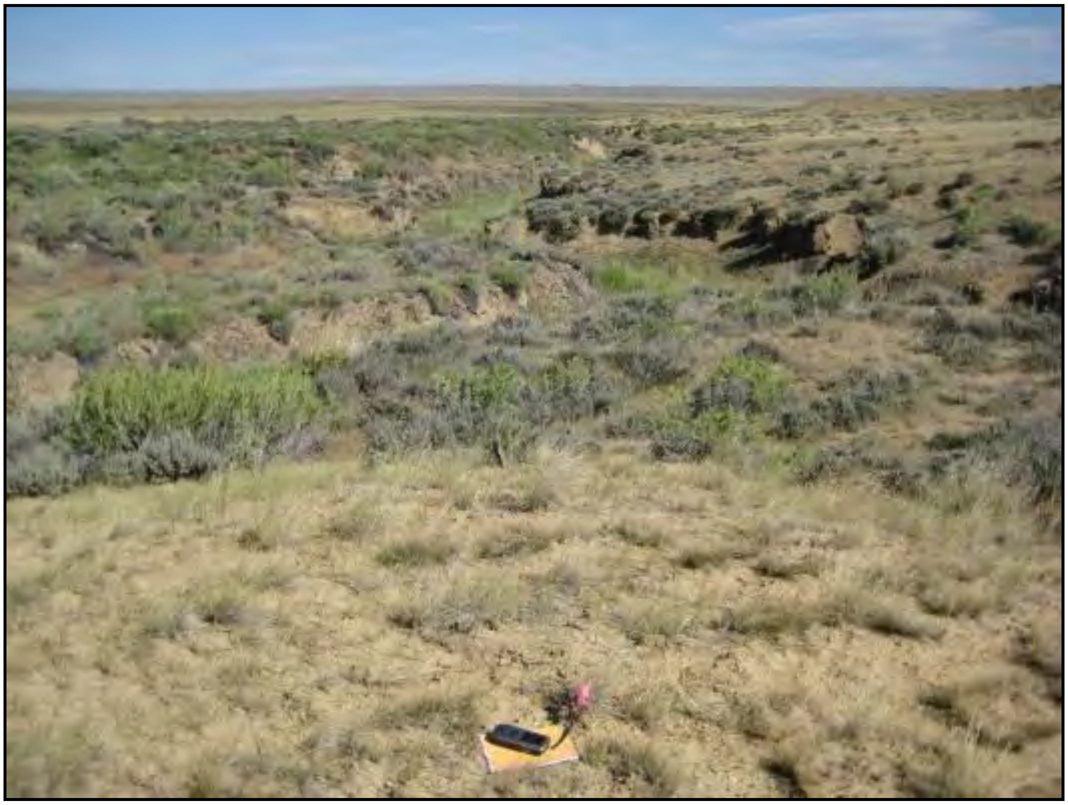

Photo 39. BLM nest site FH20852901. No nest is located at this site.

Photo 40. Nest located 200 meters north of FH20852901.

Photo 41. BLM nest site FH20860101. No nest is located at or near this site.

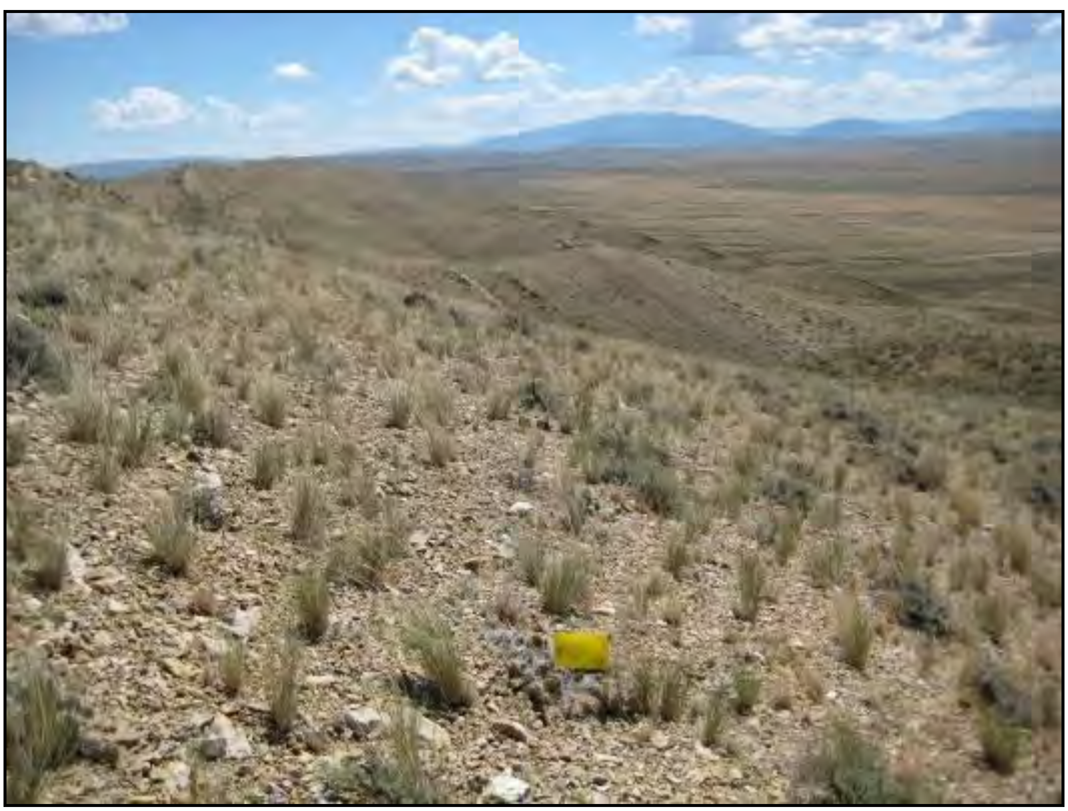

Photo 42. BLM nest site FH20860102. No nest is located at or near this site.

Photo 43. BLM nest site FH20860201. No nest was found at this site.

Photo 44. Nest located 80 meters northeast of FH20860201.

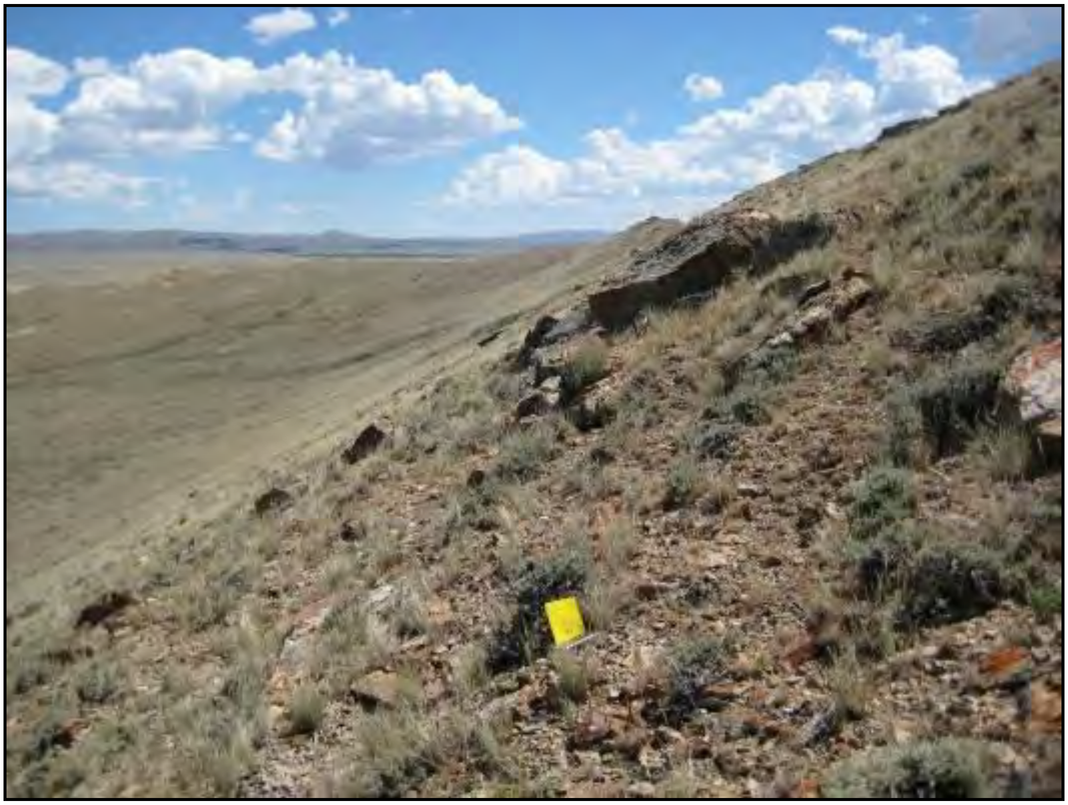

Photo 45. BLM nest site FH20860202. No nest is located at or near this site.

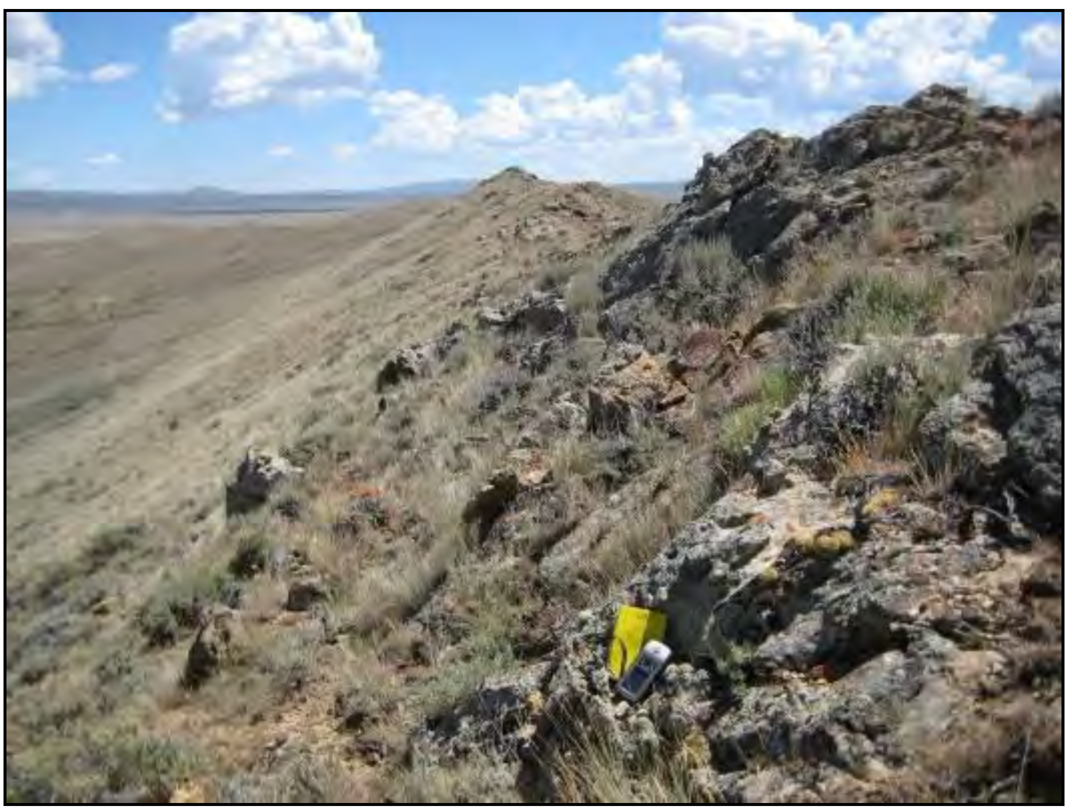

Photo 46. BLM nest site FH20860203. No nest is located at or near this site.

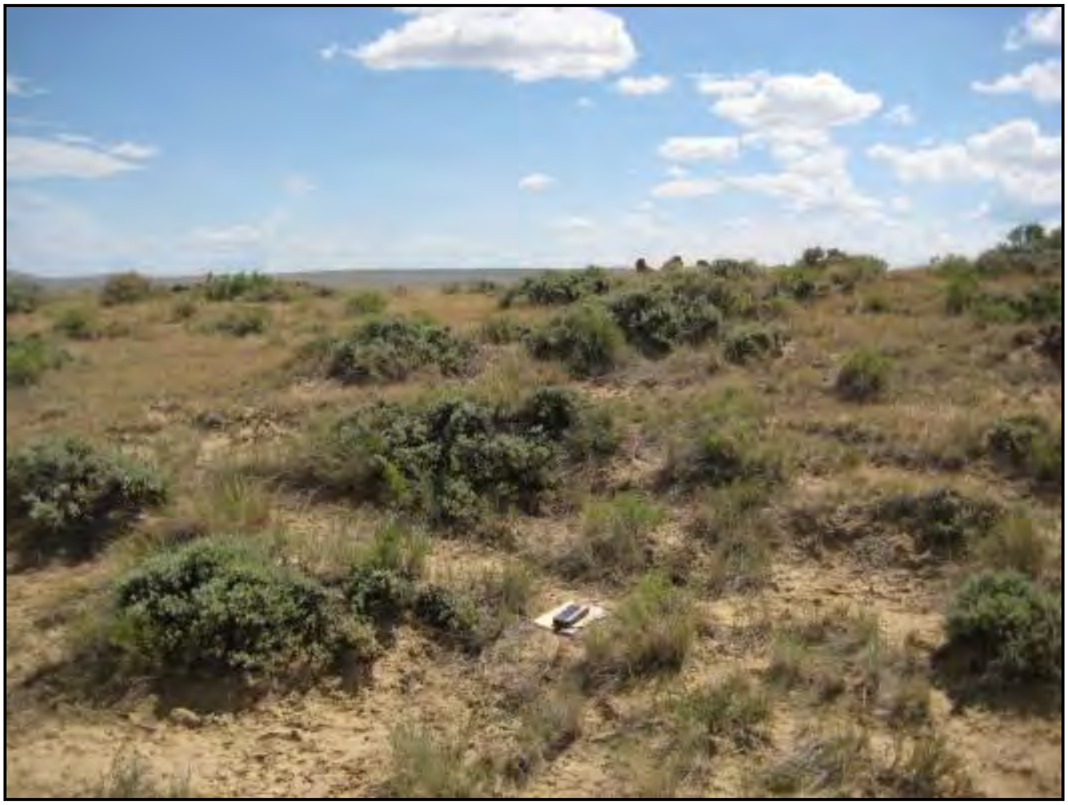

Photo 47. BLM nest site FH20860901. No nest is located at or near this site.

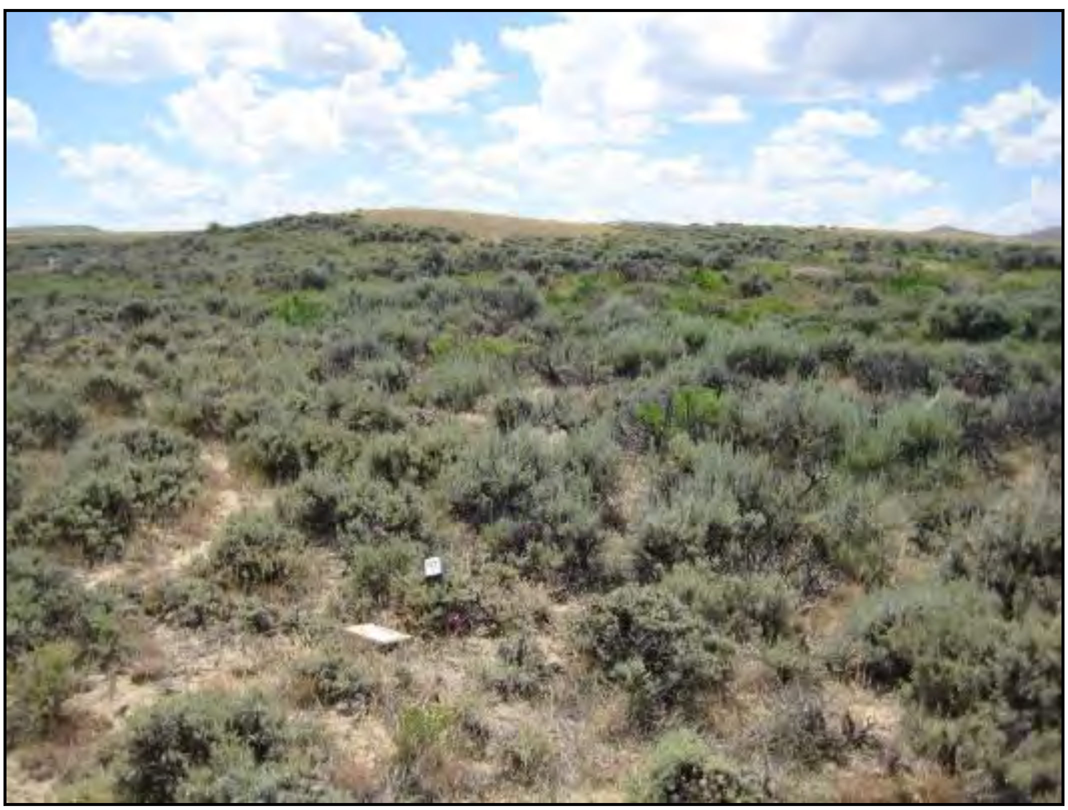

Photo 48. BLM nest site FH20861501. No nest is located at or near this site.

Photo 49. BLM nest site FH20862201. No nest is located at or near this site.

Photo 50. Remnants of a nest located 78 meters northwest of FH20862301. Photo taken during SWCA's nest flights.

Photo 51. Nest located at BLM site FH20862302.

Photo 52. BLM nest site FH20881301. No nest is located at this site.

Photo 53. Nest located 75 meters southeast of FH20881301.

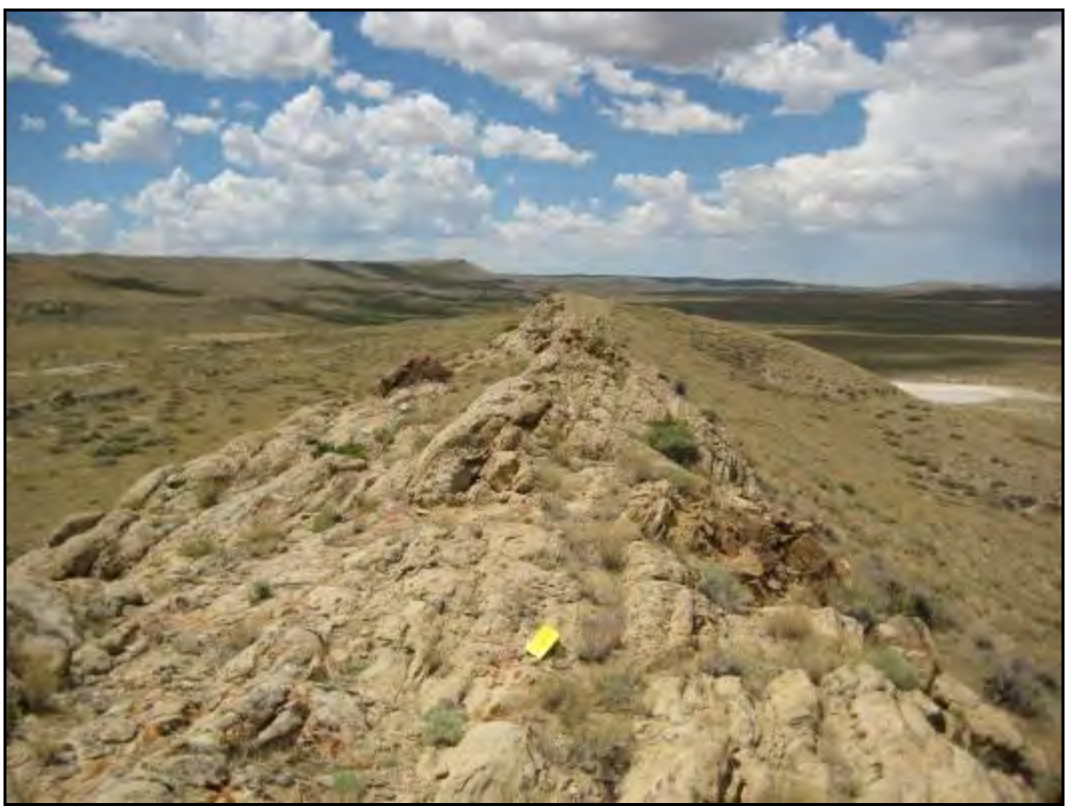

Photo 54. BLM nest site FH21853101. No nest was found at this site.

Photo 55. Nest located 329 meters east of FH21853101.

Photo 56. Nest located 115 meters east of FH21853201.

Photo 57. Remnants of a nest located 100 meters southwest of FH21853301.

Photo 58. BLM nest site FH21863601. No nest is located at or near this site.

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Summary Report for 2012 Nest Surveys
Chokecherry and Sierra Madre Wind Energy Project

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INTRODUCTION

In April and May 2012, SWCA Environmental Consultants (SWCA) conducted raptor nest surveys within the Chokecherry and Sierra Madre Wind Energy Project (Project) site and in suitable nesting habitats within a 5-mile buffer (approximately 700 square miles) surrounding the Project (Figure 1). The selection of a 5-mile turbine buffer was made through consultation with the U.S. Fish and Wildlife Service (USFWS) and the Bureau of Land Management (BLM). This buffer was agreed upon since the existing BLM raptor nest database could be used as a basis for where to search for nests, and because terrain features that had high potential for nesting raptors were well known and established. A 5-mile turbine buffer was also deemed acceptable due to the robust avian monitoring efforts already underway within the Project Site, which could also assist in identifying potential nesting raptors. Additionally, BLM regularly conducts raptor nest monitoring in areas that fall outside of the 5-mile turbine buffer.

Three types of survey methods were used to identify nests, determine nest condition and activity, and assess nesting success. Helicopter surveys were used to evaluate all known nests and all potential nesting habitats along cliff bands, on steep slopes, and along the North Platte River corridor. Ground surveys were used to identify nests not readily identified from helicopter surveys and to assess nests that were not identified or observable during the helicopter surveys. All viable ferruginous hawk (*Buteo regalis*) nests in the Project Site were visited to assess nesting status. Multiple nest monitoring visits were made to all active eagle nests and most other active raptor nests identified during helicopter and ground surveys. Nest monitoring visits were made until fledging was confirmed or until juveniles were no longer present on the nest. All nest survey and monitoring activities were conducted in accordance with the protocols submitted to and accepted by the USFWS.

AERIAL SURVEYS

During aerial nest surveys, two biologists and a pilot flew in a Bell 206B3 helicopter on April 25 and 26, and May 8, 2012. Surveys on April 25 and 26 were completed for the area surrounding the Chokecherry Wind Development Area (WDA) and the North Platte River corridor. Surveys on May 8 were completed for the area surrounding the Sierra Madre WDA and the Atlantic Rim.

Approximately 20 hours were spent flying the Project Site and associated buffer. SWCA biologists used historic nest locations provided by the BLM Rawlins Field Office (RFO) and data collected during 2011 nest surveys for guidance in surveying existing and undocumented nest locations. Aerial surveys focused on known and potential nesting habitat for golden eagle (*Aquila chrysaetos*), bald eagle (*Haliaeetus leucocephalus*), and ferruginous hawk, as well as previously documented nest locations for these species and other large *Buteos*, falcons, and accipiters. These habitat types included cliff bands, rock outcrops and promenades, steep slopes, riparian zones and river corridors, and forested areas with large trees capable of supporting large nest structures. All inactive nests that were observed during aerial surveying efforts were recorded; however, historical nest sites with no remaining nest structure were not recorded due to the low likelihood those nests will be used again.

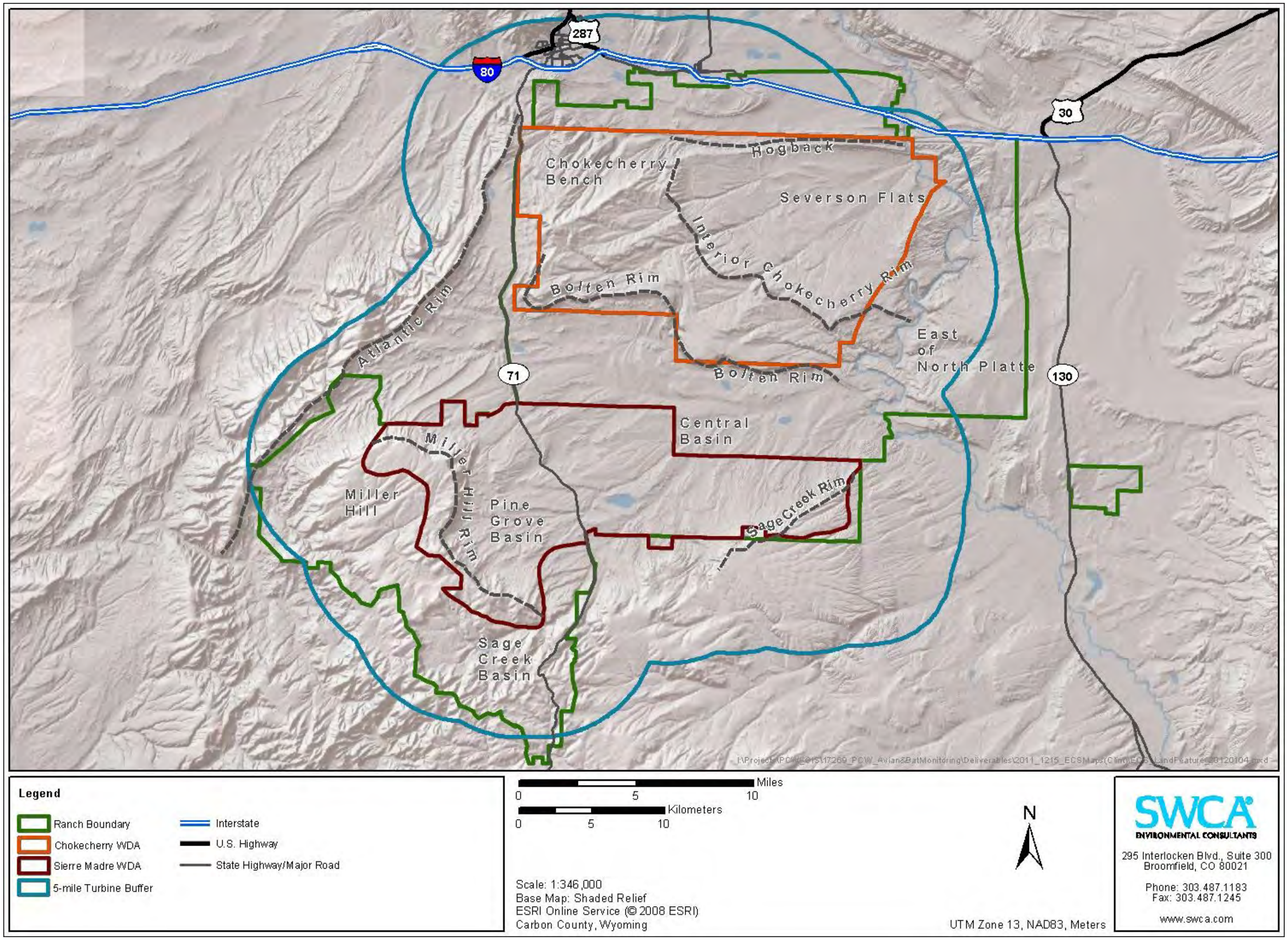

Figure 1. Project Site, 5-mile turbine buffer, and significant land features.

Data collected at each nest site included documentation of the nest substrate and location, nest condition, nest status (e.g., active or inactive, number of nestlings, etc.), global positioning system (GPS) location, and photo documentation of the nest when feasible and safe.

GROUND SURVEYS

Ground surveys were used to evaluate potential nesting habitat that could not be surveyed or readily observed during aerial flights. Ground surveys focused on treed habitats with known nesting structures that could not be observed during helicopter surveys as well as selected known *Buteo* and accipiter nests in the Project Site. Ground surveys also included visits to 12 historical ferruginous hawk nest locations on the Project Site to evaluate current nest condition and activity (Table 1). In 2011, 40 historical ferruginous hawk nests contained in the BLM's nest database and located on the Project Site were visited. During these surveys, the majority of the historical nest sites were either not located, or determined to be unviable as now only a few deteriorated sticks remain. All ground survey locations were accessed on foot or with trucks and all-terrain vehicles. Data collected during ground surveys were identical to the data recorded during aerial surveys.

Table 1. Existing Historical Ferruginous Hawk Nests on the Project Site.

Nest ID	Easting	Northing	Substrate	Condition	BLM Nest Association
FH20850302	338031	4622605	Rock outcrop	Good	N/A
FH20852802	335323	4615247	Rock outcrop	Poor	N/A
FH20862302	328919	4617385	Rock outcrop	Good	N/A
FH-N1	329868	4622032	Rock outcrop	Fair	Near BLM Nest FH20860201
FH-N2	330639	4623027	Rock outcrop	Good	Near BLM Nest FH21853101
FH-N3	312604	4620081	Rock outcrop	Good	Near BLM Nest FH20881301
FH-N4	318857	4612023	Rock outcrop	Poor	Near BLM Nest FH19871002
FH-N18	335189	4615940	Rock outcrop	Fair	Near BLM Nest FH20852901
FH-N21	327708	4612200	Rock outcrop	Good	Near BLM Nest FH19860301
FH-N22	329290	4604725	Hilltop	Fair	Near BLM Nest FH19863501
FH-N23	320037	4603851	Hill slope	Fair	Near BLM Nest FH18870202
FH-N24	332949	4623131	Rock outcrop	Fair	Near BLM Nest FH21853201

RESULTS

In total, 34 active raptor nests were located within the Project Site and associated 5-mile buffer (Figures 2 and 3). The species composition of the active raptor nests was as follows: 10 red-tailed hawk (*Buteo jamaicensis*), nine prairie falcon (*Falco mexicanus*), seven golden eagle, six bald eagle, and two American kestrel (*Falco sparverius*). An additional five active non-raptor nests were located during the flights and included two common raven (*Corvus corax*), one Canada goose (*Branta canadensis*), one great blue heron (*Ardea herodias*), and one great horned owl (*Bubo virginianus*). No ferruginous hawks were found nesting in any of the 12 potential nest locations surveyed in 2012; however, two of the active golden eagle nests (both along the Hogback) were at nest sites previously identified through the 2011 ferruginous hawk nest surveys.

Only the two active golden eagle nests along the Hogback (both likely used by the same pair of eagles after the first nest failed) were located near or within the Chokecherry WDA. These nests are located on the northern boundary of the WDA (one inside and one outside the WDA) and outside the area of likely turbine development. Four active golden eagle nests and four active bald eagle nests were located along the North Platte River corridor outside of the WDAs. One active bald eagle nest was located along the North Platte River within the Chokecherry WDA but within the 1-mile turbine exclusion setback from the North Platte River established for the Project to protect nesting raptors and other wildlife. The nest is well outside the area of likely turbine development and therefore risk from Project development is minimal. The higher observance of active bald eagle nests along the North Platte River may be due to conducting aerial surveys earlier in the year in 2012 as compared to 2011, before trees had fully leafed out.

With respect to the Sierra Madre WDA, no active eagle nests were located within the WDA. One active golden eagle nest was located approximately 1.5 miles south of the southern boundary of the WDA in the area of Sage Creek Rim; however, during a May 29 nest monitoring visit, it was discovered that this nest had been blown off of the cliff. One active bald eagle nest was located approximately 0.6 mile south of the WDA in a snag west of the base of Sage Creek Rim (the same location as observed in 2011).

Follow-up ground surveys were completed to document nest activity and fledging success for all eagle nests and many other raptor nests in the Project Site between May 24 and July 27. By July 27, all seven golden eagle and six bald eagle nests were confirmed as fledged or inactive, and 15 other *Buteo* and falcon nests were confirmed as fledged or inactive (Table 2). The remaining nests were not included in the follow-up surveys due to being located on private land, or being located in cavities and tight crevasses along cliff bands where they could not be observed from the ground.

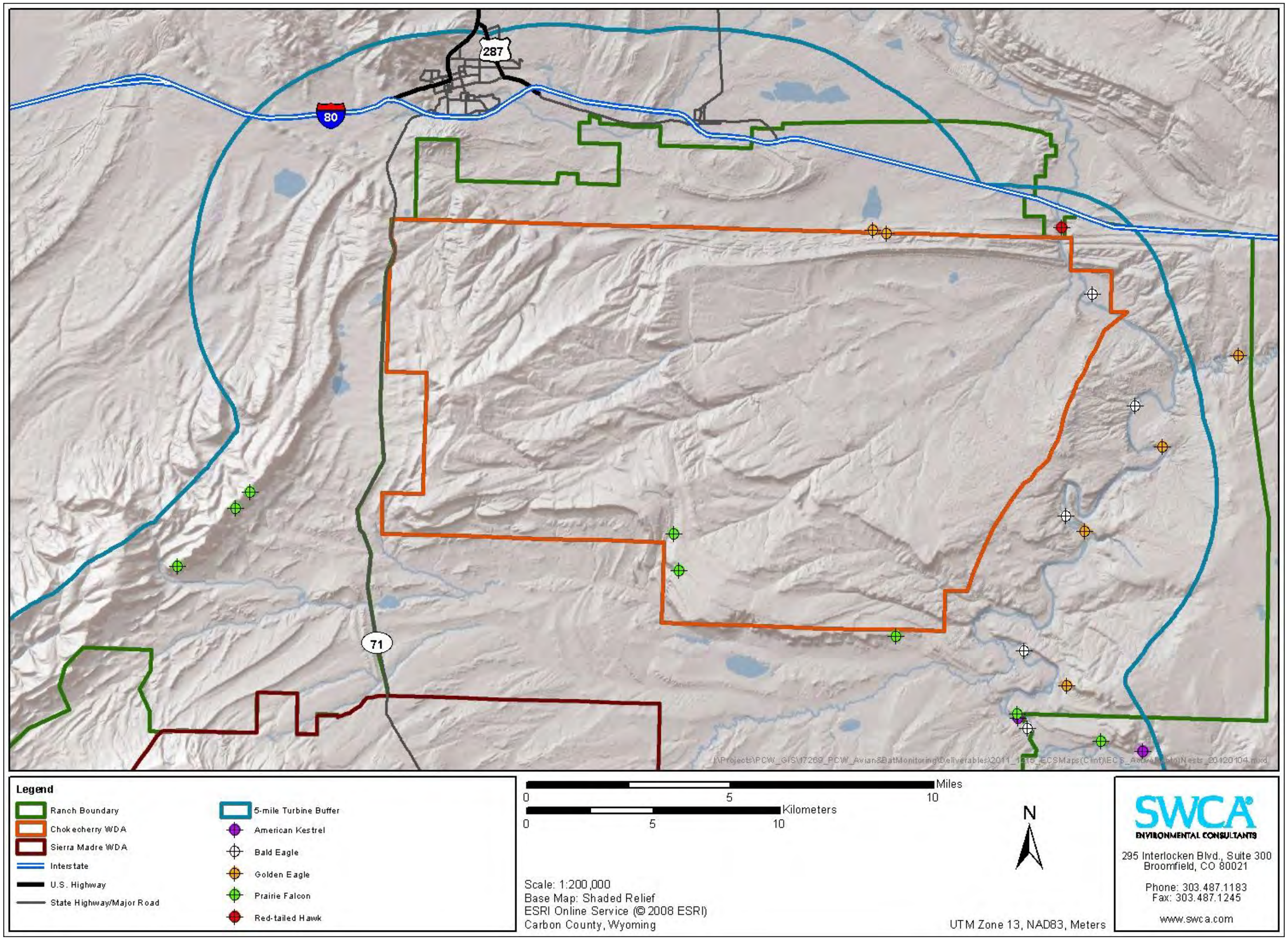

Figure 2. All active nests located in the vicinity of the Chokecherry WDA.

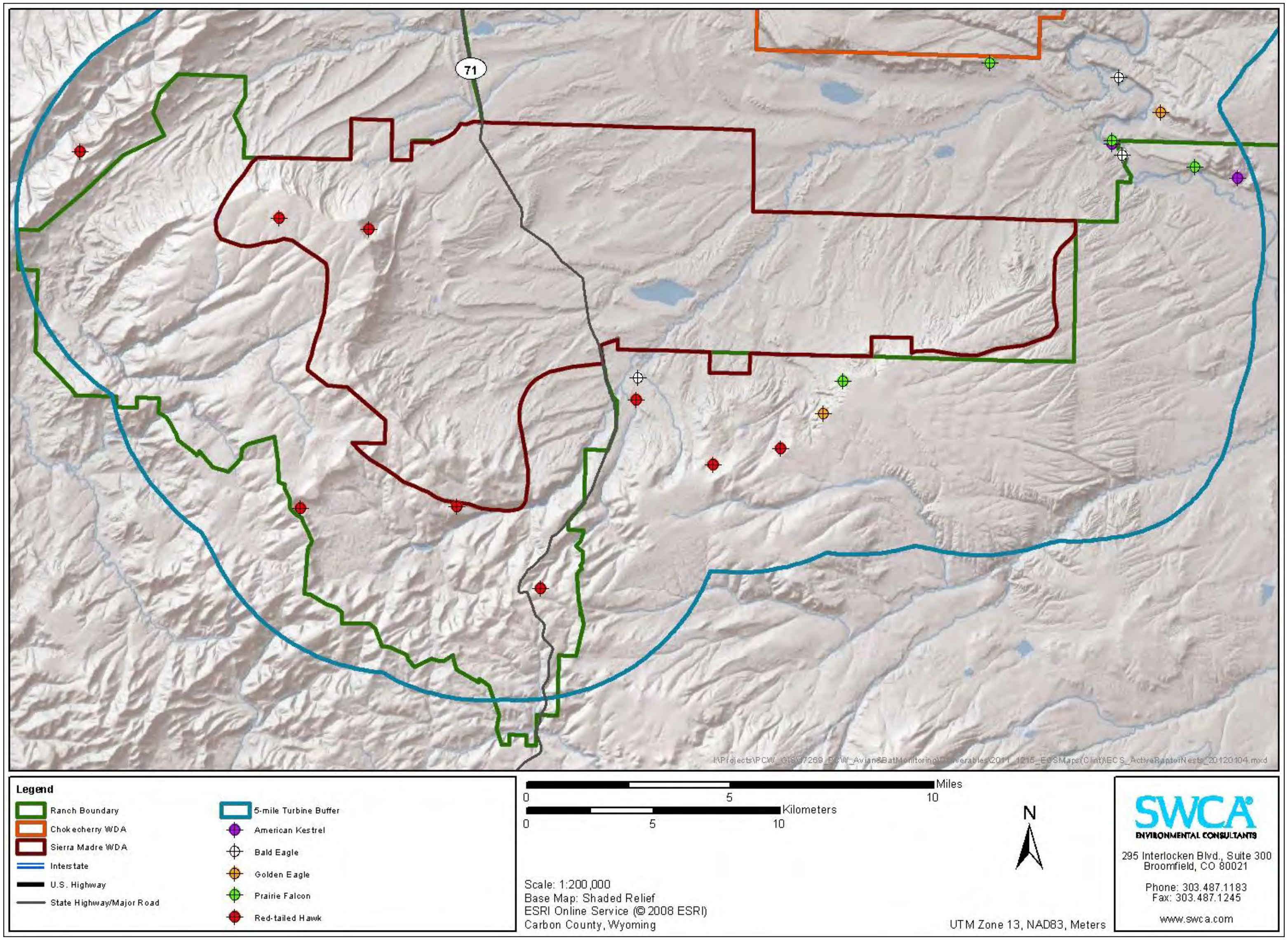

Figure 3. All active nests located in the vicinity of the Sierra Madre WDA.

Table 2. Nest Checks for All Active Bald and Golden Eagle Nests and Most Other Raptor Nests within the Project Site and Associated Buffer.

Species	Substrate	Easting	Northing	1st Check	2nd Check	3rd Check	4th Check
American Kestrel	Cliff cavity	341388	4602365	6/1: adult flushed from eyrie	6/22: likely fledged	N/A	N/A
American Kestrel	Cottonwood cavity	336444	4603689	5/24: incubating	6/26: 1 fledgling	N/A	N/A
Bald Eagle	Cottonwood	336820	4603277	4/25: 1 nestling	5/31: active; unknown number of nestlings	6/26: active; unknown number of nestlings	7/27: unknown
Bald Eagle	Cottonwood	336682	4606344	4/25: incubating	5/25: active; adult flushed from nest tree	6/22: active; 2 adults observed	7/23: fledged
Bald Eagle	Cottonwood	338325	4611699	4/25: 2 adults perched on nest	5/30: failed	N/A	N/A
Bald Eagle	Cottonwood	341067	4616070	4/25: incubating	6/1: active; unknown number of nestlings	6/30: failed	N/A
Bald Eagle	Cottonwood	339381	4620512	4/25: incubating	6/19: failed	N/A	N/A
Bald Eagle	Snag	317657	4594433	4/25: 2 adults perched on nest	5/30: 1 nestling	6/18: 1 nestling	7/23: fledged
Golden Eagle	Cliff	338361	4604961	4/25: incubating	5/25: unknown	6/22: unknown; likely inactive	7/23: failed
Golden Eagle	Cliff	339071	4611096	4/25: incubating	5/30: unknown	6/21: 1 nestling	7/23: fledged
Golden Eagle	Cliff	342167	4614447	4/25: incubating	5/30: failed	N/A	N/A
Golden Eagle	Rock outcrop	330685	4623050	4/25: incubating	6/19: failed	N/A	N/A
Golden Eagle	Cliff	345176	4618079	4/26: incubating	6/1: 2 nestlings	6/19: 2 nestlings	7/23: likely fledged
Golden Eagle	Cliff	324997	4593017	5/9: incubating	5/29: failed; nest blown off cliff	N/A	N/A

Species	Substrate	Easting	Northing	1st Check	2nd Check	3rd Check	4th Check
Golden Eagle	Rock outcrop	331228	4622914	6/27: failed	N/A	N/A	N/A
Prairie Falcon	Cliff cavity	322793	4611002	4/26: adult flushed from eyrie	5/31: unknown	6/30: 1 fledgling	N/A
Prairie Falcon	Cliff	323018	4609521	4/26: incubating	5/31: unknown	6:30: unknown; likely inactive	N/A
Prairie Falcon	Cliff	325753	4594280	5/8: 2 adults flushed from nest	5/29: active; adult perched near nest	6/20: active; 2 adults flushed	7/25: likely fledged
Prairie Falcon	Cliff	336428	4603842	5/25: adult flushed from nest	6/26: unknown; likely fledged	N/A	N/A
Red-tailed Hawk	Aspen	313788	4586085	5/8: incubating	5/31: active; adult observed	6/23: 2 nestlings	7/25: fledged
Red-tailed Hawk	Snag	304269	4589261	5/8: incubating	5/31: 1 nestling	6/23: 2 nestlings	7/24: fledged
Red-tailed Hawk	Aspen	320629	4590980	5/8: 2 adults flushed from area	5/29: unknown; 2 adults observed	6/20: unknown	7/25: unknown; 2 adults observed
Red-tailed Hawk	Aspen	323291	4591635	5/8: adult perched on nest	5/29: 2 nestlings	6/20: 3 nestlings	7/25: fledged
Red-tailed Hawk	Snag	306965	4600335	5/22: adult perched on nest	6/18: unknown; likely inactive	N/A	N/A
Red-tailed Hawk	Cottonwood	338160	4623133	6/1: incubating	6/19: 2 nestlings	7/23: likely fledged	N/A
Red-tailed Hawk	Snag	303433	4600759	6/29: 1 nestling	7/27: fledged	N/A	N/A
Red-tailed Hawk	Aspen	310451	4589317	6/23: 1 nestling	7/26: fledged	N/A	N/A
Red-tailed Hawk	Cottonwood	317580	4593539	5/8: adult perched in nest tree	5/30: unknown	6/18: 1 nestling	7/23: 1 nestling

SUMMARY

In addition to the 34 active raptor nests, 158 inactive nests were also located and documented during the nest flights and other nest searching activities. These nests were located across the Project Site and associated buffer; however, the vast majority were located around the perimeter of the Chokecherry WDA, the North Platte River corridor, and along the Atlantic Rim. While all nests observed during the nest flights were documented, it is possible that nests of certain species (e.g., American kestrel, prairie falcon, common raven, etc.) were not located due to the nature of aerial surveys, and because of the way their nests are structured (i.e., oftentimes built in cavities or tight crevasses along cliff bands). All of the inactive nests marked were large in size and were considered potential raptor nests; however, as these nests were inactive, it is not possible to know exactly what species built and/or used the nest.

The 2012 Year Three survey showed two active golden eagle nests located on the boundaries of the Chokecherry WDA (likely the same pair), but well outside the area of likely turbine development, and none were located within the Sierra Madre WDA. Five active golden eagle nests were located outside the Project Site but within the 5-mile buffer. There was one active bald eagle nest within the Chokecherry WDA but well outside the likely turbine development area. No other active bald eagle nests were within the Project Site. Five active bald eagle nests were outside the boundaries of the Project Site within the 5-mile buffer. Two active red-tailed hawk nests were located within the Sierra Madre WDA near the western boundary, while most others were located south of the Sierra Madre WDA and along the Atlantic Rim. Two prairie falcon nests were located along the Bolten Rim within the Chokecherry WDA, while most others were located along the North Platte River, the Sage Creek Rim, and Atlantic Rim. Multiple follow-up ground surveys were completed to document nest activity and fledging success for all eagle nests and many other raptor nests within the Project site between May 24 and July 27, 2012, and the results of those surveys are summarized in Table 2.

Summary Report for 2013 Nest Surveys
Chokecherry and Sierra Madre Wind Energy Project

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August 2013

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INTRODUCTION

In April 2013, SWCA Environmental Consultants (SWCA) conducted raptor nest surveys within the Chokecherry and Sierra Madre Wind Energy Project (Project) site and in suitable nesting habitats within a 5-mile buffer (approximately 700 square miles) surrounding the Project (Figure 1). The selection of a 5-mile turbine buffer was made through consultation with the U.S. Fish and Wildlife Service and the Bureau of Land Management (BLM). This buffer was agreed upon since the existing BLM raptor nest database could be used as a basis for where to search for nests, and because terrain features that had high potential for nesting raptors were well known and established. A 5-mile turbine buffer was also deemed acceptable due to the robust avian monitoring efforts already underway within the Project site, which could also assist in identifying potential nesting raptors. Additionally, the BLM regularly conducts raptor nest monitoring in areas that fall outside of the 5-mile turbine buffer.

Two types of survey methods were used to identify nests, determine nest condition and activity, and assess nesting success. Helicopter surveys were used to evaluate all known nests and all potential nesting habitats along cliff bands, on steep slopes, and along the North Platte River corridor. Ground surveys were used to identify nests not readily identified from helicopter surveys and to assess nests that were not identified or observable during the helicopter surveys. All viable ferruginous hawk (*Buteo regalis*) nests in the Project site were visited to assess nesting status. Multiple nest monitoring visits were made to all active eagle nests and most other active raptor nests identified during helicopter and ground surveys. Nest monitoring visits were made until fledging was confirmed or until juveniles were no longer present on the nest. All nest survey and monitoring activities were conducted in accordance with the protocols submitted to and accepted by the U.S. Fish and Wildlife Service.

AERIAL SURVEYS

During aerial nest surveys, two biologists and a pilot flew in a Bell 206B3 helicopter on April 24 and 25, 2013. Surveys on April 24 were completed for the area surrounding the North Platte River corridor and the Sierra Madre Wind Development Area (WDA). Surveys on April 25 were completed for the Chokecherry WDA and the area surrounding the Atlantic Rim.

Approximately 20 hours were spent flying the Project site and associated buffer. SWCA biologists used historic nest locations provided by the BLM Rawlins Field Office and data collected during 2011 and 2012 nest surveys for guidance in surveying existing and undocumented nest locations. Aerial surveys focused on known and potential nesting habitat for golden eagle (*Aquila chrysaetos*), bald eagle (*Haliaeetus leucocephalus*), and ferruginous hawk, as well as previously documented nest locations for these species and other large *Buteos*, falcons, and accipiters. These habitat types included cliff bands, rock outcrops and promenades, steep slopes, riparian zones and river corridors, and forested areas with large trees capable of supporting large nest structures. All inactive nests that were observed during aerial surveying efforts were recorded; however, historical nest sites with no remaining nest structure were not recorded due to the low likelihood those nests will be used again.

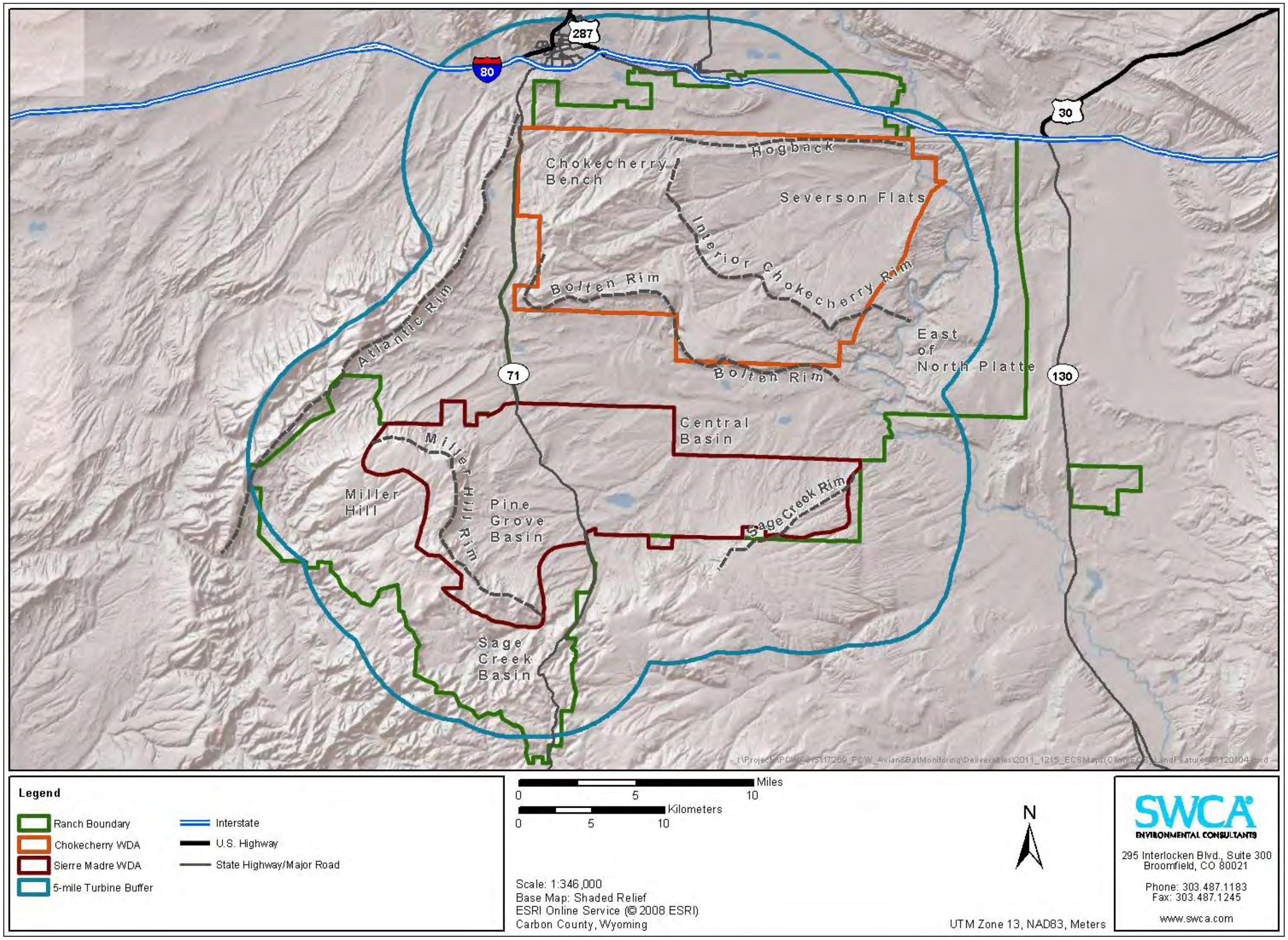

Figure 1. Project site, 5-mile turbine buffer, and significant land features.

Data collected at each nest site included documentation of the nest substrate and location, nest condition, nest status (e.g., active or inactive, number of nestlings, etc.), global positioning system (GPS) location, and photo documentation of the nest when feasible and safe.

GROUND SURVEYS

Ground surveys were used to evaluate potential nesting habitat that could not be surveyed or readily observed during aerial flights. Ground surveys focused on treed habitats with known nesting structures that could not be observed during helicopter surveys as well as selected known *Buteo* and accipiter nests in the Project site. Ground surveys also included visits to 12 historical ferruginous hawk nest locations on the Project site to evaluate current nest condition and activity (Table 1). In 2011, 40 historical ferruginous hawk nests contained in the BLM's nest database and located on the Project site were visited. During the 2013 surveys, the majority of the historical nest sites were either not located, or determined to be unviable as only a few deteriorated sticks remain. All ground survey locations were accessed on foot or with trucks and all-terrain vehicles. Data collected during ground surveys were identical to the data recorded during aerial surveys.

Table 1. Existing Historical Ferruginous Hawk Nests on the Project Site.

Nest ID	Easting	Northing	Substrate	Condition	BLM Nest Association
59	332949	4623131	Rock outcrop	Fair	Near BLM Nest FH21853201
211	338031	4622605	Rock outcrop	Fair	FH20850302
212	335323	4615247	Rock outcrop	Fair	FH20852802
234	328919	4617385	Rock outcrop	Fair	FH20862302
238	327708	4612200	Rock outcrop	Good	Near BLM Nest FH19860301
239	329290	4604725	Hilltop	Fair	Near BLM Nest FH19863501
241	309124	4608503	Hill slope	Fair	FH19882201
257	329868	4622032	Rock outcrop	Fair	Near BLM Nest FH20860201
258	312604	4620081	Rock outcrop	Good	Near BLM Nest FH20881301
259	318857	4612023	Rock outcrop	Poor	Near BLM Nest FH19871002
260	335189	4615940	Rock outcrop	Fair	Near BLM Nest FH20852901
263	320037	4603851	Hill slope	Fair	Near BLM Nest FH18870202

RESULTS

In total, 25 active raptor nests were located within the Project site and associated 5-mile buffer (Figures 2 and 3). The species composition of the active raptor nests was as follows: 7 bald eagle, 7 golden eagle, 6 red-tailed hawk (*Buteo jamaicensis*), 4 prairie falcon (*Falco mexicanus*), and 1 American kestrel (*Falco sparverius*). One additional occupied golden eagle nesting territory was identified in the Central Basin during other Project survey efforts, but no nest initiation was detected during multiple visits to the site. Seven active non-raptor nests were also located during the flights and included 4 common raven (*Corvus corax*) and 3 great horned owl (*Bubo virginianus*). No evidence of ferruginous hawk nesting or nest maintenance was found at any of the 12 nest locations surveyed in 2013 (Table 1).

Only 1 active golden eagle nest located on Kindt Point was identified within the Chokecherry WDA. This nest was located just within the southern boundary of the WDA and falls within the Turbine No-Build area that encompasses the entirety of the Bolten Rim and Interior Chokecherry Rim. This nest also falls more than 5 miles outside the boundaries of the Phase I development area for the Chokecherry WDA. Four active golden eagle nests and 5 active bald eagle nests were located along the North Platte River corridor outside of the WDAs. These nests are all 10 to 15 miles outside the boundaries of the Phase I development area for the Chokecherry WDA. One active bald eagle nest was located along the North Platte River within the Chokecherry WDA but within the 1-mile turbine exclusion setback from the North Platte River established for the Project to protect nesting raptors and other wildlife. The nest is well outside the area of likely turbine development and therefore risk from Project development is minimal.

With respect to the Sierra Madre WDA, no active eagle nests were located within the WDA. One active golden eagle nest was located approximately 0.50 mile south of the southern boundary of the WDA in the area of Sage Creek Rim, and another was located approximately 5.75 miles south of the southern boundary of the WDA, just inside the boundary of the survey buffer. These nests are both more than 5 miles outside the boundaries of the Phase I development area for the Sierra Madre WDA One active bald eagle nest was located approximately 0.6 mile south of the WDA in a snag at the base of Sage Creek Rim (the same location as observed in 2011 and 2012). This nest is approximately 1.5 miles outside the boundaries of the Phase I development area for the Sierra Madre WDA, and is located immediately south of a Turbine No-Build Area surrounding Rasmussen Reservoir that was created to protect foraging and use areas associated with this nest.

One additional occupied golden eagle nesting territory was identified in the Central Basin between the Chokecherry and Sierra Madre WDAs, approximately 0.75 mile west of Sage Creek Reservoir. This nest location is approximately 9 miles southeast of the Phase I development area for the Chokecherry WDA and 9 miles east of the Phase I development area for the Sierra Madre WDS. Individuals were observed perching and copulating on this nest; however, no signs of nest initiation were detected during multiple visits to the site. This nest falls within the Turbine No-Build area that encompasses much of the Central Basin between the Chokecherry and Sierra Madre WDAs.

Follow-up ground surveys were completed to document nest activity and fledging success for all eagle nests and many other raptor nests in the Project site between May 21 and July 26. Of the 7 golden active eagle nests documented during 2013 nest surveys, 5 were determined to have failed by the end of June, and only one was determined to have fledged by the end of July. One was unable to be visited due to private land access issues. With regards to the 7 active bald eagle nests, 2 were confirmed as failed by the end of June, 2 were determined to have fledged and an additional 2 were about to fledge by the end of July. The status of one bald eagle nest was unable to be determined due to dense foliage surrounding the nest. Of the 6 active red-tailed hawk nests, 2 were confirmed to have fledged and 1 was confirmed to have failed by the end of June, and 2 were unable to be determined whether they had fledged or failed due to the timing of nest visits (Table 2). One red-tailed hawk nest was unable to be visited due to private land access issues. The remaining nests were not included in the follow-up surveys due to being located on private land, or being located in cavities and tight crevasses along cliff bands where they could not be observed from the ground.

In addition to the 25 active raptor nests, 196 inactive and historic nests were surveyed and assessed during the nest flights and other nest searching activities. These nests were located across the Project site and associated buffer; however, the vast majority were located around the perimeter of the Chokecherry WDA, the North Platte River corridor, and along the Atlantic Rim. While all nests observed during the nest flights were documented, it is possible that nests of certain species (e.g., American kestrel, prairie falcon, common raven, etc.) were not located due to the nature of aerial surveys, and because of the way their nests are structured (i.e., oftentimes built in cavities or tight crevasses along cliff bands). All of the inactive nests marked were large in size and were considered potential raptor nests; however, as these nests were inactive, it is not possible to know exactly what species built and/or used the nest.

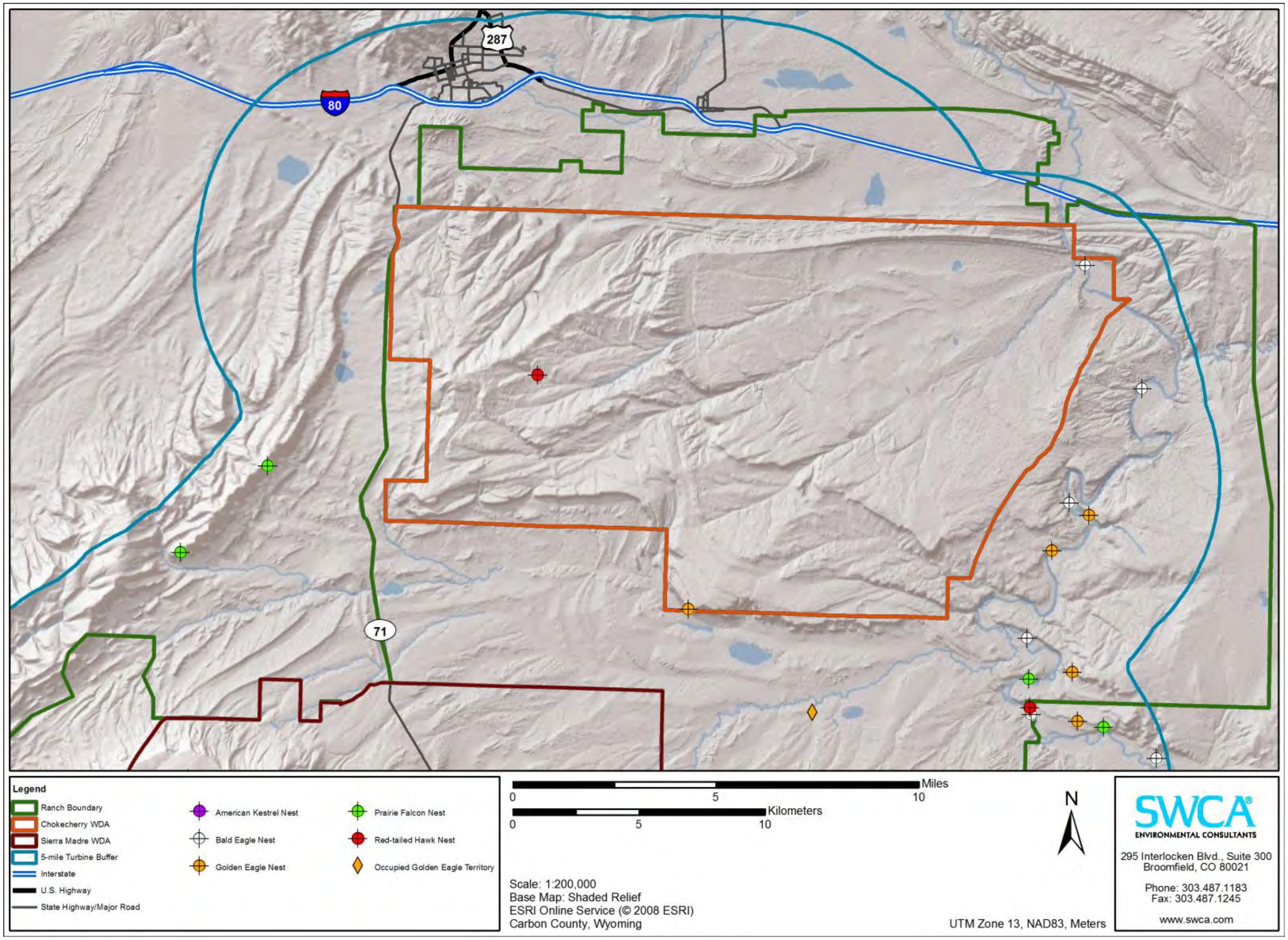

Figure 2. All active nests located in the vicinity of the Chokecherry WDA.

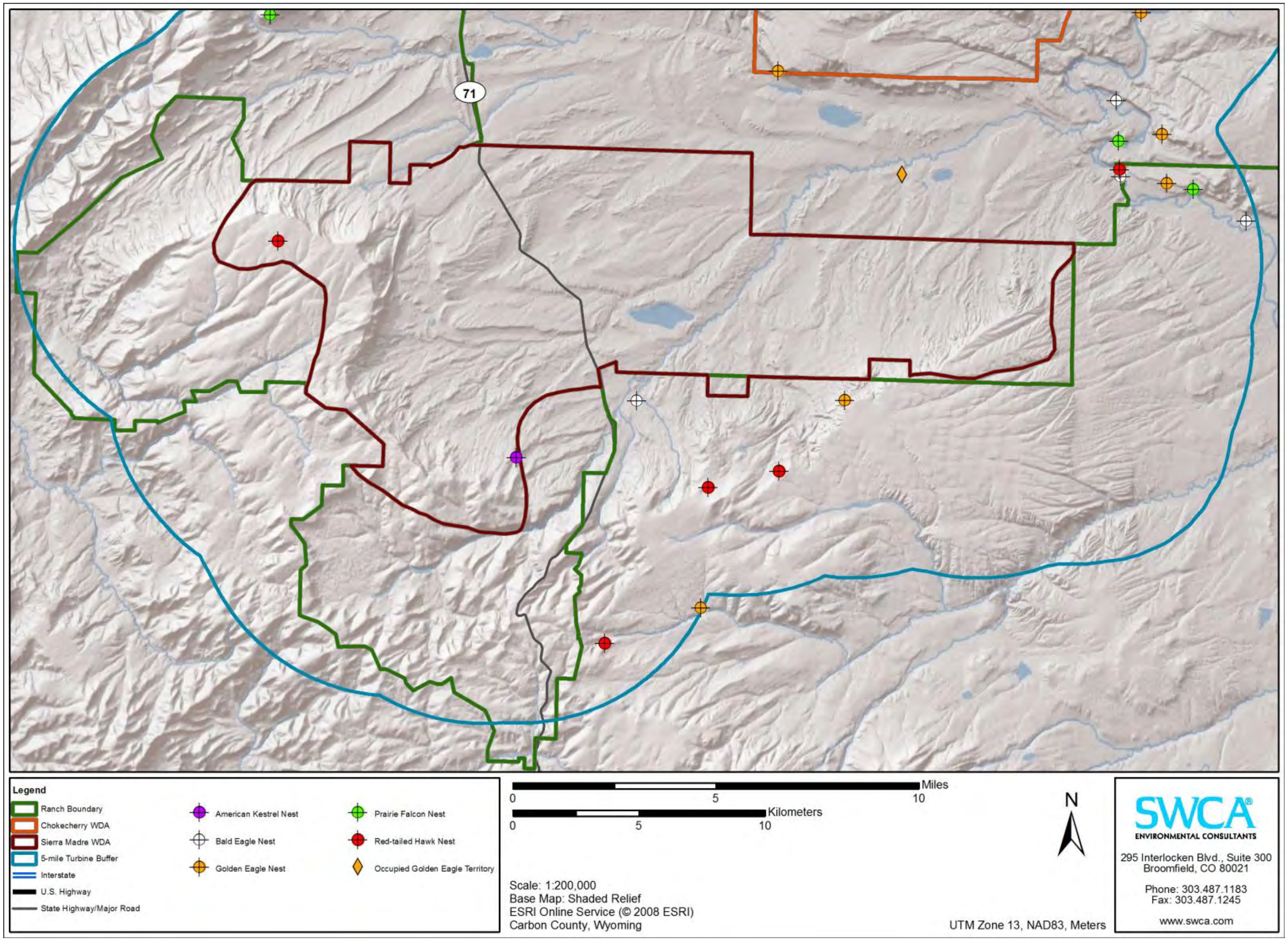

Figure 3. All active nests located in the vicinity of the Sierra Madre WDA.

Table 2. Nest Checks for All Active Bald and Golden Eagle Nests and Most Other Raptor Nests within the Project Site and Associated Buffer.

Species	Substrate	Easting	Northing	1st Check	2nd Check	3rd Check	4th Check
Bald eagle	Cottonwood	341820	4601564	4/24: 2 adults perched on nest	5/30: unable to check due to cattle in area (private land)	7/10: failed	N/A
Bald eagle	Cottonwood	336852	4603315	4/24: incubating	5/30: active; unknown number of nestlings	6/28: 1 nestling	7/24: fledged
Bald eagle	Cottonwood	336682	4606344	4/24: incubating	5/30: active; unknown number of nestlings	6/28: failed	N/A
Bald eagle	Cottonwood	338352	4611712	4/24: incubating	5/22: 1 nestling	6/27: 1 nestling	7/25: about to fledge
Bald eagle	Cottonwood	341240	4616259	4/24: 2 adults perched on nest	5/23: active; unknown number of nestlings	6/27: 1 nestling	7/25: fledged
Bald eagle	Cottonwood	338988	4621149	4/24: 2 adults perched on nest	5/23: active; unknown number of nestlings	6/26: active; unknown number of nestlings	7/23: unknown
Bald eagle	Snag	317657	4594433	4/24: incubating	6/4: active; unknown number of nestlings	7/1: 1 nestling	7/23: about to fledge
Golden eagle	Cliff	338676	4603051	4/25: incubating	5/30: unknown; likely inactive	6/28: failed	N/A
Golden eagle	Cliff	338483	4605000	4/25: incubating	5/30: unknown; likely inactive	6/29: failed	N/A
Golden eagle	Cliff	337660	4609823	4/25: incubating	5/21: active; unknown number of nestlings	6/27: failed	N/A
Golden eagle	Cliff	339131	4611220	4/25: incubating	5/22: unknown	6/27: failed	N/A

Species	Substrate	Easting	Northing	1st Check	2nd Check	3rd Check	4th Check
Golden eagle	Cliff	323263	4607504	4/25: incubating	5/29: active; unknown number of nestlings	6/29: 1 nestling	7/24: fledged
Golden eagle	Cliff	325909	4594456	4/24: incubating	5/29: unknown	7/2: failed	N/A
Golden eagle	Conifer	320199	4586224	4/24: incubating	N/A: private land, unable to check status	N/A	N/A
Golden eagle	Cliff	328174	4603404	3/15: adults observed copulating on nest	5/2: no activity	5/16: no activity	N/A
Red-tailed hawk	Cottonwood	336791	4603594	4/24: incubating	5/30: active; unknown number of nestlings	N/A	N/A
Red-tailed hawk	Cottonwood snag	317278	4616802	5/15: incubating	5/31: incubating	7/3: failed	N/A
Red-tailed hawk	Aspen	323291	4591635	4/24: incubating	5/29: likely active	6/26: unknown	N/A
Red-tailed hawk	Conifer snag	303433	4600759	4/24: incubating	5/28: active; unknown number of nestlings	6/27: likely fledged	N/A
Red-tailed hawk	Aspen	320485	4590999	4/24: incubating	5/29: active; unknown number of nestlings	6/26: likely fledged	N/A

SUMMARY

The 2013 nest surveys showed one active golden eagle nest located on the southern boundary of the Chokecherry WDA within a Turbine No-Build area, and none were located within the Sierra Madre WDA. Six active golden eagle nests were located outside the Project site but within the 5-mile buffer. One occupied golden eagle nesting territory was identified in the Central Basin in a Turbine No-Build area, but nest initiation was never detected. There was one active bald eagle nest within the Chokecherry WDA but well outside the likely turbine development area. No other active bald eagle nests were within the Project site. Six active bald eagle nests were outside the boundaries of the Project site within the 5-mile buffer. One active red-tailed hawk nest was located in the western area of the Chokecherry WDA, and one was located on top of Miller Hill in the Sierra Madre WDA. Most other red-tailed hawk nests were located south of the Sierra Madre WDA and one was located along the North Platte River. Two prairie falcon nests were located along the North Platte River, and two were located along the Atlantic Rim. Multiple follow-up ground surveys were completed to document nest activity and fledging success for all eagle nests and many other raptor nests within the Project site between May 21 and July 26, 2013, and the results of those surveys are summarized in Table 2.

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SWCA ENVIRONMENTAL CONSULTANTS

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Chokecherry and Sierra Madre Wind Energy Project

Prepared for

Power Company of Wyoming, LLC

Prepared by

SWCA Environmental Consultants

August 2014

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INTRODUCTION

This report documents SWCA Environmental Consultants (SWCA) raptor nest survey results for 2014 within the Chokecherry and Sierra Madre Wind Energy Project (CCSM Project) Site and in suitable nesting habitats within a 5-mile buffer (approximately 700 square miles) surrounding the CCSM Project (Figure 1). The selection of a 5-mile turbine buffer was made through consultation with the U.S. Fish and Wildlife Service (USFWS) and the Bureau of Land Management (BLM). The USFWS and BLM concurred that the 5-mile buffer was appropriate because the existing raptor nest database could be used as a basis for where to search for nests, and because terrain features that had high potential for nesting raptors were well known and established. A 5-mile turbine buffer was also deemed acceptable due to the robust avian monitoring efforts that have been underway within the CCSM Project Site since 2010, which also assists in identifying potential nesting raptors. Additionally, BLM regularly conducts raptor nest monitoring in areas that fall outside of the 5-mile turbine buffer.

Two types of survey methods were used to identify nests, determine nest condition and activity, and assess nesting success. Helicopter surveys were used to evaluate all known nests and all potential nesting habitats along cliff bands, on steep slopes, and along the North Platte River corridor. Ground surveys were used to identify nests not readily identified from helicopter surveys and to assess nests that were not identified or observable during the helicopter surveys. All known viable ferruginous hawk (*Buteo regalis*) nests in and immediately adjacent to the CCSM Project Site were visited to assess nesting status. SWCA biologists made multiple nest monitoring visits to all active eagle nests identified during helicopter and ground surveys. Nest monitoring visits are made until fledging is confirmed or until juveniles are no longer present on the nest. All nest survey and monitoring activities were conducted in accordance with the protocols submitted to and accepted by USFWS.

AERIAL SURVEYS

During aerial nest surveys, two biologists and a pilot flew in an Aerospatiale AS355 helicopter on May 1, 13, and 14, 2014. Surveys on May 1 and 13 were completed for the area surrounding the North Platte River corridor, Chokecherry Wind Development Area (WDA), and the Atlantic Rim. Surveys on May 14 were completed for areas in and adjacent to the Sierra Madre WDA. Data collected at each nest site included documentation of substrate and location, nest condition, nest status (e.g., active or inactive, number of adults, eggs, nestlings, etc.), activity, and global positioning system (GPS) location.

Approximately 18 hours were spent flying the CCSM Project Site and 5-mile turbine buffer. Historic nest locations provided by BLM Rawlins Field Office and data collected during 2011, 2012, and 2013 nest surveys were used for guidance in surveying existing and undocumented nest locations. Surveys focused on known and potential nesting habitat for golden eagle (*Aquila chrysaetos*) and bald eagle (*Haliaeetus leucocephalus*), as well as previously documented nest locations for other large *Buteos*, falcons, and accipiters. Habitat types included cliff bands, rock outcrops and promenades, steep slopes, riparian zones and river corridors, and forested areas with large trees capable of supporting nest structures. All inactive nests observed during aerial surveys were recorded.

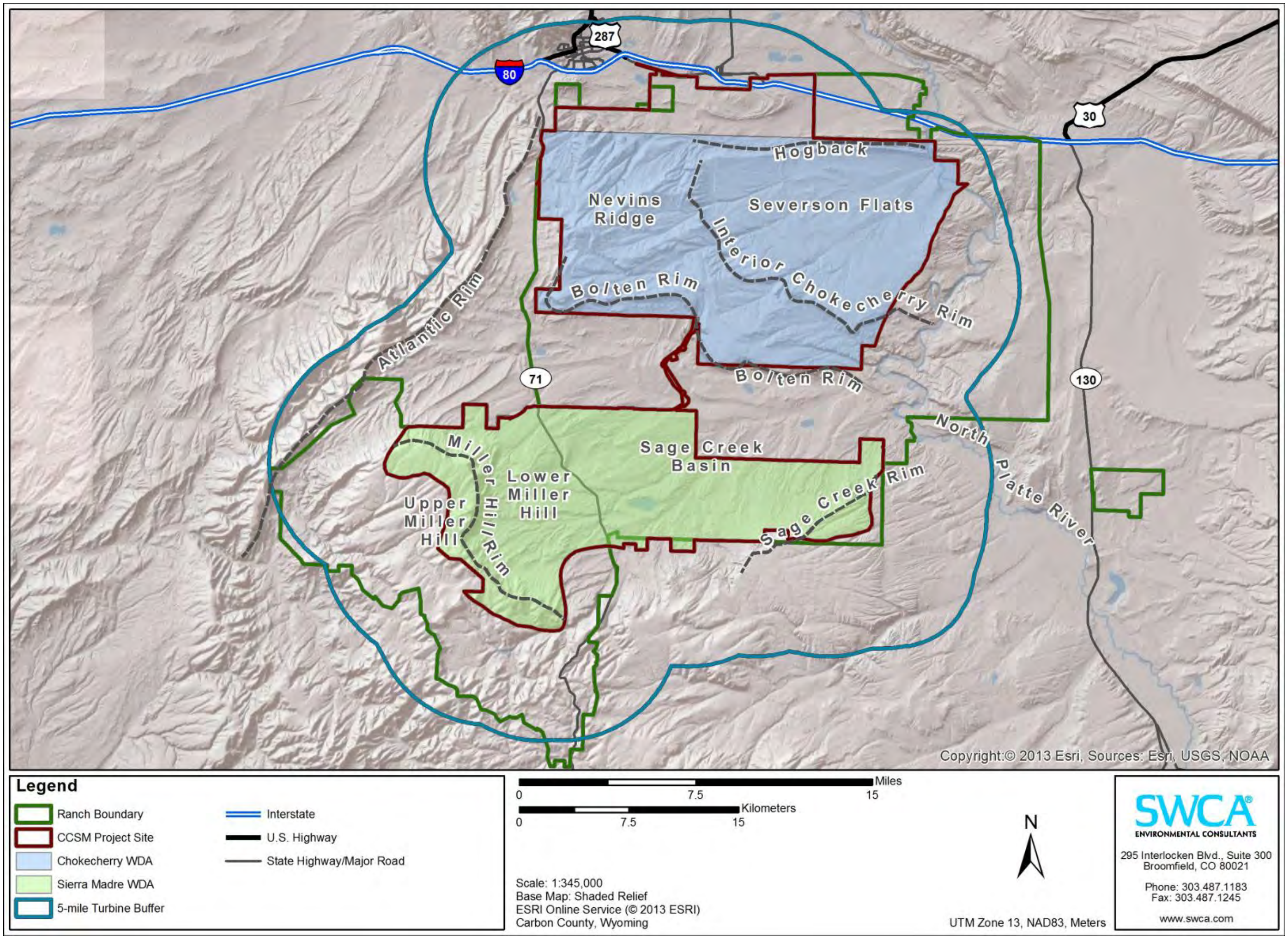

Figure 1. CCSM Project Site, Wind Development Areas, 5-mile turbine buffer, and notable land features.

GROUND SURVEYS

Ground surveys were used to evaluate potential nesting habitat that could not be surveyed or readily observed during aerial flights. Ground surveys focused on treed habitats with known nesting structures that could not be observed during helicopter surveys as well as selected known *Buteo* and accipiter nests in the CCSM Project Site. Ground surveys also included visits to 12 historical ferruginous hawk nest locations on and adjacent to the CCSM Project Site to evaluate current nest condition and activity (Table 1). In 2011, 40 historical ferruginous hawk nests contained in the BLM's nest database and located on or adjacent to the CCSM Project Site were visited. During the 2011 surveys, 28 of the historical nest sites were either not located or determined to be unviable as only a few deteriorated sticks remained. The 12 remaining historical ferruginous hawk nests have been accessed on foot or with trucks and all-terrain vehicles each subsequent year to survey for activity. Data collected during the 2014 ground surveys were identical to the data recorded during previous aerial and ground surveys.

Table 1. Existing Historical Ferruginous Hawk Nests on the CCSM Project Site.

Nest ID	Easting	Northing	Substrate	Condition	BLM Nest Association
59	332949	4623131	Rock outcrop	Fair	Near BLM Nest FH21853201
211	338031	4622605	Rock outcrop	Fair	FH20850302
212	335323	4615247	Rock outcrop	Fair	FH20852802
234	328919	4617385	Rock outcrop	Fair	FH20862302
238	327708	4612200	Rock outcrop	Good	Near BLM Nest FH19860301
239	329290	4604725	Hilltop	Fair	Near BLM Nest FH19863501
241	309124	4608503	Hill slope	Fair	FH19882201
257	329868	4622032	Rock outcrop	Fair	Near BLM Nest FH20860201
258	312604	4620081	Rock outcrop	Good	Near BLM Nest FH20881301
259	318857	4612023	Rock outcrop	Poor	Near BLM Nest FH19871002
260	335189	4615940	Rock outcrop	Fair	Near BLM Nest FH20852901
263	320037	4603851	Hill slope	Fair	Near BLM Nest FH18870202

RESULTS

During 2014 survey efforts, 43 active raptor nests were located within the CCSM Project Site and associated 5-mile buffer (Figures 2 and 3). The species composition of the active raptor nests was as follows: 17 golden eagle, 12 red-tailed hawk (*Buteo jamaicensis*), 7 bald eagle, 4 prairie falcon (*Falco mexicanus*), 2 Swainson's hawk (*Buteo swainsoni*), and 1 unidentified *Buteo* nest that was likely a red-tailed hawk. Eighteen active non-raptor nests were also located during the flights and included 12 common raven (*Corvus corax*), 5 great horned owl (*Bubo virginianus*), and 1 Canada goose (*Branta canadensis*). No evidence of ferruginous hawk nesting or nest maintenance was found at any of the 12 nest locations surveyed in 2014 (Table 1).

Nesting patterns in 2014 were consistent with results from 2011, 2012, and 2013 surveys. As observed during previous raptor nest surveys, the highest density of nesting raptors in the 5-mile buffer surrounding the CCSM Project Site was along the North Platte River. Of the 43 active raptor nests identified during 2014 surveys, 16 (37%) were located along the North Platte River corridor. The 16 nests were comprised of 6 bald eagle nests (86% of all active bald eagle nests in the survey area), 6 golden eagle nests (35% of all active golden eagle nests in the survey area), 3 red-tailed hawk nests, and 1 prairie falcon nest. The nests along the North Platte River fall within an identified turbine no-build area and are more than 17 kilometers (11 miles) from the nearest Phase I turbine location.

Six of the 43 raptor nests identified during 2014 surveys were located on the Bolten Rim, which roughly corresponds to the southern boundary of the Chokecherry WDA, and one was located on a rock outcrop just north of the Bolten Rim. All 7 nests were located within identified turbine no-build areas or other associated setbacks from the Bolten Rim that were established in redesigning the CCSM Project to avoid and minimize risks to eagles and other avian species. Six of the 7 nests along the Bolten Rim were occupied by golden eagles with the remaining nest occupied by a prairie falcon. Of the 6 active golden eagle nests, 2 are on the eastern half of the Bolten Rim and are 8.5 and 12.9 kilometers (5.3 and 8.7 miles) from the nearest Phase I turbine location. The remaining 4 golden eagle nests are on the western half of the Bolten Rim and were specifically addressed in redesigning the Phase I Wind Turbine Development to avoid and minimize risks to eagles and other avian species (Figures 2 and 3). Of these 4 nests, the 2 westernmost golden eagle nests are located more than 3.4 kilometers (2 miles) from the nearest Phase I turbine location. The other two golden eagle nests are located between 2 and 3 kilometers (1.2 and 1.8 miles) from the nearest Phase I turbine location.

One active golden eagle nest was located on a small cliff in the Sage Creek Basin between the Chokecherry and Sierra Madre WDAs, approximately 1.2 kilometers (0.8 mile) west of Sage Creek Reservoir. This nest is located in a Turbine No-Build Area established in the Sage Creek Basin and is 14.7 kilometers (9.1 miles) from the nearest Phase I turbine location. This nest was occupied by golden eagles in 2013 and 2014, but failed early into the nesting season both years. This year the majority of the nest collapsed off the cliff and is no longer viable in its current form. This nest location falls within the Turbine No-Build Area that encompasses much of the Sage Creek Basin between the Chokecherry and Sierra Madre WDAs

Two active golden eagle nests were located along the Atlantic Rim west of the Chokecherry and Sierra Madre WDAs. The northernmost nest on Atlantic Rim is approximately 8.7 kilometers (5.41 miles) north of the nearest Phase I turbine location in the Sierra Madre WDA, and is located completely outside of the CCSM Project Site. The southernmost nest on Atlantic Rim is 6.8 kilometers (4.2 miles) west of the nearest Phase I turbine location in the Sierra Madre WDA, and is located completely outside of the CCSM Project Site.

With respect to the Sierra Madre WDA, no active eagle nests were located within the WDA. One active golden eagle nest was located approximately 0.8 kilometer (0.5 mile) south of the southern boundary of the WDA in the area of Sage Creek Rim and is 11.4 kilometers (7.1 miles) from the nearest Phase I turbine location. One additional active golden eagle nest was located 8.4 milometers (5.2 miles) south of the southern boundary of the WDA, just inside the boundary of the survey buffer and 7.9 kilometers (4.9 miles) southeast of the nearest Phase I turbine location. One active bald eagle nest was located approximately 0.6 kilometers (0.4 miles) south of the WDA in a snag at the base of Sage Creek Rim (the same location as observed in 2011, 2012 and 2013). This nest is approximately 3.9 kilometers (2.4 miles) from the nearest Phase I turbine location, and is located immediately south of a Turbine No-Build Area surrounding Rasmussen Reservoir that was created to protect foraging and use areas associated with this nest.

Follow-up ground surveys were completed to document nest activity and fledging success for all eagle nests in the CCSM Project Site and associated 5-mile buffer between May 22 and July 21 (Table 2). During this time, flight path mapping surveys were also initiated at 7 golden eagle nests located along the Bolten Rim, Interior Chokecherry Rim, and Sage Creek Rim in order to determine how eagles from those nests were using the surrounding habitat, and whether they were utilizing the Phase I Wind Turbine Development Site for their activities. These specific nests were selected due to their proximity to the Chokecherry and Sierra Madre WDAs, and results and analysis from these surveys may be found in Appendix A. Flight path mapping documented that patterns of use surrounding these 7 nests was consistent with observations made in previous years. The majority of use occurred south of the Bolten Rim over the Sage Creek Basin in a designated Turbine No-Build Area. The limited time spent north of the Bolten Rim occurred in designated Turbine No-Build Areas and associated setback and did not occur within the Phase I Wind Turbine Development Site.

Of the 17 active golden eagle nests documented during 2014 nest surveys, 7 were determined to have failed and 6 were determined to have fledged by the end of July. The statuses of the remaining nests were unable to be determined because of private land access issues or lack of evidence of fledging or failure. With regards to the 7 active bald eagle nests, 1 was confirmed to have failed, and 6 were determined to have fledged by the end of July 2014.

In addition to the 43 active raptor nests, 241 inactive and historic nests were surveyed and assessed during the helicopter nest flights and other nest searching activities. These nests were located across the CCSM Project Site and associated buffer; however, the highest concentrations were located along the Bolten Rim, the North Platte River corridor, and along the Atlantic Rim. While all nests observed during the helicopter nest flights were documented, it is possible that nests of certain species (e.g., American kestrel, prairie falcon, common raven, etc.) were not located due to the nature of aerial surveys, and because of the way their nests are structured (i.e., oftentimes built in cavities or tight crevasses along cliff bands). All of the inactive nests observed were large in size and were considered potential raptor nests; however, as these nests were inactive, it is not possible to know exactly which species built and/or used the nest in the past.

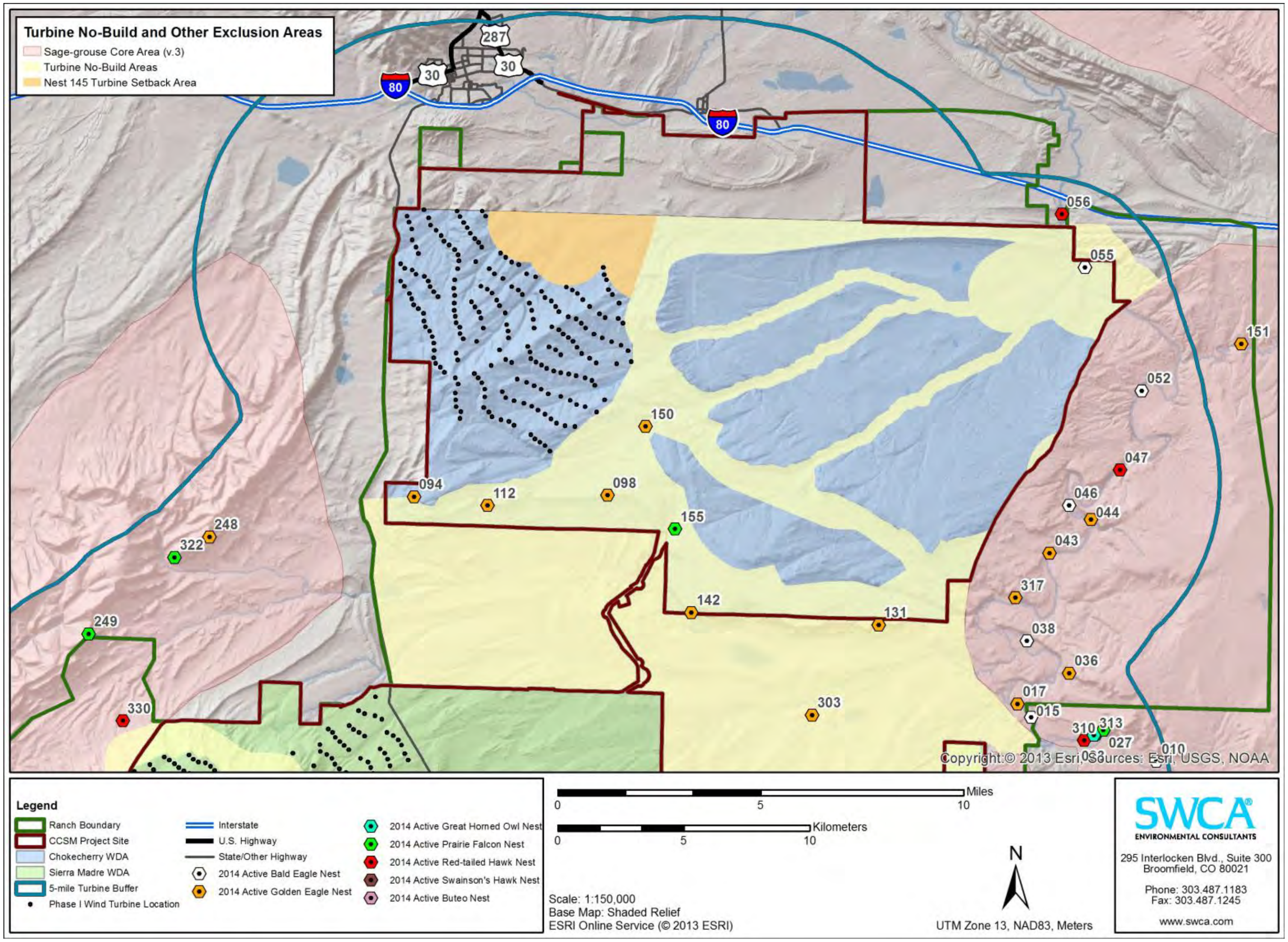

Figure 2. All active nests, Turbine No-Build Areas, and other avoidance and minimization areas located in the vicinity of the Chokecherry WDA.

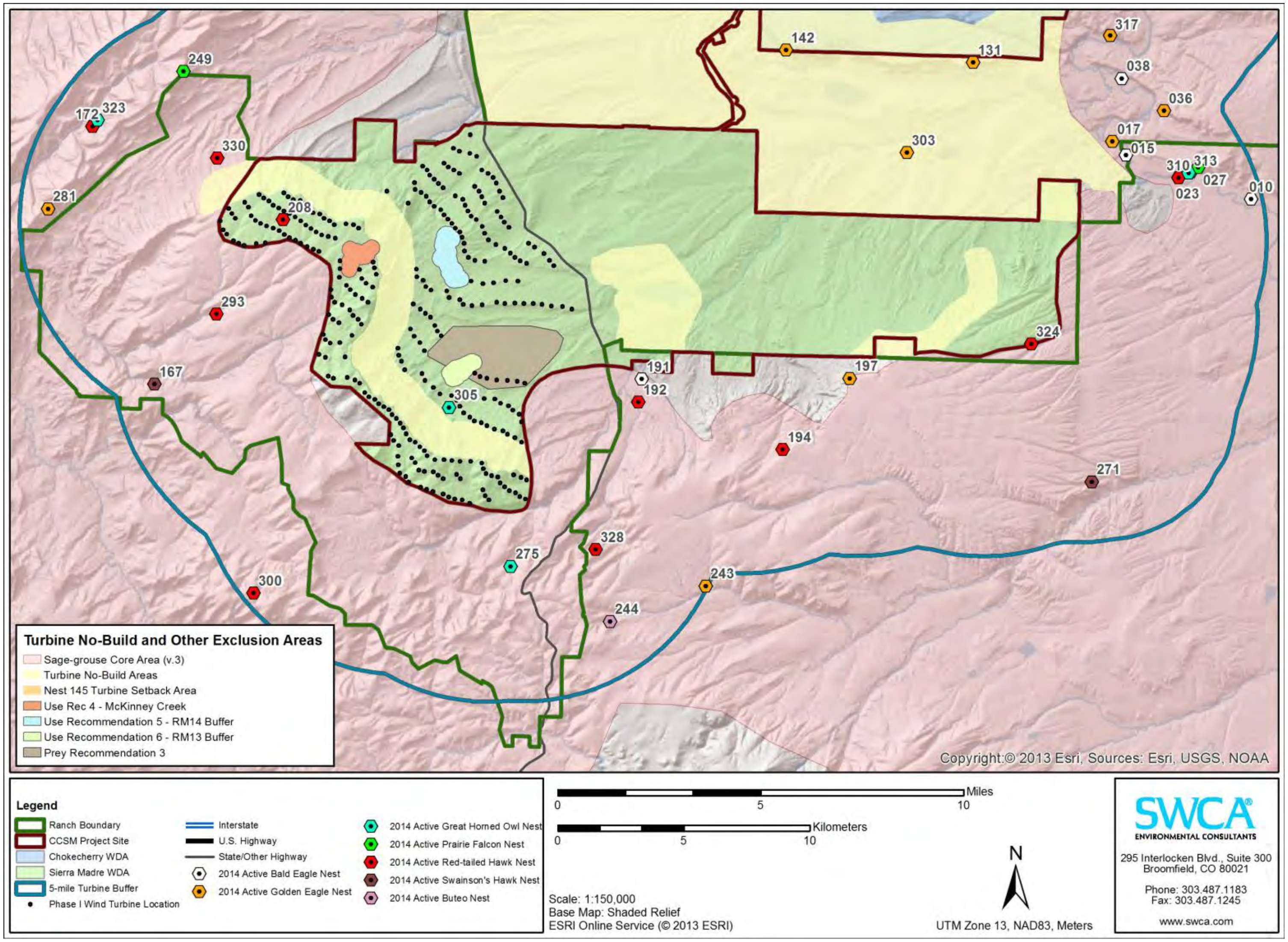

Figure 3. All active nests, Turbine No-Build Areas, and other avoidance and minimization areas located in the vicinity of the Sierra Madre WDA.

Table 2. Nest Status Assessments for All Active Bald and Golden Eagle Nests within the CCSM Project Site and Associated Buffer.

Species	Nest ID	Substrate	Easting	Northin g	Status at Flight	1st Check	2nd Check	3rd Check
Bald eagle	010	Cottonwood	341820	4601564	5/1: incubating	not checked	7/2: 1 adult perched on nest	7/20: fledged
Bald eagle	015	Cottonwood	336852	4603315	5/1: incubating	6/12: brooding	7/1: 2 adults perched on nest	7/24: 1 nestling fledged
Bald eagle	038	Cottonwood	336682	4606344	5/1: incubating	6/13: no activity detected	7/1: 1 nestling	7/20: 1 nestling fledged
Bald eagle	046	Cottonwood	338352	4611712	5/13: incubating	6/10: 1 nestling	6/30: 1 nestling	7/18: 1 nestling fledged
Bald eagle	052	Cottonwood	341240	4616259	5/13: 2 adults perched on nest	6/10: 1 adult perched on nest	6/30: 2 nestlings	7/18: 1 nestling fledged
Bald eagle	055	Cottonwood	338988	4621149	5/13: eggs in nest, adult perched nearby	6/10: no activity detected	6/30: no activity detected	7/23: failed
Bald eagle	191	Snag	317657	4594433	5/14: incubating	6/26: 1 nestling	7/3: 1 nestling	7/21: 1 nestling fledged
Golden eagle	017	Cliff	336319	4603846	5/13: incubating	6/12: no activity detected	7/1: no activity detected	7/20: failed
Golden eagle	036	Cliff	338361	4605066	5/13: 2 nestlings	6/13: no activity detected	7/2: 1 adult perched on nest	7/18: 1 nestling fledged
Golden eagle	043	Cliff	337586	4609820	5/13: 1-2 nestlings	6/10: 1 adult perched on nest	6/30: 2 eagles of perched on nest, unknown age	7/18: status unknown
Golden eagle	044	Cliff	339223	4611152	5/13: 1 nestling	6/10: no activity detected	6/30: 1 nestling	7/18: 1 nestling fledged
Golden eagle	094	Cliff	312378	4612056	5/1: incubating	6/11: 1 adult flying nearby	6/23: no activity detected	7/17: failed
Golden eagle	098	Cliff	320060	4612115	5/1: incubating	6/5: 1 adult flying nearby	7/15: no activity detected	7/17: failed
Golden eagle	112	Cliff	315305	4611707	5/1: incubating	6/4: 1 adult flying nearby	6/23: 1 adult flying nearby	7/16: fledged

Species	Nest ID	Substrate	Easting	Northin g	Status at Flight	1st Check	2nd Check	3rd Check
Golden eagle	131	Cliff	330801	4606975	5/1: incubating	6/20: 1 adult sitting on nest	7/1: 1 nestling	7/15: 1 nestling fledged
Golden Eagle	142	Cliff	323377	4607473	5/1: incubating	6/3: 1 adult flying nearby	6/25: 1 adult flying nearby	7/15: unknown fledging status
Golden Eagle	150	Cliff	321562	4614839	5/1: incubating	5/28: no activity detected	6/11: failed	N/A
Golden Eagle	151	Rock Outcrop	345183	4618108	5/13: incubating	not checked	7/2: 1 nestling	7/18: 1 nestling fledged
Golden Eagle	197	Cliff	325910	4594457	5/14: incubating	6/2: no activity detected	6/24: 1 adult flying nearby	7/14: failed
Golden Eagle	303	Cliff	328174	4603405	4/18: incubating	4/30: failed, nest collapsed from cliff	N/A	N/A
Golden Eagle	317	Cliff	336235	4608056	5/13: 1-2 nestlings	not checked	6/30: 1 nestling	7/18: 1 nestling fledged
Golden Eagle	248	Cliff	304266	4610464	5/13: incubating	6/26: 1 nestling	7/3: 1 nestling	7/21: 1 nestling fledged
Golden Eagle	281	Cliff	294128	4601180	5/14: incubating	6/25: 1 adult perched on nest	7/3: failed	N/A
Golden Eagle	243	Conifer	294128	4601180	5/14: incubating	NA – Private land	NA – Private land	NA – Private land

Appendix A: Results of Flight Path Monitoring Surrounding Select Active Golden Eagle Nests

INTRODUCTION

During May, June and July of 2013 and 2014, SWCA Environmental Consultants (SWCA) conducted flight path mapping surveys for the Chokecherry and Sierra Madre Wind Energy Project (CCSM Project) Site at select active golden eagle nest locations. The active nests surveyed were located along the Bolten Rim and Sage Creek Rim, which generally follow the southern boundaries of the Chokecherry and Sierra Madre Wind Development Areas (WDAs), respectively. In 2013, 2 active golden eagle nests (nests 143 and 197) were located along these rims, and in 2014, 7 nests (nests 094, 098, 112, 131, 142, 150, and 197) were located along these rims. All of the active golden eagle nests surveyed were between 2 and 14 kilometers (1.2 and 8.7 miles) of Phase I turbine locations.

FLIGHT PATH SURVEYS

For flight path surveys, biologists selected survey locations on top of the Bolten and Sage Creek rims with views of the nests and surrounding landscape. Surveys locations were sites at least 400 meters from nest locations to reduce the likelihood of disturbing nesting activities. Surveys were generally conducted once per week for 2 to 4 hours at each nest, and survey start times were rotated each week to provide coverage of all daylight hours at each nest location. During surveys, biologists would scan the landscape around them with the assistance of binoculars to detect any golden eagles utilizing the airspace around the active nest locations. Once an eagle was detected, biologists would track the eagle and record its flight path to capture its use of the surrounding topographic features and habitat. Golden eagle flight paths were mapped out to approximately 4,000 meters from the observer, and data collected during these surveys focused primarily on accurate recording of golden eagle flight paths and identification of the active nest the flight path was associated with. Flight paths were georeferenced and digitized for analysis purposes.

In 2013, approximately 30 hours were spent mapping flight paths at the 2 active golden eagle nests located on the Bolten and Sage Creek Rims and in 2014, approximately 160 hours were spent mapping flight paths at the 7 active golden eagle nests located on the Bolten and Sage Creek Rims. Survey effort varied between the two years primarily due to changes in the number of active golden eagle nests.

RESULTS

Flight path patterns observed in 2013 and 2014 were consistent with observations made during raptor surveys conducted for the CCSM Project from 2011 through 2013. As was observed during past raptor surveys, the majority of all eagle flight paths mapped during 2013 and 2014 occurred along and south of the Bolten Rim and north of the Sage Creek Rim in the Sage Creek Basin located between these two topographic features (Figure A.1). Almost no flight paths were recorded north of the Bolten Rim and south of the Sage Creek Rim. The few flight paths that occurred north of the Bolten Rim were located within Turbine No-Build Areas and other areas specifically addressed in redesigning the Phase I Wind Turbine Development to avoid and minimize risks to eagles and other avian species. Several nests (nest numbers 094, 098, 150, and 197) failed early in the flight path survey effort; therefore, few or no flight paths were recorded for these nests.

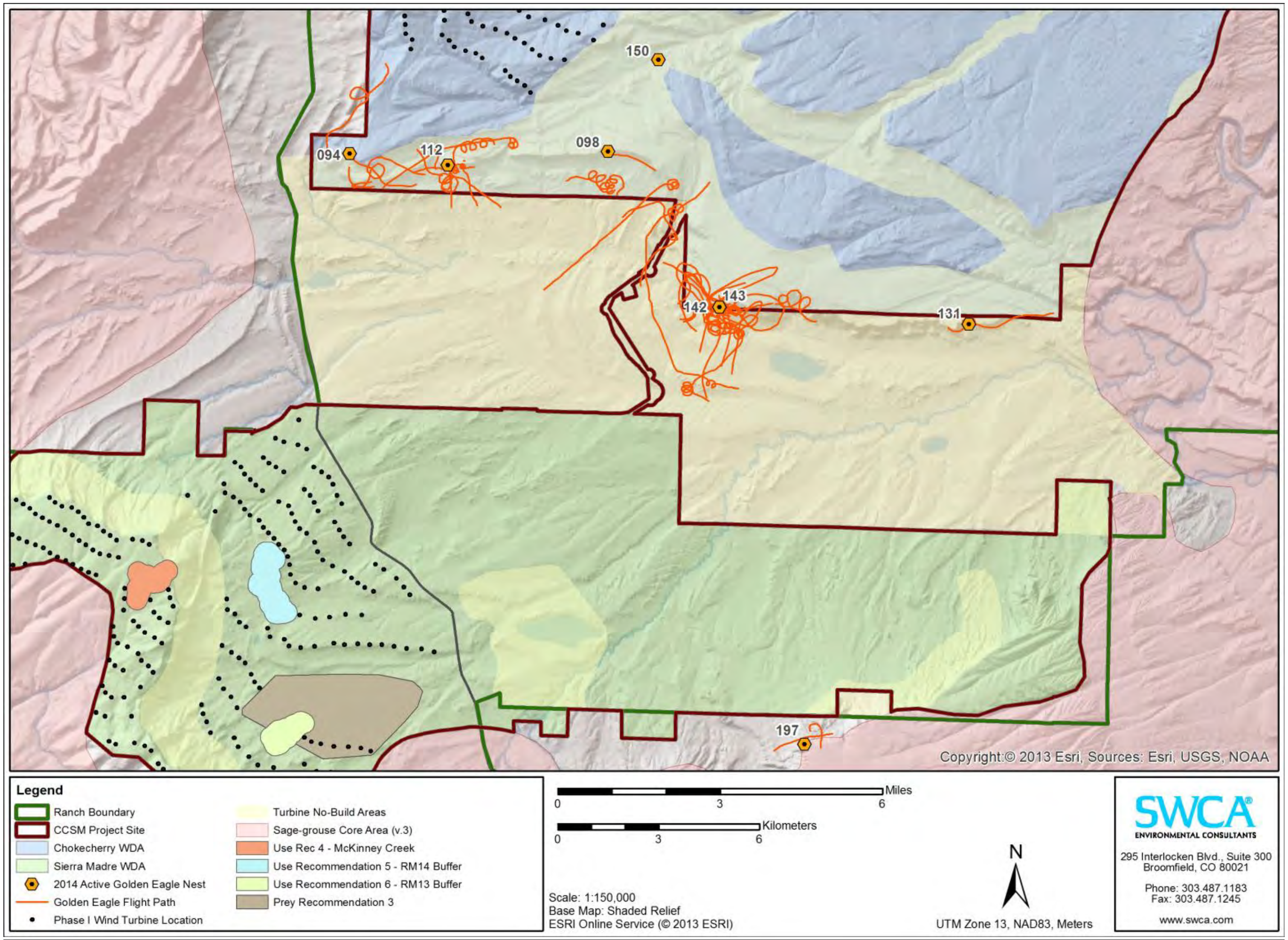

Figure A.1. Golden eagle nests and flight paths, Turbine No-Build Areas, and other avoidance and minimization areas located in the CCSM Project Site

Appendix E

Summary Report for 2013 Eagle Roost Surveys
Chokecherry and Sierra Madre Wind Energy Project

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March 2013

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INTRODUCTION

In February 2013, SWCA Environmental Consultants (SWCA) conducted aerial eagle roost surveys within suitable habitats on the Chokecherry and Sierra Madre Wind Energy Project (Project) site and surrounding area (Figure 1). These surveys were specifically conducted to locate roosting locations for bald eagles (*Haliaeetus leucocephalus*), which are known to roost overnight in communal groups (U.S. Fish and Wildlife Service [Service] 1983). Golden eagles (*Aquila chrysaetos*) are not typically known to roost in communal groups; however, any observation of either species of eagle detected during the roost flights was documented. Surveys followed established protocols for locating bald eagle roosts as described in the Service's Northern States Bald Eagle Recovery Plan (Service 1983).

Prior to surveys, potential bald eagle roost areas were assessed and delineated through a desktop habitat analysis of the Project site and surrounding area. High-resolution aerial imagery, vegetation, and other supplementary spatial layers were reviewed in ArcGIS software to delineate riparian zones, cottonwood (*Populus* sp.) galleries, mixed-conifer groves, and other large stands of quaking aspen (*Populus tremuloides*) or other tree species that could have potential to serve as communal roost sites for bald eagles. These targeted areas with the highest potential for roosting activity were surveyed exclusively rather than flying transects over the Project site, most of which is dominated by sagebrush steppe or salt desert scrub vegetation types with very little forested area to support communal roosts (Figure 2). The key areas delineated in the desktop analysis for eagle roost surveys include the North Platte River corridor and associated cottonwood galleries along the eastern boundary of the Project site and the Chokecherry Wind Development Area (WDA); sections of Pass Creek, Jack Creek, and associated tributaries with forested cover east and south of the Project site; stands of mixed conifers and quaking aspen south of the Project site; and stands of mixed conifers and quaking aspen along the eastern and north faces of Miller Hill in the Sierra Madre WDA (Figure 3).

AERIAL SURVEYS

During the aerial roost surveys, two biologists and a pilot experienced in aerial wildlife surveys flew in a Cessna 182 fixed-wing aircraft during the evening hours of February 27 and the morning hours of February 28, 2013. Surveys on both dates were conducted during the accepted timeframe provided in the Northern States Bald Eagle Recovery Plan (Service 1983), and all of the delineated areas discussed above and displayed in Figure 3 were surveyed on both flights. The fixed-wing aircraft was flown at a low to moderate speed at an average altitude of 30 meters above ground level. Biologists surveyed from both sides of the aircraft to achieve full coverage of the delineated survey areas, and any eagles observed during the flights were documented.

RESULTS

No communal bald or golden eagle roosts were located during either of the aerial roost surveys. On February 27, the aerial roost survey began at 4:30 p.m. and continued until 6:15 p.m. The fixed-wing aircraft left the Saratoga, WY airport and flew north along the North

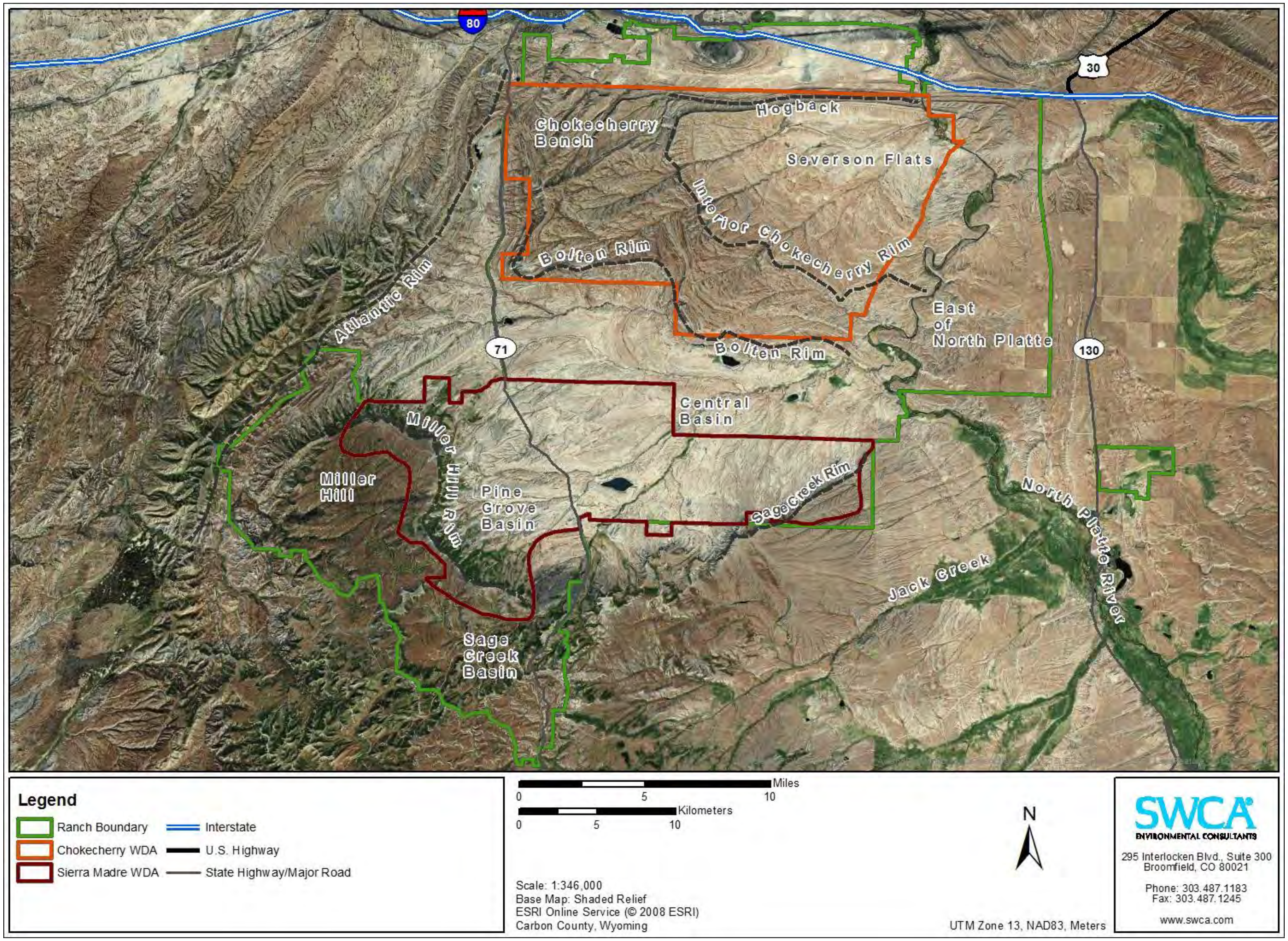

Figure 1. Project site and significant land features.

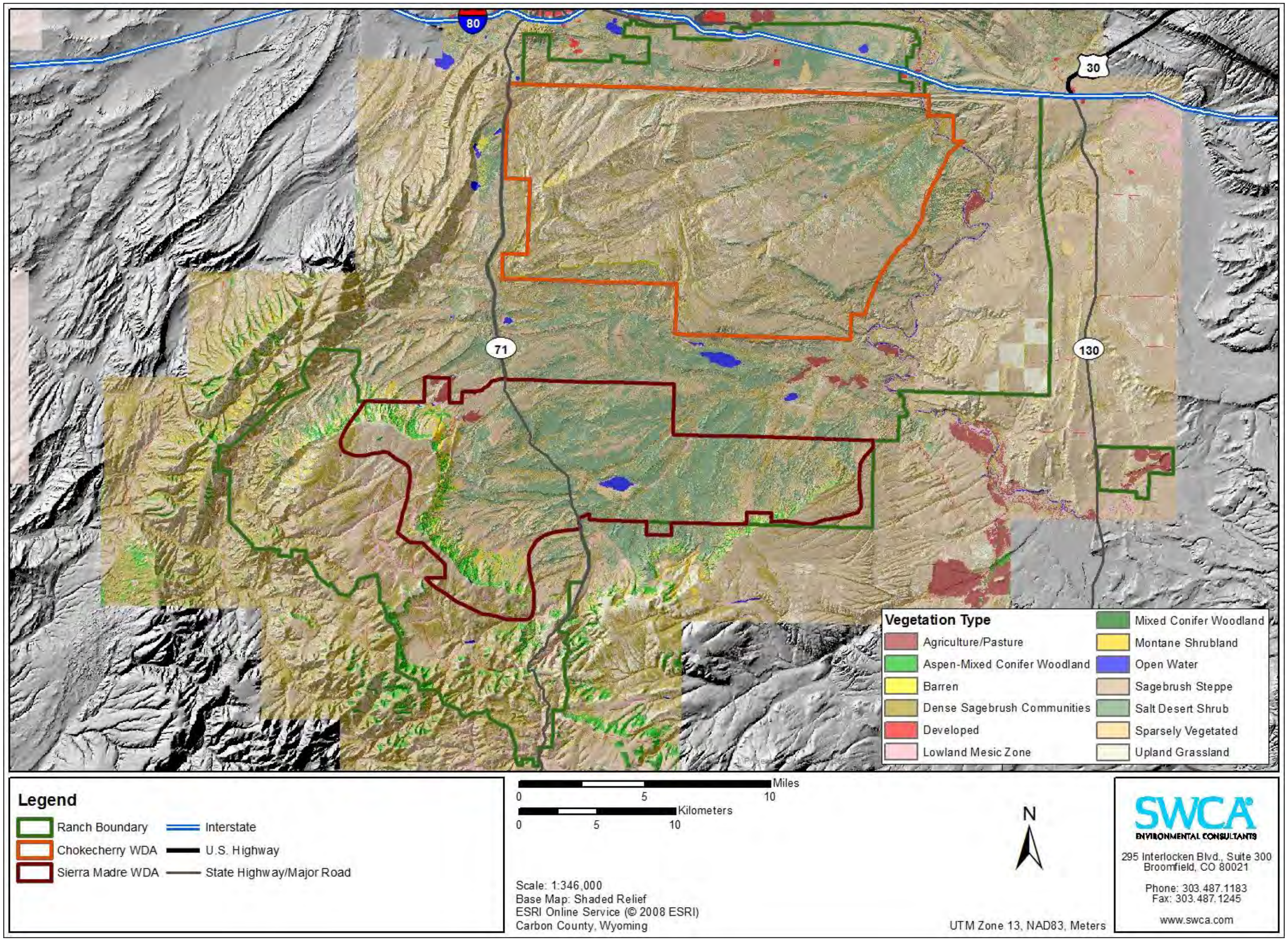

Figure 2. Vegetation types within the Project site and surrounding areas.

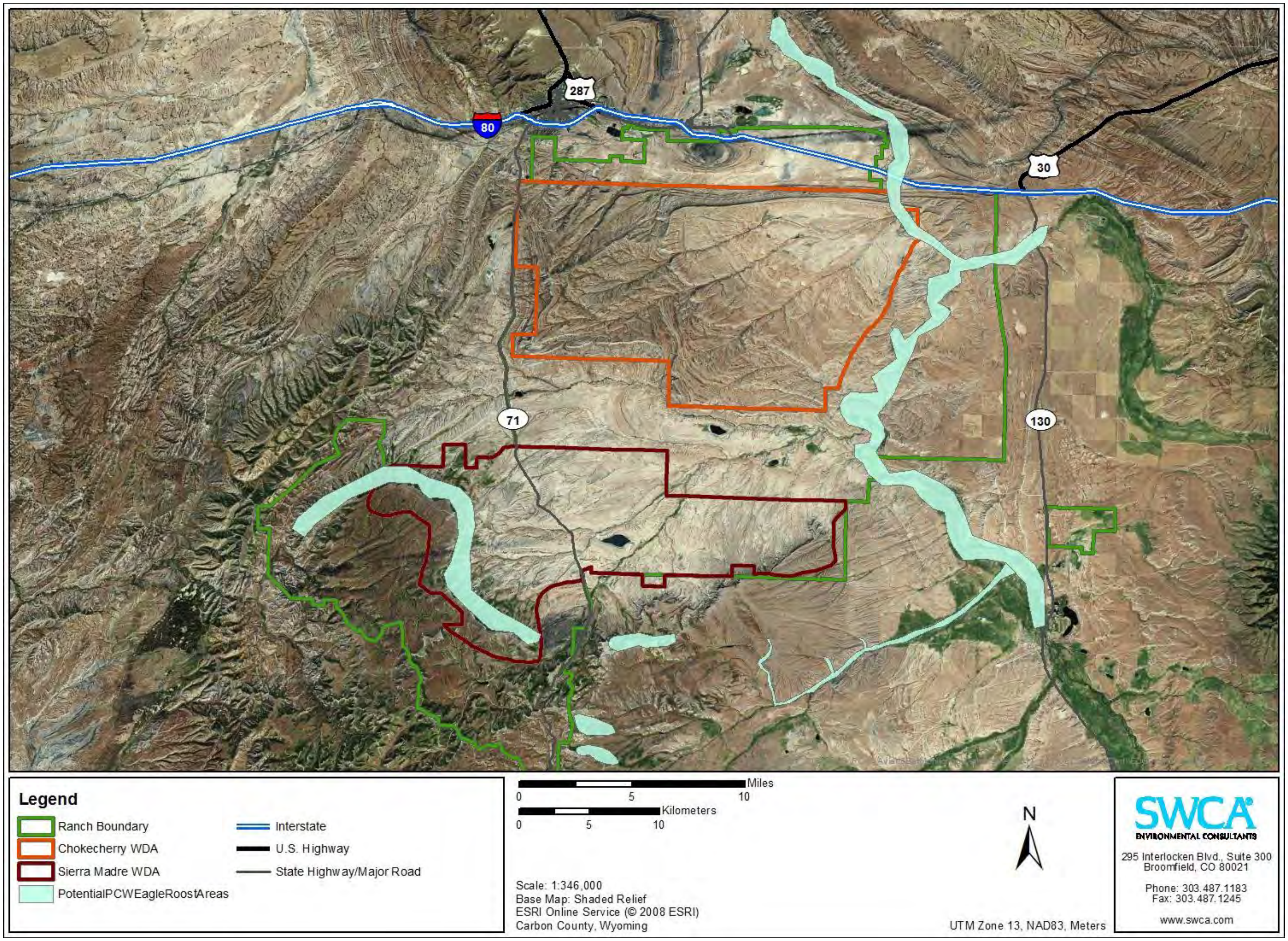

Figure 3. Potential communal eagle roost habitat within the Project site and surrounding areas.

Platte River corridor. One bald eagle was observed in flight near the North Platte, and two golden eagles were observed perched on a cliff wall along the North Platte near a documented nesting area. The flight continued north of Interstate 80 to the Fort Steele area before heading back south along the North Platte River. In addition to the North Platte River, the Pass Creek and Jack Creek tributaries were also flown in areas that supported large cottonwood trees. Once the North Platte River corridor and associated tributaries were covered, the mixed conifer and quaking aspen stands located due south of the Project site were surveyed, as well as the mixed conifer and quaking aspen stands along the east and north faces of Miller Hill. No other eagles were observed during this flight.

On February 28, the aerial roost survey began at 6:20 a.m. and continued until 8:10 a.m. This flight followed the same flight path taken on the previous day's survey. One golden eagle was observed flying near the cliff band where the two individuals were perched the previous evening, likely one of the same individuals. One individual bald eagle was observed perched in a cottonwood tree at the northern extent of the survey area along the North Platte River. Two bald eagles were observed perched in a cottonwood tree along Jack Creek, likely establishing their breeding season territory. One additional golden eagle was also observed flying low over Jack Creek; however, no additional eagle activity was observed.

SUMMARY

In the course of two aerial eagle roost surveys conducted during both morning and evening hours within the Project site and surrounding area, no communal eagle roosts were documented. Only a few incidental observations of individual eagles or territorial pairs were documented during the aerial roost surveys. These results are consistent with the habitat available on the Project site given there are very few forested areas or areas with trees large enough to support a communal eagle roost (Figure 2). The North Platter River corridor is the only portion of the Project site that could have any potential to support a communal roost as it does have large galleries of cottonwood trees, the cliffs around the river provide some protection from inclement weather conditions, and the river may provide a potential prey source if it is not frozen over. However, only two individual bald eagles were observed along the river during both flights. None of the other delineated areas that were surveyed have any potential to support a communal eagle roost as the available trees are too small and spread out, there is little protection from inclement weather, and there are few consistent prey sources to support a large number of eagles.

REFERENCES

U.S. Fish and Wildlife Service (Service). 1983. Northern States Bald Eagle Recovery Plan. Northern States Bald Eagle Recovery Team. U.S. Fish and Wildlife Service, Department of the Interior, Washington D.C. Available online at http://www.fws.gov/midwest/eagle/recovery/be_n_recplan.pdf. Accessed in March 2013.

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Appendix F

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Eagle and Raptor Prey Base Assessment

Chokecherry and Sierra Madre Wind Energy Project

October 2012

Power Company of Wyoming LLC

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APPENDIX A: Results of 2012 Prey Base Assessment Surveys

EXECUTIVE SUMMARY

Power Company of Wyoming LLC (PCW) is developing a proposed 1,000-turbine wind energy project in Carbon County, Wyoming, which has some of the best wind resources in the nation—Class 6 and 7—along with buildable terrain. The proposed Chokecherry and Sierra Madre Wind Energy Project (the Project) will generate 2,000–3,000 megawatts of clean, renewable wind energy, and is exactly the type of large-scale renewable energy development that the Administration has said is crucial to help transform America's energy economy.

The Project Site itself is divided into two wind turbine development areas (WDAs) referred to as Chokecherry and Sierra Madre. Chokecherry is the wind development area located in the northern portion of the Project Site (Chokecherry WDA). Sierra Madre is the wind development area located in the southern portion of the Project Site (Sierra Madre WDA) (collectively WDAs). The significance of the WDAs is that these are the only areas in which PCW will install wind turbines. There will be no wind turbines sited outside the WDAs. Moreover, within the WDAs there are areas of "likely turbine development." Thus, there are areas within the WDAs where PCW is not planning on siting turbines (turbine no-build areas).

The Service, in January 2011, released the Draft Eagle Conservation Plan Guidance (Draft ECP Guidance) that describes a process for wind energy developers to utilize in preparing an Eagle Conservation Plan to assess the risk of projects to eagles and assess how siting, design, and operational modifications can mitigate that risk. The Draft ECP Guidance calls for scientifically rigorous surveys, monitoring, assessment, and research designs proportionate to the risk to eagles.

The ECP addresses collision risk to eagles through: (1) identifying high eagle use areas through field surveys and radar; (2) identifying and understanding important foraging areas and connecting corridors; and (3) assessing the status of the resident eagle population as well as migrants and floaters. These areas and parameters are identified using the data collected in Stage 2 of the Draft ECP Guidance. In its Draft ECP Guidance, the Service defines important eagle use areas as an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost site that are essential for the continued viability of the site for breeding, feeding, or sheltering eagles.

In August 2012 PCW submitted to the Service an Eagle Conservation Plan for the Project (ECP) that provides data on the important eagle use areas that are in proximity to the Project Site, including foraging areas and connecting corridors. Surveys and analyses were conducted by SWCA Environmental Consultants (SWCA) under contract to PCW to determine locations and abundance of potential eagle prey species in the vicinity of the Project Site and surrounding landscapes and to assess the potential of such prey species to support resident and non-resident eagles and other raptor species. This report details the results of those surveys and analyzes and supplements the ECP.

Based upon field surveys and data analysis, SWCA has concluded that:

a) Likely eagle prey items in the vicinity of the Project include white-tailed prairie dogs, waterfowl, waterbirds, greater sage-grouse, big game and lagomorphs.

b) Analyses of eagle observations indicate that foraging behavior is rare in the WDAs.

c) Highest availability of prey base for eagles and other raptors occurs outside of the WDAs and eagle use in the WDAs is more characteristic of movement between nesting and roosting or foraging locations.

d) The findings presented in SMITH (2010) are not consistent with published densities of white-tailed prairie dog burrows, WGFD's mapped colonies, the findings of WEST (2008), or the observations by SWCA and BLM biologists.

e) Based on the mapping efforts of WGFD, the conclusions made in WEST (2008) and the results of surveys completed by SWCA (Appendix A), the results of SMITH (2010) are fatally flawed and should not be relied upon.

f) There are a number of species available as prey base for eagles and other raptors within the vicinity of the Project Site; however, none of these species occur at the necessary densities required to consistently attract eagles within the Project Site or the immediate surrounding area. Because of the dispersed patterns of prey density, the most likely foraging locations for eagles occur where the distribution of multiple prey items overlap.

g) Most of the prey base occurs within the Central Basin and along the North Platte River corridor (outside the WDAs), with very limited and dispersed foraging opportunities available outside of these two areas. This is consistent with known nesting areas for eagles in the vicinity of the Project Site. Within the Central Basin, available prey base includes white-tailed jackrabbit, desert cottontail, white-tailed prairie dog, Wyoming ground squirrel, big game and waterbird species. Collectively, these prey resources are diffuse, scattered and/or limited and likely only represent opportunistic foraging opportunities for eagles; therefore they are not important eagle use areas as defined by the Draft ECP Guidance. Outside of the Central Basin (Chokecherry Plateau and Miller Hill) and Platte River corridor, the dispersed distribution of prey species represent only opportunistic foraging potential.

h) White-tailed prairie dog burrow densities are at the lower end of the range of conditions reported for other white-tailed prairie dog colonies (Menkens et al. 1987, Clark and Stromberg 1987), supporting the conclusion that the Bolten Complex provides small, scattered pockets of prairie dogs that likely provide only dispersed, opportunistic foraging potential for raptors and eagles.

i) Eagle and raptor foraging opportunities associated with white-tailed prairie dogs is low across the Project Site based upon (i) the best available scientific data for the Project (WEST 2008, SWCA 2012), (ii) the location of the highest population densities outside of areas of likely turbine development, and (iii) seasonal absence during hibernation between approximately August and March.

j) Wyoming ground squirrel colonies are unlikely to achieve the necessary densities required to consistently attract eagles and to support golden eagle nesting populations due to the restrictive activity schedule and colony structure of Wyoming ground squirrels and; therefore, are at best a secondary prey item.

k) Leporids within the Project Site likely represent a quality food source for eagles; however, due to leporid's mainly crepuscular habits and the diffuse nature of leporid populations across the many habitats within the Project Site, they are likely taken as prey opportunistically, albeit regularly, by eagles and other raptors. There are no known areas that concentrate leporid populations in the Project Site or vicinity.

l) There are no big game parturition areas within the Project Site or vicinity.

m) Winter eagle activity is low where prey and scavenging opportunities are infrequent.

n) In the vicinity of the Project, winter eagle use is closely tied to the availability of winterkill carcasses along area highways.

o) The Project Site was converted from a sheep to a cow-calf and yearling operation in 1996 dramatically decreasing potential foraging opportunities for eagles as cattle are not taken by eagles, and domestic calves are far less likely to be preyed upon than sheep or lambs.

p) Waterfowl and waterbirds provide seasonal foraging opportunities for eagles at the four reservoirs (Kindt, Rasmussen, Sage Creek, and Teton) located in the vicinity of the Project Site, as well as along the North Platte River corridor. This foraging source is available from early spring through late fall in periods when the reservoirs and the river are ice-free; however, the highest concentration of waterbird species in the vicinity of the Project Site occurs during the fall when nesting is completed and adults and juveniles of many species aggregate on the reservoirs to prepare for southerly migration.

q) PCWs identified turbine no-build areas provide movement corridors within and between WDAs that provide connections between foraging areas.

r) PCW's Project re-design which avoids high eagle use areas will avoid and minimize take of eagles and other raptors foraging within the Project Site.

1.0 INTRODUCTION

1.1 PROJECT BACKGROUND

Power Company of Wyoming LLC (PCW) is developing a proposed 1,000-turbine wind energy project in Carbon County, Wyoming, which has some of the best wind resources in the nation—Class 6 and 7—along with buildable terrain. The Project will generate 2,000–3,000 megawatts of clean, renewable wind energy, and is exactly the type of large-scale renewable energy development that the Administration has said is crucial to help transform America's energy economy.

Since the 1990s, Anschutz subsidiary and PCW affiliate The Overland Trail Cattle Company LLC (TOTCO), has owned and operated one of the largest cattle ranching and agricultural operations in the West. Located south of Rawlins and Sinclair in Carbon County, Wyoming and headquartered in Saratoga, the Overland Trail Ranch (the Ranch) encompasses approximately 320,000 acres or 500 square miles. The Ranch is located in "checkerboard" country, in which land ownership alternates between private lands (mostly owned by TOTCO) and federal lands managed by the Bureau of Land Management (BLM). A small portion of Wyoming State Land Board and Wyoming Game and Fish Department (WGFD)-managed lands (collectively state lands) are also located within the Ranch boundary. TOTCO runs an open range cow-calf and yearling cattle operation on the Ranch and has been a part of the Carbon County community and a steward of the land and wildlife resources on the Ranch for over 15 years.

In 2007 and 2011, TOTCO granted PCW a wind easement, access easement, transmission easement and other non-exclusive rights with respect to TOTCOs privately-owned land on the Ranch. Although the Project is proposed on a portion of the Ranch, it will result in less than 1% long-term surface disturbance, leaving more than 99% of the Ranch's existing vegetation communities intact and available for wildlife management, conservation and mitigation of Project impacts.

The Project Site is located within the Ranch boundary but excludes the western most portions of the Ranch on top of Miller Hill and areas east of the North Platte River (Figure 1). The Project Site in relation to the Ranch boundary is shown in Figure 1 as well. The Chokecherry Wind Development Area (WDA) portion of the Project Site is located in the northern third of the Ranch while the Sierra Madre WDA portion of the Project Site is located in the southern third of the Ranch (Figure 1). The Project Site expressly excludes any part of the (1) designated core sage-grouse population area identified by the State of Wyoming under the Governor's Executive Order 2011-5 (EO 2011-5 Version 3 map) and (2) the Red Rim-Grizzly Wildlife Habitat Management Area (Red Rim-Grizzly WHMA) identified by BLM in the Final Environmental Impact Statement for the Project (FEIS).

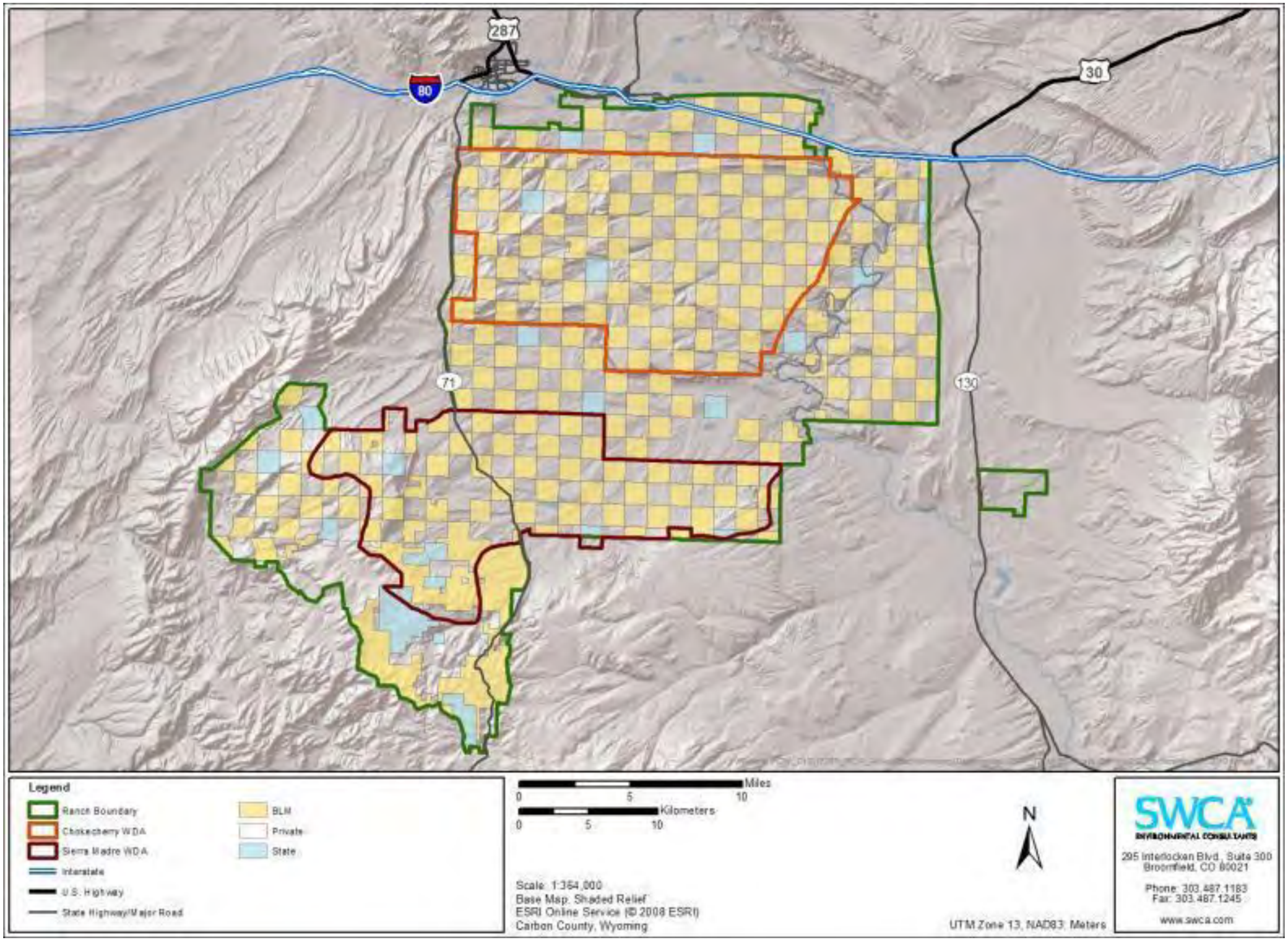

Figure 1. Ranch boundary, Chokecherry and Sierra Madre WDAs, and land ownership.

1.1.1 Physiographic Setting

The Ranch is dominated by three topographic features, Miller Hill, Chokecherry Plateau, and Sage Creek Rim, separated by a Central Basin (Figure 2). To the north, Chokecherry Plateau consists of ridges and rolling hills that generally slope northeasterly downward to the North Platte River. Approximately 25 miles of the North Platte River flow along the eastern edge of Chokecherry. Most of the northern portion of Chokecherry is defined by a small, east/west ridge commonly known as the Hogback, which is approximately 10 miles long, and the southern portion is defined by a cliff edge commonly referred to as the Bolten Rim, which is approximately 20 miles long. A prominent north/south ridge cut by three ephemeral drainages, Smith Draw, Hugus Draw, and Iron Springs Draw, bisects Chokecherry for approximately 12 miles.

The southwestern portion of the Ranch is dominated by a steep-sloped mesa commonly known as Miller Hill. This predominant feature slopes gently toward the south and southwest, with relatively level terrain near the edge of the rim and becoming increasingly undulated towards the southwest. Only a small portion of Miller Hill is within the Project Site.

The southeastern portion of the Ranch includes Sage Creek Rim, which has similar characteristics to Miller Hill, although this feature is not as large or high. Only a small portion of the top of the Sage Creek Rim is within the Project Site.

The area between these features (Central Basin) is a high desert basin transected by Sage Creek and several smaller ephemeral tributaries. Much of this basin is outside the WDAs; however, the Project haul road and internal transmission line will traverse the Central Basin and interconnect the WDAs. Larger waterbodies, which include Kindt, Rasmussen, Sage Creek, and Teton Reservoirs, are interspersed throughout this arid landscape.

Surface geology on the Ranch is predominantly Quaternary alluvium and colluvium, outwash, and eolian deposits derived from Tertiary and Cretaceous claystone, sandstone, and sedimentary rock (Chapman et al. 2004). The Chokecherry WDA is covered primarily by residuum, slopewash, and colluvium landforms, while the majority of the Sierra Madre WDA is covered by residuum landforms (Case et al. 1998).

Soils are developed from a wide variety of parent material derived from sedimentary and igneous origins, which include alluvium and residuum of limestone, sandstone, and shale, and colluvium of granite (NRCS 2004). Subsurface textures are predominantly loamy or sandy soils, while surface textures range from silty clays to coarse sands. Many physiographic features occur throughout the Ranch, but dominant features are hills, ridges, escarpments, plateaus, stream terraces, and alluvial fans (NRCS 2004).

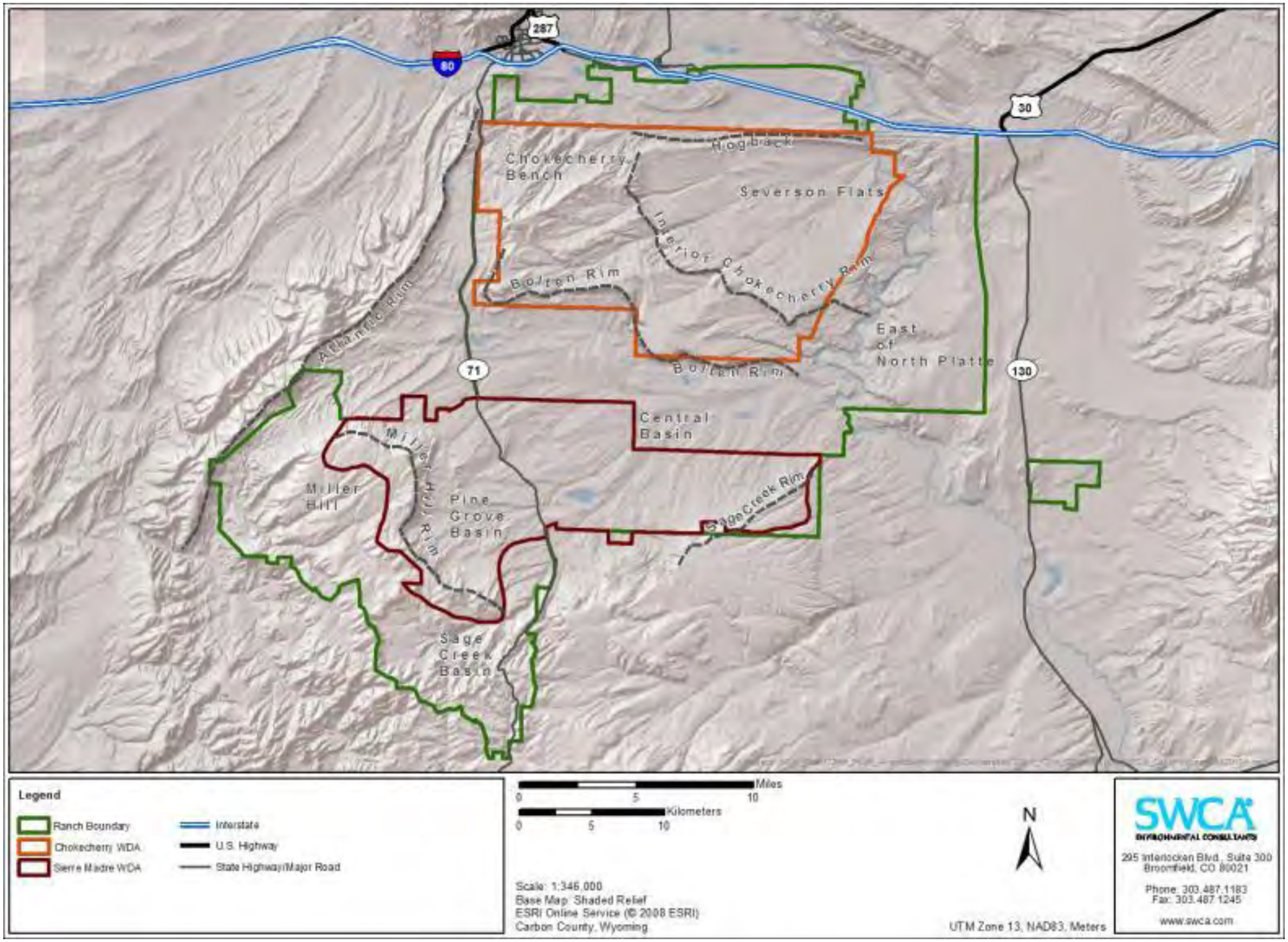

Figure 2. Topographic features throughout the Ranch.

1.1.2 Vegetation

PCWs consultant, SWCA Environmental Consultants (SWCA), did extensive field mapping and vegetation classification on the Ranch. SWCA surveyed vegetation on the Ranch at 500 randomly selected 50-meter transects in 2009. Dominant vegetation classes and associated plant communities were characterized, and detailed measurements of vegetation structure (e.g., canopy cover, canopy height, understory height) were collected. Using the field survey data, aerial imagery, and remote sensing, SWCA developed a detailed 4-meter resolution vegetation classification for the Ranch and a 3-mile buffer around the Ranch (Figures 3 and 4). Thirteen vegetation classes were created to capture the diversity of the landscape. The vegetation mapping was further confirmed through comparison to BLM vegetation mapping.

Vegetation cover is typical of Wyoming Basin and Southern Rockies ecoregions, defined by rolling sagebrush steppe, salt desert shrub basins, and foothill shrublands (Chapman et al. 2004). Rolling sagebrush steppe communities are dominated by various densities of Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*) and mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*) at higher elevations, with areas of silver sagebrush (*Artemisia cana*) in the lowlands and black sagebrush (*Artemisia nova*) and low sagebrush (*Artemisia arbuscula*) in exposed, rocky soils (Figures 3 and 4).

Sagebrush steppe communities are interspersed with bunchgrass/rhizomatous grass communities and allied shrubs, and generally have relatively low forb cover. Salt desert shrub basins are characterized by sparse vegetation cover of cushion plant communities with dominant shrub cover of Gardner's saltbush (*Atriplex gardneri*), shadscale (*Atriplex confertifolia*), and black greasewood (*Sarcobatus vermiculatum*). Perennial streams throughout salt desert shrub basins are typically surrounded by basin big sagebrush (*Artemisia tridentata ssp. tridentata*) and riparian communities dominated by willows (*Salix spp*.), sedges (*Carex spp.*), and rushes (*Juncus spp.*). Foothill shrubland communities are dominated by montane deciduous shrubland consisting of mountain big sagebrush, snowberry (*Symphoricarpos spp.*), serviceberry (*Amelanchier spp.*), and mountain mahogany (*Cercocarpus spp.*), surrounded by extended groves of quaking aspen (*Populus tremuloides*), low-growing common juniper (*Juniperus communis*), and patches of limber pine (*Pinus flexilis*).

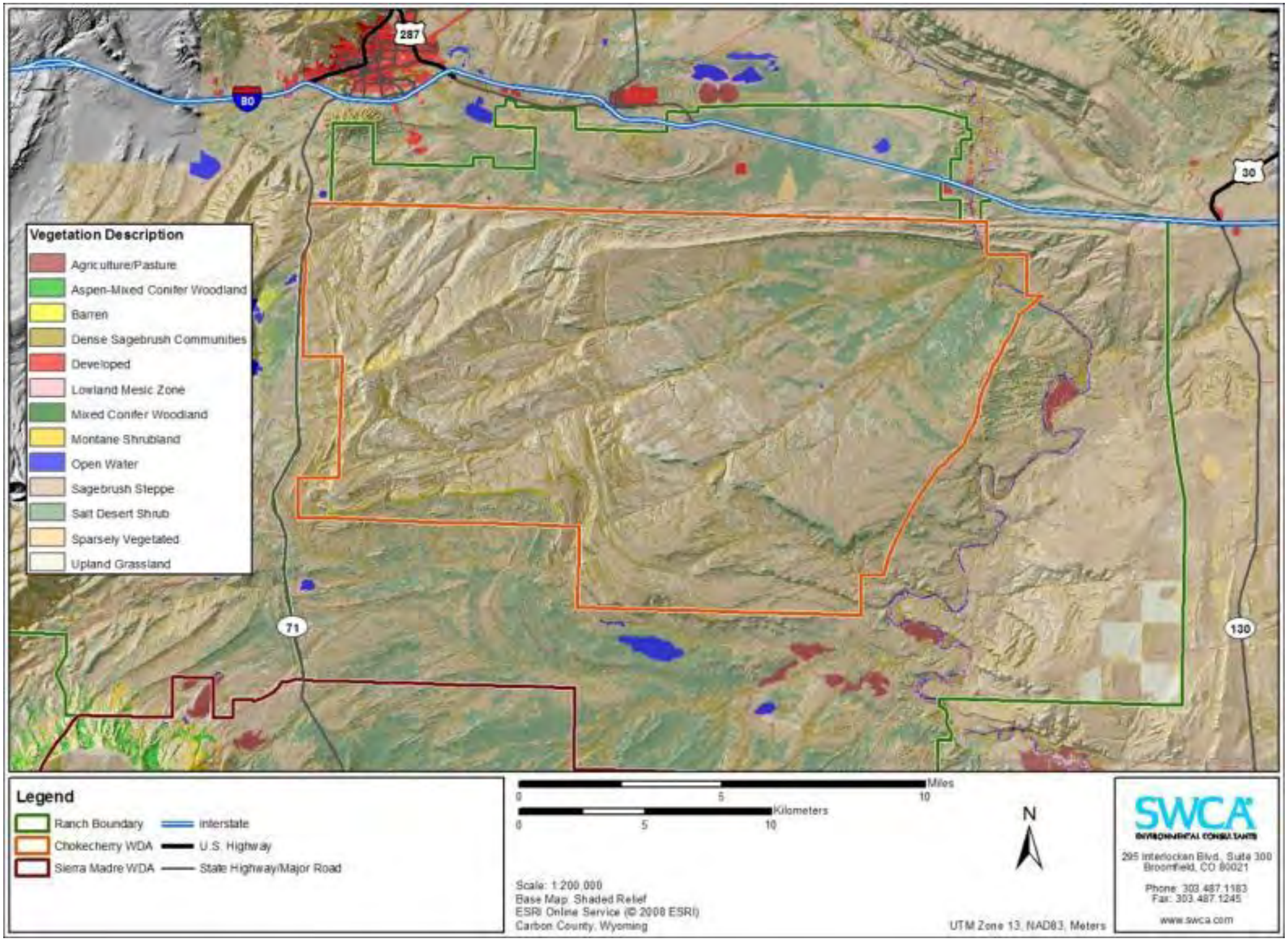

Figure 3. Chokecherry vegetation cover.

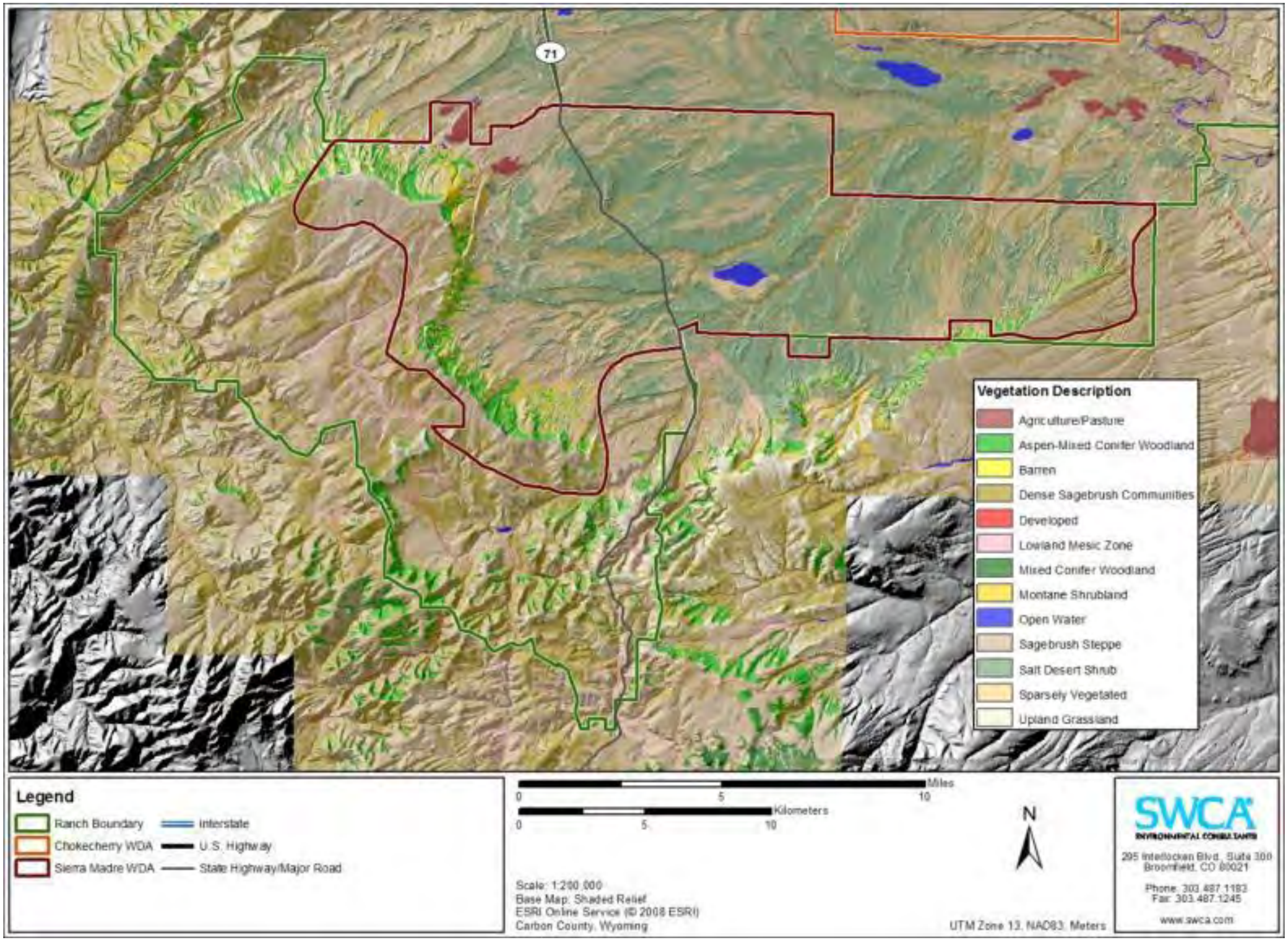

Figure 4. Sierra Madre vegetation cover.

1.2 DRAFT EAGLE CONSERVATION PLAN GUIDANCE

The U.S. Fish and Wildlife Service (Service), in January 2011, released Draft Eagle Conservation Plan Guidance (Draft ECP Guidance) to "provide a 'road map' for Service employees and industry to use for the type of analysis and science that should be considered in a robust permit application to provide flexibility to the wind energy industry while safeguarding wildlife."

The Draft ECP Guidance describes a process for wind energy developers to utilize in collecting and analyzing information that could lead to a programmatic permit under the Bald and Golden Eagle Protection Act (BGEPA) to authorize incidental take of eagles at wind energy facilities. The purpose of using the process in preparing an ECP is to assess the risk of projects to eagles and assess how siting, design, and operational modifications can mitigate that risk.

The Draft ECP Guidance calls for scientifically rigorous surveys, monitoring, assessment, and research designs proportionate to the risk to eagles. The ECP should: (a) document early pre-construction assessments to identify important eagle use areas; (b) document a commitment to avoiding, minimizing, and/or mitigating for potential adverse effects to eagles; and (c) document procedures to monitor for impacts to eagles during construction and operation.

The Service recommends that ECPs be developed in five stages. Each stage builds on the prior stage, such that together the process is a progressive, increasingly intensive analysis of the likely effects of the development and operation of a particular site and configuration on eagles. The Draft ECP Guidance recommends that at the end of each of the first four stages, project proponents determine which of the following categories the project, as planned, falls into: (1) high risk to eagles, little opportunity to minimize effects; (2) high to moderate risk to eagles, but with an opportunity to minimize effects; (3) minimal risk to eagles; or (4) uncertain.

The five-stage approach for developing an eagle conservation plan is set out below:

- Stage 1 – Identify potential wind energy facility locations with manageable risk to eagles at the landscape level.

- Stage 2 – Obtain site-specific data to predict eagle fatality rates and disturbance take at wind facility sites that pass Stage 1 assessment.

- Stage 3 – Conduct turbine-based risk assessment and estimate the fatality rate of eagles for the facility evaluated in Stage 2, excluding possible advanced conservation practices (ACPs).

- Stage 4 – Identify and evaluate ACPs that might avoid or minimize fatalities identified in Stage 3. When required to do so, identify compensatory mitigation necessary to reduce any remaining fatality effect to a no-net-loss standard.

- Stage 5 – Document annual eagle fatality rate and disturbance effects. Identify additional ACPs to reduce observed level of mortality, and determine if initial ACPs are working and should be continued. When appropriate, monitor effectiveness of compensatory mitigation.

In Stage 2 of the Draft ECP Guidance, project proponents are to collect detailed, site-specific information on eagle use of the specific sites that passed review in Stage 1. The information collected in Stage 2 is used to generate predictions of the annual number of fatalities for the Project (Stage 3) and to identify important eagle use areas likely to be affected by the Project.

In its Draft ECP Guidance, the Service defines important eagle use areas as an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost site that are essential for the continued viability of the site for breeding, feeding, or sheltering eagles. PCW's Eagle Conservation Plan (ECP) describes the important eagle use areas that are in proximity to the Project Site.

The following sections in this report identify the potential prey species identified within the WDAs, Ranch, and surrounding landscapes and describe their potential for supporting resident and non-resident eagles and other raptor species. The analyses of the datasets presented in this report are used to inform the identification of important eagle use areas as part of Stage 2 of the Draft ECP Guidance. The data also help to inform Project siting, avoidance and minimization measures, and advanced conservation practices that have been identified in the ECP for the Project.

1.3 INFLUENCE OF PREY BASE ON GOLDEN EAGLES

Golden eagles (*Aquila chrysaetos*) in North America feed primarily on mammalian prey (80-90%) and secondarily on birds, while other taxa (e.g., reptiles, fish) are minor components of golden eagles' overall diet (Olendorff 1976). Within the mammalian category, leporids (e.g., rabbits and hares) and sciurids (e.g., prairie dogs, ground squirrels, marmots) comprised 49-94% of prey items reported by 24 studies in the western U.S. (as compiled in Kochert et al. 2002). However, there is regional variation in the relative importance of these two mammalian groups and even within each group (Kochert et al. 2002). Beebe (1974) also noted that some North American golden eagle nesting populations have a predator-prey association with at least one species of lagomorph, most commonly rabbits and hares. Other western U.S. studies published since Kochert et al. (2002) have also noted the predominant proportion of lagomorphs in golden eagle populations (87% of mammalian prey in Stahlecker et al. 2009; an "overwhelming proportion" of diet in Preston 2011, p. 12).

A 23-year study in southwestern Idaho found a positive correlation between golden eagle reproduction and jackrabbit abundance (Steenhof et al. 1997). In southwestern Idaho, golden eagles preferentially hunted in jackrabbit habitat during the non-breeding season and in proportion of availability during the breeding season (Marzluff et al. 1997). In eastern Utah, golden eagle nest productivity was positively correlated with rabbit abundance (Bates and Moretti 1994). A similar predator-prey feedback association is suspected for a decline in golden eagle breeding numbers and nest success rates with a decrease in the lagomorph population in the Bighorn Basin of northern Wyoming (Preston 2011).

A literature review for studies related to eagle productivity and white-tailed prairie dogs (*Cynomys leucurus*) or Wyoming ground squirrel (*Urocitellus elegans*) abundance resulted in zero publications. The majority of published papers pertain to eagle-lagomorph studies, suggesting that dispersed prairie dog colonies such as those in the Project Site and other sciurid populations cannot support nesting eagle populations and are, at best, a secondary prey item. This is further supported by the short seasonal availability and variable diurnal availability of Wyoming ground squirrels and white-tailed prairie dogs as potential prey items. Both species hibernate between approximately late July and early April (Fitzgerald et al. 1994, Clark and Stromberg 1987) and exhibit distinct diurnal use patterns during hot periods of the summer when they spend much of the daylight hours below ground (Fitzgerald et al. 1994, Clark and Stromberg 1987.

Few studies have assessed composition of prey items in the diets of golden eagles in Wyoming. A review of these studies indicates that leporids, primarily white-tailed jackrabbit (*Lepus townsendii*) and cottontails (*Sylvilagus* sp.), consistently ranked as primary prey species (MacLaren et al. 1996, Phillips and Beske 1990). Leporids comprised 40% of prey taken (and 62% of total biomass) by golden eagles near Medicine Bow (MacLaren et al. 1996), followed by prairie dogs (27% of prey, 18% of biomass), and ground squirrels (18% prey, 5% biomass). Phillips and Beske (1990) found that white-tailed jackrabbits were the most important prey species for golden eagles in Carbon and Converse counties. Deblinger and Alldredge (1996) specifically report on golden eagles preying on pronghorn (*Antilocapra americana*) on multiple occasions in the Great Divide Basin north of Rawlins. The authors note that prey species frequently taken by golden eagles in this region also included white-tailed jackrabbits, desert cottontails (*Sylvilagus audubonii*) and greater sage-grouse (*Centrocercus urophasianus*) (as cited from U.S. Dept. of Interior 1978).

Since 2008, several efforts have focused on identifying and characterizing potential eagle and raptor prey species in the Project Site (Western EcoSystems Technology, Inc. [WEST] 2008, 2008b; Smith Environmental and Engineering [SMITH] 2010; SWCA 2012, *unpublished data* [Appendix A]). In addition to these Project Site-specific survey efforts, the BLM and WGFD maintain datasets related to potential prey species. These efforts and datasets provide information necessary to identify the types of available prey and their distribution across the Project Site, Ranch, and surrounding areas.

Based on the results of these efforts, prey species potentially available within the Project Site and surrounding areas reflects the prey species that have been identified for other regions in Wyoming. White-tailed prairie dogs, leporids (white-tailed jackrabbits and cottontails), waterfowl and waterbirds, big game species, Wyoming ground squirrels, and greater sage-grouse all occupy portions of the Project Site, Ranch, or surrounding landscape. With the exception of greater sage-grouse, the status of these species within the Project Site and foraging areas that represent important eagle use areas are identified in the following sections. Greater sage-grouse are not reviewed in this assessment as a separate review has been completed specifically for sage-grouse (SWCA 2012) and incorporated into PCWs Greater

Sage Grouse Conservation Plan (August 2012). A copy of the Greater Sage-grouse Conservation Plan was provided to the Service on August 21, 2012.

1.4 INFLUENCE OF PREY BASE ON BALD EAGLES

Bald eagles (*Haliaeetus leucocephalus*) are considered an opportunistic feeder, but in most areas they preferentially prey on fish over other prey species (Bent 1937, Sherrod 1978, Stalmaster 1987). As a result, bald eagle densities are typically localized where fish are abundant (Johnsgard 1990), including inland lakes and waterways. Non-fish prey is typically dominated by other water-associated species such as ducks, gulls, and other waterfowl (Johnsgard 1990).

Bald eagles will prey upon land-based animals, although these occurrences are typically opportunistic and in the form of road kill and carrion. At inland locations, prey selection is seasonally biased when lakes and rivers are frozen in winter. For Wyoming's wintering eagle population, concentrated foraging habitats that generally support high prey densities include ice-free water bodies as well as areas with concentrations of big game or livestock (Service 2003). In the BLM Rawlins Field office, concentrated foraging habitats (e.g., ice-free water bodies, crucial ungulate winter ranges with high mortality, livestock stockyards) are not known to exist and foraging opportunities are often limited to scavenging events (i.e., road kill from vehicle collisions along roadways) (Service 2003).

2.0 SPECIES-SPECIFIC PREY BASE ASSESSMENTS

2.1 WHITE-TAILED PRAIRIE DOGS

Golden eagles and other raptors are known to prey on white-tailed prairie dogs (Campbell and Clark 1981); however, white-tailed prairie dogs are generally available as prey items only from about mid-March to late October (Keinath 2004) with most adults becoming unavailable beginning in late July as they enter their burrows (Fitzgerald et al. 1994, Clark and Stromberg 1987). Peak activity occurs from late May when juveniles emerge from burrows to late July when adult males begin to descend into burrows. Adult females descend two to three weeks later than males and emerge two to three weeks later in the spring. Juveniles begin to hibernate in late October or early November (Keinath 2004).

The state of Wyoming contains approximately 71% of the current national range of white-tailed prairie dog, a fossorial (burrowing) mammal that typically inhabits shrub-steppe and grassland assemblages in cool intermountain basins (Keinath 2004). Prairie dogs are known to provide habitat and forage for many other wildlife species including other BLM sensitive species, such as mountain plover (*Charadrius montanus*), western burrowing owl (*Athene cunicularia hypugaea*), swift fox (*Vulpes velox*), golden eagle, ferruginous hawk (*Buteo regalis*), and black-footed ferret (*Mustela nigripes*). The white-tailed prairie dog is a large ground squirrel (Family *Sciuridae*) that ranges in length between 33-38 cm (13-15 in) and generally weighs 0.8-1.5 kg (1.8-3.3 lbs). Habitat includes mid-elevation (approximately 1,150-3,050 meters above mean sea level) grasslands and shrublands with moderate slope (less than 20%). White-tailed prairie dogs inhabit higher elevation grasslands and shrub-steppe with more abundant shrub cover than its close relative, the black-tailed prairie dog (*C. ludovicianus*) (Campbell and Clark 1981). White-tailed prairie dogs are colonial, forming "towns" averaging 3.2 prairie dogs per hectare (Clark 1973). Unlike black-tailed prairie dogs that form tight colonies with clearly defined boundaries, white tailed prairie dogs form diffuse colonies of burrows comprised of amorphous fingers and clusters (Seglund et al. 2004).

White-tailed prairie dogs have experienced population declines in recent years and current occupancy estimates are commonly inflated because occupancy is generally based on historic data and pre-plague burrow distributions that are not indicative of current occupation (Keinath 2004, Seglund et. al 2004, Pauli et. al 2006). In 2010, the Service determined that the white-tailed prairie dog does not warrant protection as a threatened or endangered species under the Endangered Species Act (ESA) of 1973 because its overall distribution has not substantially changed and large acreages of occupied habitat exist across its range, particularly in Wyoming (Service 2010). In Wyoming, however, the white-tailed prairie dog remains listed as a sensitive species by the BLM.

Much of south-central Wyoming contains overlapping populations of several common fossorial mammal species which may potentially create challenges when attempting to delineate white-tailed prairie dog towns. Other burrowing mammals that create burrows similar to white-tailed prairie dogs include Wyoming ground squirrel (*Urocitellus elegans*), American badger (*Taxidea taxus*), and pocket gophers (*Thomomys* spp.). The burrows and activity of each species are often misidentified so it is important to understand the primary differences between fossorial mammal species and their burrowing behavior to ensure that each species is correctly identified, and occupancy and burrow densities are accurately described. Wyoming ground squirrels inhabit diffuse colonies of low density burrows and can use several habitat types from open ground to tall sagebrush. Pocket gophers are solitary with a complex burrow system that rarely overlaps other individuals. Burrow systems typically contain tubular tunnels near the surface and larger mounds with covered burrow entrances. American badgers are a wide ranging mustelid with a propensity for burrowing in a variety of soil types. They tend to have several dozen burrows spread across their range that are occupied in a rotational pattern. American badgers feed upon the smaller fossorial mammals by visiting colonies and excavating burrows.

2.1.1 White-tailed Prairie Dog Occurrences in the Project Site

White-tailed prairie dog occurrences have been documented within the Project Site. The Bolten Ranch Complex (hereafter Bolten Complex) is one of several areas in the State of Wyoming that has not yet been block cleared for black-footed ferrets. Numerous prairie dog colony mapping and surveys have occurred in the vicinity of the Project Site. The majority of those surveys have identified small areas of low-density dispersed use (WEST 2008, SWCA 2012, WGFD spatial data per BLM) while one survey (SMITH 2010) found large areas of fossorial mammal activity. The findings in SMITH (2010) are in conflict with the other scientific surveys in the vicinity of the Project Site and are not representative of potential eagle prey-base availability.

WGFD provided initial maps of white-tailed prairie dog colonies in the Bolten Complex from data collected in approximately the year 2000 (Figure 5, Heath Cline, BLM Rawlins Field Office Biologist, personal communication). These mapping efforts identified several active prairie dog colonies at the base of the Bolten Rim near Teton and Kindt reservoirs and in the Central Basin north of Sage Creek.

WEST collected general wildlife data beginning in 2008 as part of their baseline wildlife surveys for the Project Environmental Impact Statement (WEST 2008). WEST reported that virtually all potential prairie dog habitat within the original Sierra Madre WDA was incidentally searched while conducting mountain plover surveys, greater sage-grouse brood surveys, or during travel for avian point counts. In addition, two areas of potential prairie dog activity were identified near proposed transportation and power line corridors between the Chokecherry and Sierra Madre WDAs in the Central Basin.

WEST (2008, p.5) concluded that "there is no physical evidence to suggest that colonies within the 'non block-cleared' areas of the project boundaries ever supported anything but small, perhaps ephemeral, scattered pockets of prairie dogs and would be of poor quality for black-footed ferrets." WEST (2008) noted that the Central Basin between the WDAs does support prairie dog colonies and that two general areas of colonies may exceed 1,500 and 2,000 acres, respectively. They further noted that burrows in those two areas were scattered in distribution. These areas correspond to those that were identified by WGFD (Figure 5) along the Bolten Road. WEST's findings are consistent with the incidental observations that have been made as part of other wildlife surveys within the Project Site and are consistent with active burrow mapping completed by SWCA in 2012 and described in Appendix A and in subsequent sections of this Report. SWCA began recording incidental observations of all wildlife species within the Project Site beginning in 2009. SWCA has recorded very few observations of prairie dogs with the majority of those observations occurring in areas along the Bolten Road south of the Chokecherry WDA. No recorded observations of prairie dogs have been made in the Miller Hill area of the Sierra Madre WDA by SWCA since it first began work in the Project Site in 2009.

In 2010, BLM contracted SMITH to perform burrow mapping as part of efforts related to block clearances for black-footed ferret. The report issued by SMITH as part of this effort (SMITH 2010) present burrow densities (the report does not note what types of burrows SMITH counted in their densities) and give no indication of activity level, burrow condition or size, or observed use by white-tailed prairie dog. SMITH (2010) concludes that the Bolten Complex consists of suitable habitat characteristics for reintroduction of the black-footed ferret. This conclusion is based on identification of 198 white-tailed prairie dog colonies that comprised, in part, one complex (7-kilometer [km] criterion; Biggins et al. 1993) and two sub-complexes (1.5-km criterion; Biggins et al. 2006).

SMITH's assessment contradicts the WGFD mapped active white-tailed prairie dog colonies and the findings of WEST who concluded that "there is no physical evidence to suggest that colonies within the 'non block-cleared' areas of the project boundaries ever supported anything but small, perhaps ephemeral, scattered pockets of prairie dogs and would be of poor quality for black-footed ferrets." Additionally, the burrow densities calculated in the SMITH (2010) report exceed those reported for Wyoming in the literature (Menkens et al. 1987, Clark and Stromberg 1987) in many cases by several orders of magnitude. SMITH (2010) reports an average burrow density across the Bolten Complex of approximately 45 burrows per acre. In one case, SMITH (2010) reports an average burrow density of 1,353 burrows per acre. These extremely high values are in contrast to other published values for white-tailed prairie dog burrow densities of less than 15 per hectare (6 per acre) (Clark and Stromberg 1987).

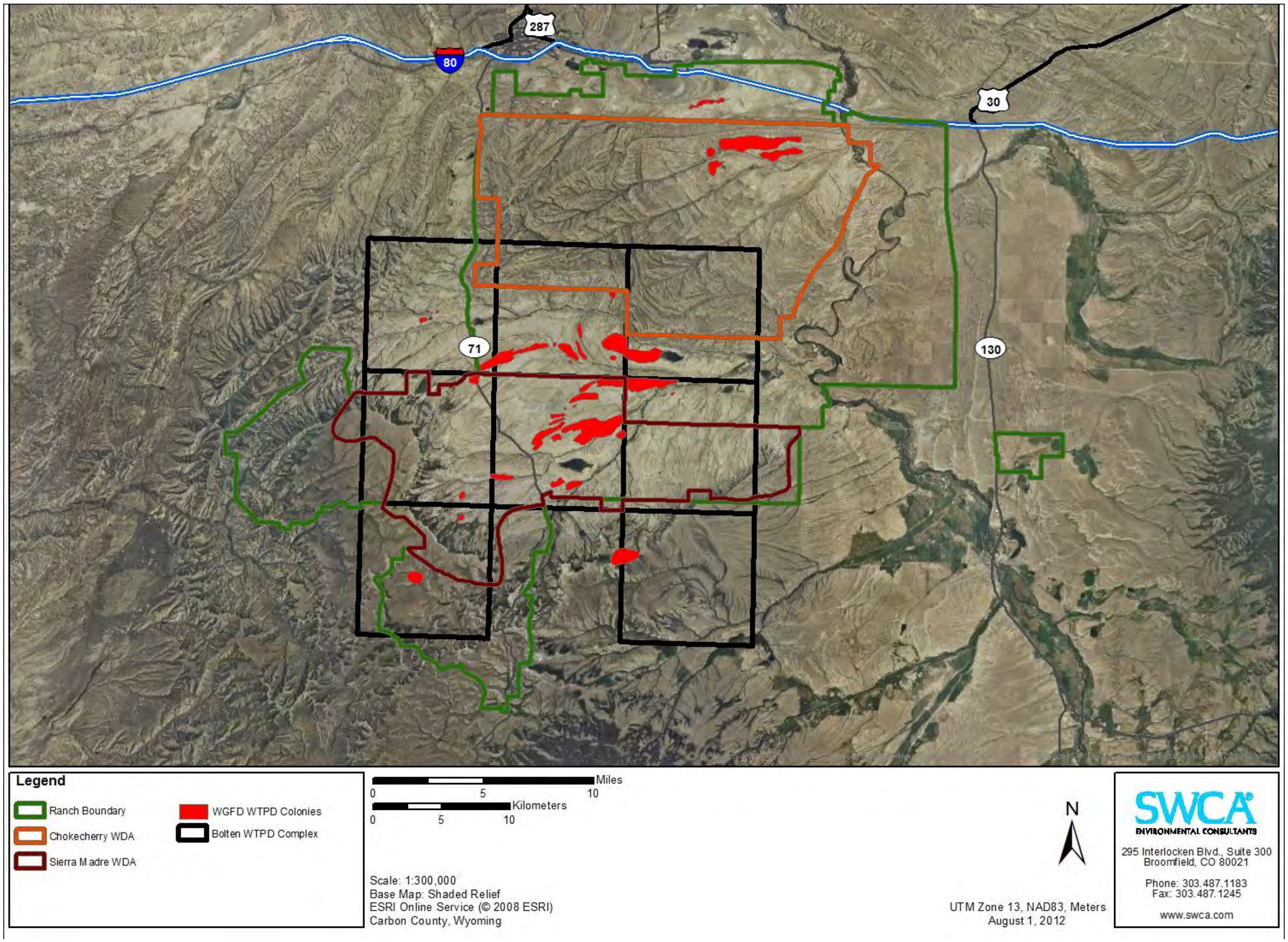

Figure 5. White-tailed prairie dog colonies in and surrounding the Bolten Complex (WGFD 2000).

The findings presented in SMITH (2010) are not consistent with published densities of white-tailed prairie dog burrows, WGFD's mapped colonies, the findings of WEST (2008), or the observations by SWCA and BLM biologists (Heath Cline, BLM Rawlins Field Office, personal communication). Due to these inconsistencies, SWCA initiated data collection efforts in 2012 to evaluate burrow densities in the polygons identified in SMITH (2010) to better characterize white-tailed prairie dog use across the Project Site (Appendix A, Figure 3).

Initially, SWCA conducted a full Project Site reconnaissance to formally assess the potential accuracy of the SMITH (2010) data and conclusions. An SWCA biologist evaluated 27 sites located with the polygons identified in SMITH (2010) Reconnaissance level surveys consisted of locating burrows, determining current or historical use (recent diggings, old or recent scat), recording presence of any small mammals in the area, and measuring burrow entrance diameters to aid in species identification. Appendix A to this Report contains the methods and results of these survey efforts. Reconnaissance surveys identified much lower burrow densities and activity levels than those identified in SMITH (2010). Additionally, reconnaissance survey results indicated that much of the burrowing activity in areas identified as having white-tailed prairie dog activity in SMITH (2010) could be attributed to other species including Wyoming ground squirrels, badgers, or pocket gophers.

Because of the discrepancies between reconnaissance survey results and SMITH (2010) results as well as the contradictory conclusions between the WEST (2008) and SMITH (2010) reports, an expanded survey effort was initiated to better understand burrow densities and potential use of white-tailed prairie dogs and other prey species in the Project Site. A total of 74, 1,000 meter long and 6-meter wide transects (Appendix A, Figure 3) were surveyed within the SMITH (2010) polygons using the methods described in McDonald et al. (2011) and Biggins et al. (1993). All burrows encountered during survey efforts were recorded and categorized according to condition, activity level, and species. Total white-tailed prairie dog burrows ranged from 1.8 per acre on Miller Hill to 8.8 per acre along the Bolten Road just below the Bolten Rim (Table 1). All white-tailed prairie dog burrows encountered on Miller Hill were inactive. No sign of recent activity or individuals were observed in this portion of the Project Site. In addition, the majority of burrows that were identified were of poor quality with collapsed entrances and no sign of recent occupation.

Active white-tailed prairie dog burrow densities generally followed the same trends as total burrow densities discussed above but were substantially lower than total burrow density. Active burrows ranged from zero per acre in the higher elevations of Miller Hill and Sage Creek Rim areas to 3.3 active burrows per acre in the colonies along the Bolten Road just below the Bolten Rim (Table 1). These burrow densities are at the lower end of the range of conditions reported for other white-tailed prairie dog colonies (Menkens et al. 1987, Clark and Stromberg 1987), supporting the conclusion that the Bolten Complex provides small, scattered pockets of prairie dogs that likely provide only low foraging potential for raptors and eagles.

Table 1. Burrow densities of white-tailed prairie dogs and other fossorial mammals throughout the Project Site.

Location	Transects (n)	Total WTPD burrows (burrows/acre)		Active WTPD burrows (burrows/acre)	
		Average	95% CI	Average	95% CI
Bolten	26	9.0	2.1	2.6	1.4
Central Basin	29	7.1	2.5	1.6	2.0
Miller Hill	11	1.8	1.44	0.0	-
Sage Creek Rim	3	7.9	5.36	0.0	-
Severson	5	6.7	2.10	0.1	0.26

2.1.2 Assessment of White-tailed Prairie Dogs as Prey in the Project Site

Based on the mapping efforts of WGFD, the conclusions made in WEST (2008) and the results of survey efforts completed by SWCA (Appendix A), it is apparent that the results of SMITH (2010) are fatally flawed. The burrow densities reported by SMITH (2010) are orders of magnitude greater than the highest burrow densities observed during SWCA surveys, WEST (2008), and SWCA observations (2012) (Appendix A), and densities that are reported in the literature for white-tailed prairie dogs (Clark 1973, Clark and Stromberg 1987, Menkens et al. 1987, Keinath 2004). In many cases, the burrow densities reported by SMITH (2010) are higher than those reported for the closely related black-tailed prairie dogs which are known to form dense, social communities with high burrow densities and concentrated populations (Clark 1973, Campbell and Clark 1981, Severson and Plumb 1998, Seglund et al. 2004). The assumption that delineated prairie dog colonies in SMITH (2010) contain a viable prey source for golden eagles is not valid. Colony locations identified by WGFD and burrow densities in the Project Site as measured by SWCA and as reported by WEST (2008) are more representative of expected white-tailed prairie dog use and should be used as the best available scientific information to inform Project siting and identification of important eagle use areas.

Furthermore, burrow density of white-tailed prairie dogs is not reflective of actual population density (Menkens et al. 1987) and; therefore, should not be directly correlated with identification of important foraging areas. However, the equations provided in Menkens et al. (1987) do provide a method for roughly calculating the potential density of white-tailed prairie dogs across the Project Site to identify those areas that might provide some foraging opportunities for eagles and other raptors.

$$\boldsymbol{Prairie\ dog\ density\ per\ hectare} = \mathbf{3.77 + 0.09} * \boldsymbol{Burrow\ Density}, \mathbf{(r^2 = 0.47, F = 2.66, p < 0.05)}$$

Based on both the active and total burrow densities presented in Table 1 and using the Menkens et al. (1987) equation to predict the density of white-tailed prairie dogs, mean white-tailed prairie dog density was calculated as 1.7 prairie dogs per acre (U95% CI = 1.74, L95% CI = -1.4). Maximum density was estimated at 1.85 prairie dogs per acre. The highest density would occur in the survey areas along the Bolten Road between the Chokecherry and

Sierra Madre WDAs and in the Central Basin outside of the turbine development area in the Sierra Madre WDA. The Menkens et al. (1987) equation predicts a minimum density of 1.53 prairie dogs per acre. The actual expected minimum density in the Project is 0 prairie dogs per acre as multiple areas were identified as not having prairie-dog burrows. These low- and no-density areas occur on Miller Hill and the Sage Creek Rim in the Sierra Madre WDA, the Central Basin in the Sierra Madre WDA, and on portions of Severson Flats in the northeast corner of the Chokecherry WDA. These density calculations are lower than those reported for other areas (Menkens et al. 1987, Fitzgerald et al. 1994, Clark and Stromberg 1987) and confirm that use in the Project Site is characteristic of dispersed and ephemeral occupation by white-tailed prairie dogs. These low occupation levels provide low foraging potential for eagles and raptors.

While the population evaluation provides adequate information to identify that prairie dog activity in the Project Site only provides opportunistic foraging opportunities for eagles, additional analyses were completed to identify which of the white-tailed prairie dogs colonies provide the best foraging opportunities. Although a number of white-tailed prairie dog colonies are delineated through the Project Site and in the immediate surrounding areas, most colonies are not active (historic colonies) or have population densities too low to support foraging eagles or other raptors. The relative quality of white-tailed prairie dog colonies in the Project Site was assessed at two levels: burrow density and burrow activity. First, colonies that had total burrow densities greater than 7.0 total burrows per acre (greater than the average burrow density reported in Clark and Stromberg 1987) were considered adequate size to provide some foraging activities for eagles. Nine white-tailed prairie dog colonies (37.5 percent of all mapped colonies) satisfied this criterion (Appendix A). However, not all of these colonies had active burrows. Activity for each of the nine white-tailed prairie dog colonies was assessed to determine if the colonies were active and, if active, whether they would provide some level of foraging opportunity for eagles and other raptors. An active-to-total burrow ratio was used as an index to determine overall activity of the largest white-tailed prairie dog colonies. All colonies with total burrow densities greater than 7.0 total burrows per acre and activity index greater than 0.15 (i.e., 15% of burrows are active) were identified as adequately active colonies able to support some foraging by eagles or other raptors. Three white-tailed prairie dog colonies (12.5 percent of all mapped colonies) satisfied these criteria (Figure 6). These three colonies correspond to those along the Bolten Road with the highest active burrow densities identified in Table 1.

The low foraging potential resulting from the low densities is further reduced by the seasonal aboveground use by white-tailed prairie dogs. The absence of white-tailed prairie dogs as a prey source for up to 8 months per year during their hibernation period suggests that this species is not a key forage source for golden eagles and other raptors for the majority of the year (roughly August to April) and is at best an opportunistic prey source.

Eagle and raptor foraging opportunities associated with white-tailed prairie dogs are low across the Project Site based upon (i) the best available scientific data for the Project (WEST 2008, SWCA 2012), (ii) the location of the highest white-tailed prairie dog population densities outside of areas of likely turbine development, and (iii) seasonal absence of white-tailed prairie dog during hibernation.

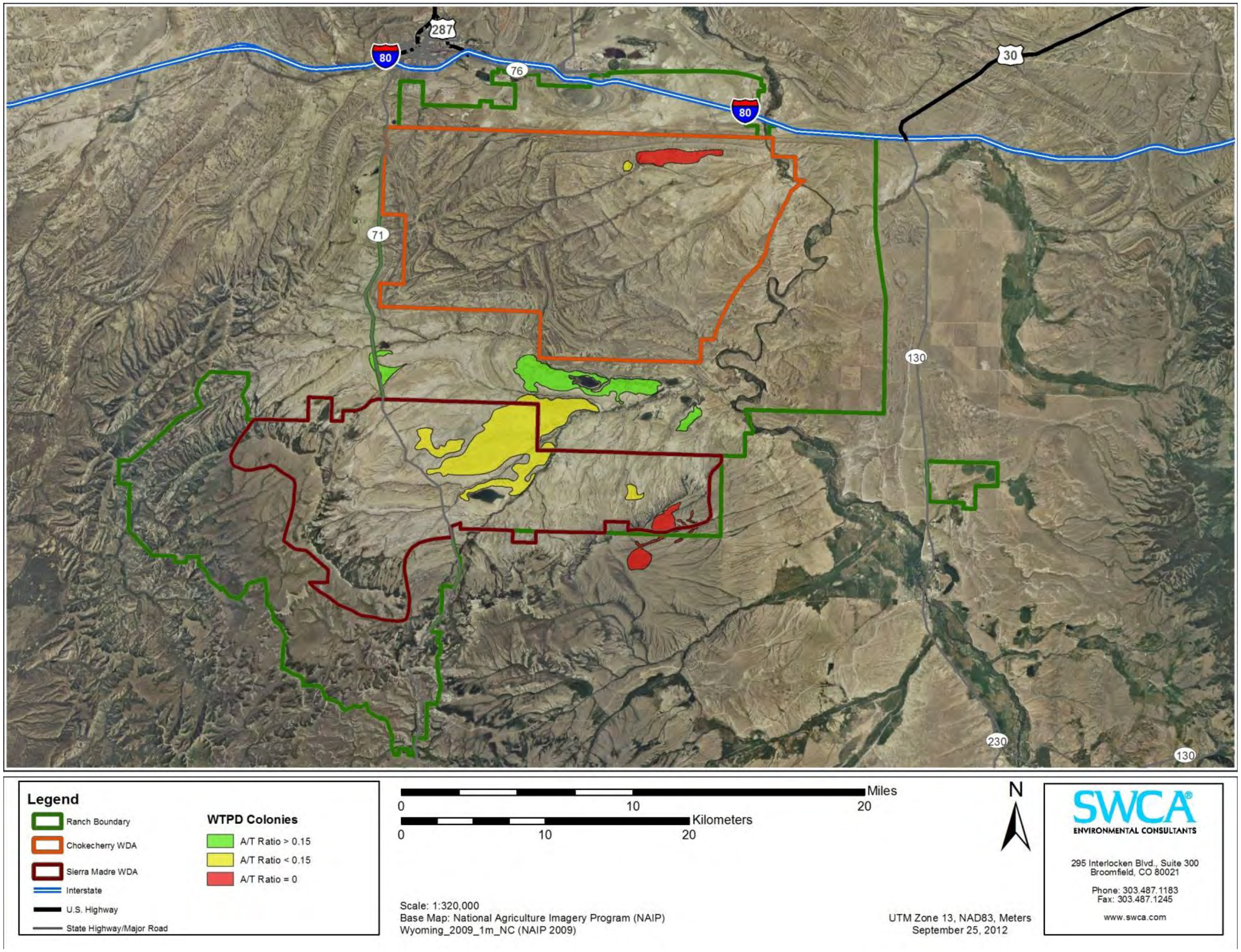

Figure 6. Nine white-tailed prairie dog colonies with greater than 7.0 total burrows per acre (green colored polygons represent colonies with greater than 15% active burrows).

2.2 WYOMING GROUND SQUIRREL

Wyoming ground squirrel occur throughout southern Wyoming and are a known prey item for golden eagles, although studies in Wyoming show they only comprise approximately 18% of the prey taken by golden eagles compared to 62% leporids and 27% prairie dogs (MacLaren et al. 1996). No additional studies on the predator-prey relationship of eagles and Wyoming ground squirrel were found.

Wyoming ground squirrel habitat includes grasslands and sagebrush with loose, deep soils. Other than eagles, predators include hawks, badgers, coyotes, bobcats, fox, weasels, and rattlesnakes. Ground predators may be a significant cause of Wyoming ground squirrel mortality (Zegers 1984). This species is one of the least social ground squirrels (Streubel 2000a). While Wyoming ground squirrels do live in colonies, in actuality these colonies are little more than loose groupings of individuals who tend to aggregate in quality habitat and foraging locations (Fitzgerald et al. 1994). Sylvatic plague can impact populations (Armstrong et al 2011). Adults weigh 7-14 oz (Reid 2006); the mean weight of adult is 10.3 oz (Zegers 1984). Mean weight when emerging from hibernation 8.2 oz for males and 6.7 oz for females (Zegers 1984). Fattening occurred in June and July, before hibernation.

Similar to white-tailed prairie dogs, Wyoming ground squirrels are only active from mid-March/early April (depending on late winter conditions) to late July when they begin to hibernate (Armstrong et al. 2011, Reid 2006). By mid-September, most all ground squirrels have entered hibernation. Males usually emerge from hibernation one to three weeks before the females. Breeding takes place a few days after females emerge from hibernation and one litter of 5 to 7 young is born in late April or May after a three- to four-week gestation period (Zegers 1984, Reid 2006). Juveniles emerge from burrows at 4 to 5 weeks old, therefore highest population densities above ground occur between May and July.

Even during their active season, ground squirrels are typically only above ground during cooler weather in the mornings and evenings, retreating into their burrows during hot weather (Clark and Stromberg 1987). Wyoming ground squirrels spend around 21 hours per day inside their burrows (Zegers 1984). Wyoming ground squirrel colonies are unlikely to achieve the necessary densities required to consistently attract eagles and to support golden eagle nesting populations due to the restrictive activity schedule and colony structure of Wyoming ground squirrels and; therefore, are at best a secondary prey item.

2.3 LEPORIDS

Leporids are known to be an important prey source for eagles in Wyoming. As stated previously, leporids were found to comprise up to 40% of prey taken by golden eagles near Medicine Bow by MacLaren et al. (1996), and Phillips and Beske (1990) found that white-tailed jackrabbits were the most important prey species for golden eagles in Carbon and Converse counties. Other scientific studies (Bates and Moretti 1994, Preston 2011) have determined that fitness and overall nesting success of some breeding populations of golden eagles may depend heavily on the cyclic abundance and deficiencies of leporid populations, especially the white-tailed jackrabbit (Steenhof et al. 1997). These cycles in leporid populations are caused by an abundance or shortage of available forage, with shortages of forage typically linked to periods of drought. Presently, much of Wyoming is in a stage of moderate to severe drought which has been persisting to varying degrees since 1999 (Wyoming Water Development Office 2012) and may be impacting leporid populations and the predators who depend on them.

The leporids commonly found within the Project Site are white-tailed jackrabbit, desert cottontail and mountain cottontail (*S. nuttallii*). The density of white-tailed jackrabbits in Wyoming has been estimated to average 7 per km^2 (Rogowitz and Wolfe 1991). Adults typically weigh 7.5 pounds and breed from late February to mid-July. Females have up to four litters per year of 1-11 young each (4-5 young on average) (Reid 2006, Streubel 2000b). Both species of cottontail weigh around 2 pounds as adults and have up to five litters per year during warm months (Reid 2006). Desert cottontail litters average 2-4 young while mountain cottontail average 4-8 young per litter.

These three species appear to be diffuse and widespread across the Project Site. White-tailed jackrabbit typically inhabit the lower-lying Central Basin of the Project Site, which is comprised if salt desert scrub and dense sagebrush steppe vegetation assemblages, but may also be found in higher areas of the Project Site. Desert cottontail may also be found in the Central Basin, the North Platte River corridor, and to a lesser extent on the Chokecherry plateau and Miller Hill, while mountain cottontail mainly occur on Miller Hill and to a lesser extent on the higher elevations of Chokecherry. All three species tend to inhabit areas with moderate shrub densities for use as cover from predators.

All three species are crepuscular, feeding predominantly during the early morning and late evening hours; however white-tailed jackrabbits are known to forage throughout the night as well. Though leporids are able to meet much of their water needs through absorbing moisture from forage, they are attracted to the moist low-lying vegetation along state and county roads surrounding the Project. This attraction leads to many individuals being killed along these roadways and may represent scavenging opportunities for eagles in the vicinity of the Project Site on public roads and highways such as Interstate 80 and State Highways 130 and 71.

Leporids differ from many potential eagle prey species in that they do not hibernate and are active during the winter months, which may create some additional foraging opportunities for eagles during this time of year. This winter activity is typically concentrated in lower-lying basin areas with little or no snow cover, or areas where they are able to forage from underneath shrub cover.

Scientific literature describes the importance of the eagle-leporid predator-prey relationship. Leporids within the Project Site likely represent a quality food source for eagles. However, due to leporid’s mainly crepuscular habits and the diffuse nature of leporid populations across the many habitats within the Project Site, they are likely taken as prey opportunistically, albeit regularly, by eagles and other raptors.

2.4 BIG GAME SPECIES

Big game species provide eagle foraging opportunities throughout the year. During spring and summer months, big game parturition areas can be important as eagles will prey on young deer (*Odocoileus* spp.), elk (*Cervus elaphus*), and pronghorn (*Antilocapra americana*). No parturition areas have been identified by PCW, WGFD, or BLM in the WDAs or Project vicinity; however, young pronghorn may be found in the Central Basin and young mule deer may be found along the North Platte River during the spring and early summer. Observations of two golden eagle and one bald eagle nest during the recovery of greater sage-grouse GPS telemetry tags have shown high concentrations of juvenile pronghorn legs located on and around the base of these nests, indicating that young pronghorn are a viable prey item taken regularly by eagles nesting in the vicinity of the Project Site.

During fall and early winter months, carcasses and remains left by hunters can be an important food base for eagles. Hunting in the vicinity of the Project Site occurs primarily in the Red Rim-Grizzly WHMA, in block federal lands south of the Sierra Madre WDA, and in the Medicine Bow National Forest. Privately owned and controlled lands are either not hunted or are hunted very lightly and do not provide adequate carcasses or remains to be important for eagle use. Areas hunted south of the Sierra Madre WDA are outside of the likely turbine development area and will not be impacted by wind development activities.

During winter months, carcasses of winter-killed or vehicle collision-killed big game species is an important forage source for bald and golden eagles. Areas of big game winter range have been identified by WGFD in the vicinity of the Project (Figure 7). Portions of mule deer winter range overlap with the northern portions of the Chokecherry WDA along the Hogback and pronghorn winter range occurs east of the Chokecherry WDA. PCW is currently working with WGFD, BLM, and the University of Wyoming to better understand use of the Project Site by mule deer and other big game species. These efforts will continue and data will be used to inform final Project design and mitigation considerations.

Presently, the principal risk to bald and golden eagles in the vicinity of the Project is collision with highway traffic. Wintering and migratory eagles are attracted to road kill on area highways (including Highway 130 north of Saratoga, Interstate 80 in the area of Sinclair and Rawlins, and other surrounding roadways). During winter 2012, the Service documented multiple eagle mortalities along these two highways in the vicinity of the Project (Travis Sanderson, personal communication). These mortalities were associated with public highway traffic and not in any way related to Project activities. During February 2012 avian survey efforts, 14 individual eagles and one ferruginous hawk concentrated around two pronghorn carcasses were observed during a 15-minute drive along a 10-mile stretch of Highway 130 east of the Project. At the same time, several others were observed along Interstate 80 north of the Project. These eagles were under immediate threat of mortality from vehicle collision. In contrast, during February 2012 survey efforts, only eight eagles were observed during 75 hours of survey within the Project Site indicating, as would be expected, that winter eagle activity is low where prey and scavenging opportunities are infrequent. In the vicinity of the Project, winter eagle use is closely tied to the availability of winterkill carcasses along area highways.

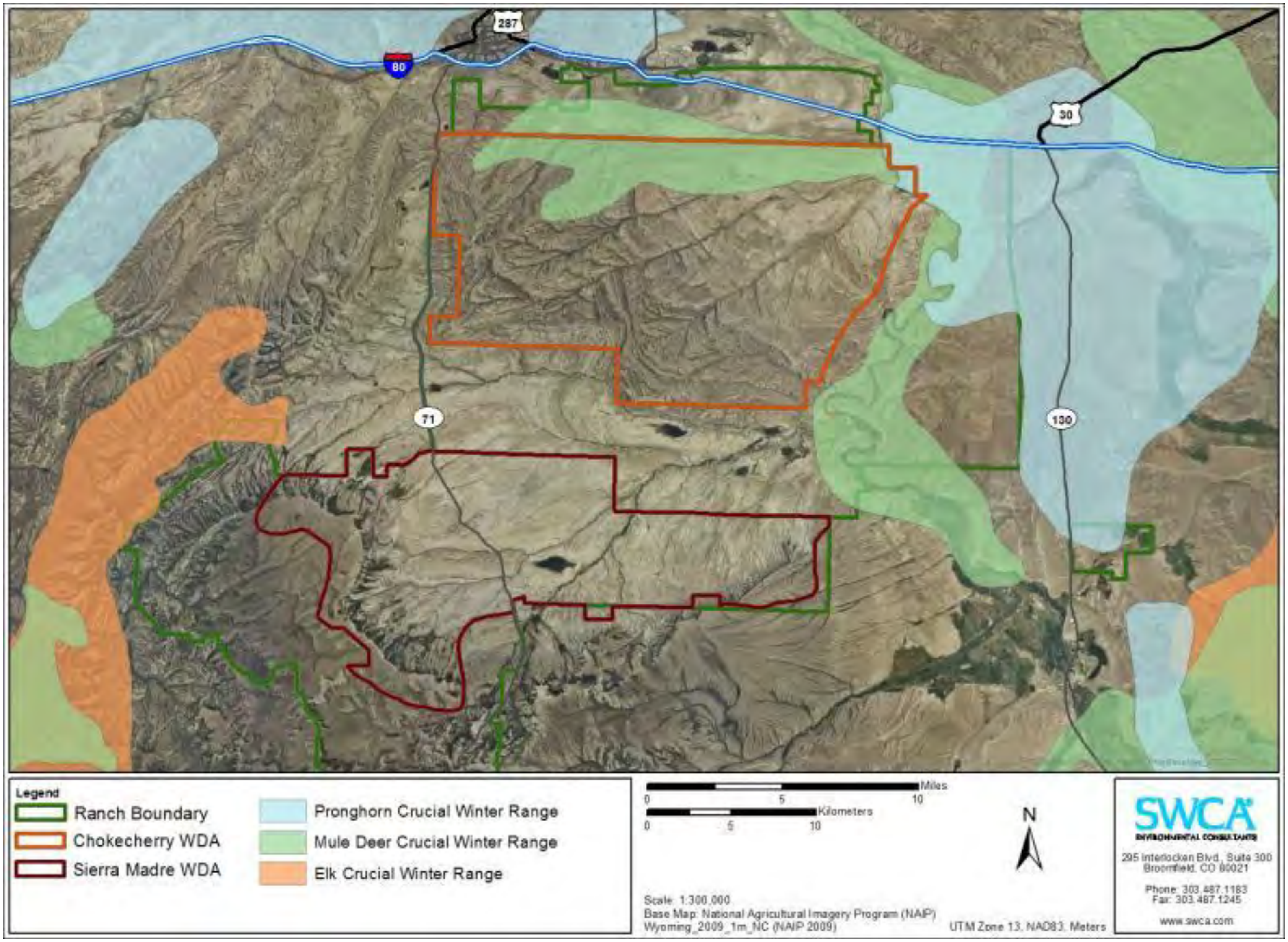

Figure 7. Big-game winter range in and surrounding the Ranch.

2.5 LIVESTOCK AND GRAZING

The Project Site was historically, and is currently, utilized as a livestock rearing operation. The Bolten Ranch (now a part of The Overland Trail Ranch) dates to the early 20th Century and was one of the largest sheep ranches in the state of Wyoming (Barclay 2011). The Bolten Ranch took its name from Isadore Bolten, a Russian immigrant, who operated the ranch as a sheep operation for the first half of the twentieth century. In the 1950s, his widow sold the ranch and it came to be owned and operated by a succession of sheep operators. In 1996, the Bolten Ranch was sold to an affiliate of the current owner TOTCO, who consolidated the Bolten Ranch with other properties to form The Overland Trail Ranch.

Golden eagle predation on livestock has been documented in many areas of the western United States (Avery 2004). Most depredations involve golden eagles preying on young lambs and goats; depredations on domestic calves occur occasionally (Avery 2004). A survey conducted from 1997 to 2002 by Wyoming Agriculture and presented in the Wyoming Agriculture Statistics, indicated that eagles, specifically golden eagles, took over 40,000 sheep/lambs during this period (Avery 2004). O'Gara (1978) draws a connection between a decline in jackrabbit populations and increased lamb predation by golden eagles, especially juvenile and subadult birds, which have no established territories.

From the turn of the century until TOTCO became the owner, the Ranch was primarily run as a sheep rearing operation. Under the ownership of Herman Werner and others, the Bolten Ranch suffered significant sheep/lamb losses due to golden eagle predation (W. Miller, TOTCO, personal communication). Under TOTCO's ownership, sheep have been removed from the Ranch and operations converted to a cow-calf and yearling operation.

The widespread availability of sheep/lambs as a prey source within the Project Site over the decades created more forage resources to potentially support a larger golden eagle population than has been observed over the three years of eagle surveys conducted by WEST and SWCA for the Project. Predation on sheep may have served to stabilize golden eagle populations during periods of declining leporid populations. This, along with the longevity of large raptor nests which have the potential to persist for decades, may explain the large number of inactive nests located within the vicinity of the Project Site, especially along the Bolten Rim, relative to active pairs of golden eagles. In 1996 when the Ranch was converted from a sheep to a cow-calf and yearling operation, this change dramatically decreased potential foraging opportunities for eagles as cattle are not preyed upon by eagles, and predation on domestic calves occurs only occasionally and is not well documented (Avery 2004, Phillips 1996). While there was still potential for eagles and other raptors to scavenge on the afterbirth left behind after calving, or to scavenge on the occasional carcass, the overall decreased prey density caused by the end of sheep rearing likely led to more competition for restricted resources, thereby causing fewer golden eagles to utilize the ranch for nesting and foraging. Recently, the Ranch has been converted to a yearling only operation further reducing foraging opportunities for eagles by eliminating calving remnants and very young calves.

For the reasons stated above, domestic livestock operations do not create or support areas of high eagle use that must be considered in avoidance and minimization measures for the ECP.

2.6 WATERFOWL AND WATERBIRDS

Although golden eagles are known to prey upon avian species, according to Olendorff (1976), the percentage of avian prey taken by eagles is drastically smaller than that of mammalian prey, which constitutes 80-90% of eagle prey. Waterfowl and waterbirds do provide seasonal foraging opportunities for bald and golden eagles at the four reservoirs (Kindt, Rasmussen, Sage Creek, and Teton) located on the Project Site, as well as along the North Platte River corridor. This foraging source is available from early spring through late fall in periods when the reservoirs and the river are ice-free; however, the highest concentration of waterbird species on the Project Site occurs during the fall when nesting is completed and adults and juveniles of many species aggregate on the reservoirs to prepare for southerly migration.

Waterbird surveys were conducted in 2011 during spring (April 26–May 4), summer (August 23–24), and fall (October 20–21) at each of the four reservoirs. Spring waterbird surveys resulted in a total count of 1,415 individuals representing 35 species. American coot (*Fulica americana*) was the most abundant species accounting for 364 individuals (26% of total count). Scaup (*Aythya* sp.), *Aechmophorus* grebes (i.e., western and Clark's), and eared grebe (*Podiceps nigricollis*) were the next most abundant species with 351, 209, and 113 individuals, respectively. Collectively, those four groups accounted for 1,037 individuals or 73% of all birds detected. More species and individuals were counted at Kindt Reservoir (25 species, 808 individuals), which is outside the WDAs, than the other three reservoirs. The fewest species and number of individuals (12 species, 165 individuals) were recorded at Sage Creek Reservoir during spring surveys.

In total, 1,708 individuals representing 29 species were recorded on summer waterbird surveys. Redhead (*Aythya americana*) had the highest number of individuals (815) accounting for 48% of all birds detected during summer surveys. Lesser scaup (*Aythya affinis*), mallard (*Ana splatyrhynchos*), and American coot were the next most abundant species with 157, 149, and 99 individuals, respectively. Collectively, those four species accounted for 1,221 individuals or 71% of all birds detected. The highest number of individuals (920) was recorded at Rasmussen Reservoir, where 89% (780 individuals) were redheads. Nearly all of the season's redheads (780 of 815) were recorded at Rasmussen Reservoir. Despite the high number of birds recorded at Rasmussen Reservoir, biologists recorded the fewest number of species (12) at that location.

Surveys during the fall migration period resulted in 11,473 individuals of 29 species recorded. Similar to spring, in the fall American coot accounted for the majority of individuals (8,024, 70% of total individuals). A total of 1,692 American wigeon (*Anas americana*) were also recorded. Combined, American coot and American wigeon accounted for 9,716 individuals (85% of all individuals). More individuals (8,773) and species (22) were recorded at Kindt Reservoir during fall surveys than at other reservoirs. Of the 8,024 American coots and 1,692 American wigeons recorded at all reservoirs combined, the survey at Kindt Reservoir accounted for 5,810 coots (66%) and 1,690 wigeon (99%).

Observation data from Year Two and Year Three survey efforts have indicated that Rasmussen Reservoir is an important foraging location for a known bald eagle pair nesting immediately south of the Sierra Madre WDA and south of Rasmussen Reservoir. Year Two observational data also indicate the potential use of Kindt reservoir as a foraging location for a golden eagle pair that nested just above the reservoir. Waterbirds utilizing the North Platte River are also an available prey source for eagles nesting along this corridor.

3.0 DISCUSSION AND CONCLUSIONS

The Project Site contains several species that have the potential to provide foraging opportunities for eagles and other raptors; however, very few of these prey species occur in high enough concentrations to represent a consistently available food source for eagles. Prey species are most likely taken opportunistically and do not attract or concentrate eagle foraging activities because of low prey population densities and widely scattered occurrences.

White-tailed jackrabbit and cottontail species (leporids) are the most widely available mammalian prey species found within the Project Site (Appendix A). White-tailed jackrabbits are found primarily throughout the Central Basin, east of the North Platte River, north and west of the Chokecherry WDA, and to a lesser extent on the higher elevations of the Chokecherry plateau and Miller Hill. Numerous scientific studies have also reported the importance of white-tailed jackrabbits as a key forage item for golden eagles as well (Preston 2011, Steenhof et al. 1997, MacLaren et al. 1996, Bates and Moretti 1994, Phillips and Beske 1990). While leporids are recognized as a key prey species for eagles and other raptors, their crepuscular nature likely means they are available as forage mainly during the morning and evening hours and infrequently through the rest of the day. Additionally, no known concentration areas for leporids have been identified over more than three years of wildlife surveys in the Project Site. Leporids are distributed in a dispersed pattern across the landscape in the Project Site and vicinity and are likely taken opportunistically as they are encountered.

White-tailed prairie dogs are also recognized as an important prey source for eagles and other raptors; however, their low densities and temporal availability within the Project Site make them less available than waterbird species and leporids, respectively. Numerous studies (WEST 2008, SMITH 2010, SWCA 2012 [Appendix A]) have been undertaken to quantify the occurrence of white-tailed prairie dogs on the Project Site. Corresponding data from WGFD, WEST and SWCA all show that white-tailed prairie dog occur in ephemeral, low-density colonies through sections of the Central Basin. During 2012 surveys, SWCA biologists documented only inactive, historic colonies within the Miller Hill and Chokecherry WDAs, with the exception of a small, low density colony located in the north central region of the Chokecherry WDA, which is located well outside of the likely turbine development area (Appendix A). SMITH (2010) observations are inconsistent with these studies and are not representative of white-tailed prairie dog populations in the Project Site. The assumption that delineated prairie dog colonies in SMITH (2010) contain a viable prey source for golden eagles is not valid. Burrow densities in the Project Site as measured by SWCA and as reported by WEST (2008) are more representative of expected white-tailed prairie dog use and should be used as the best available scientific information to inform Project siting and identification of important eagle use areas.

White-tailed prairie dog colonies within the Bolten complex (Central Basin - occurring around Kindt reservoir) reached the highest average active burrow densities at 2.6 burrows per acre (Figure 6; Appendix A), well below the average of 6 burrows per acre in other areas of Wyoming (Clark and Stromberg 1987). Other active colonies south of the Bolten complex only contain an average density of 1.6 burrows per acre. White-tailed prairie dogs are only active a limited period of time during the year and their colonies are only found in low densities in the Central Basin; therefore, they represent an intermittently available prey species that may be taken opportunistically as they are encountered during other activities by eagles and other raptors.

Similar to white-tailed prairie dog, Wyoming ground squirrel also represents an intermittently available prey species. Though they are found to be more widespread on the Project Site, they occur in lower density, more diffuse colonies than white-tailed prairie dogs. Wyoming ground squirrel also have a more restrictive activity schedule than white-tailed prairie dog with daily activity mainly occurring in the morning and evening hours, and most individuals entering hibernation between the months of July and April. Based on this, Wyoming ground squirrel are, at best, a secondary prey species taken opportunistically by eagles and other raptors on the Project Site.

Big game species present some foraging opportunities for bald and golden eagles and other raptors throughout the year. During the spring and early summer, pronghorn and mule deer fawns are available as potential prey species for eagles although there are no parturition areas identified in the Project Site that would concentrate eagle foraging. Pronghorn fawns are typically dispersed across the Project Site, while mule deer fawns may be found in areas with higher cover along the North Platte River. Throughout the rest of the year and especially in the winter, big game carcasses provide scavenge for eagles and other raptors. During the spring, summer and fall months, these scavenging opportunities occur sporadically throughout the Project Site and along roadways. In the winter, however, big game species are pushed into concentrations at lower elevations by snow cover and the need for viable forage. During these months, big game species are often killed by roadway traffic, creating numerous scavenging opportunities for bald and golden eagles and other raptors along roadways. During the winter months when there are no white-tailed prairie dog, waterbirds, or Wyoming ground squirrel to hunt, these big game scavenging opportunities along roadways and in low-lying basins represent one of the most concentrated and viable food sources for resident bald and golden eagles wintering in the vicinity of the Project Site.

The Project Site was historically, and is currently, utilized as a livestock rearing operation. From the turn of the century until TOTCO became the owner, the Ranch was primarily run as a sheep rearing operation. Under TOTCO's ownership, sheep have been removed from the Ranch and operations converted to a cow-calf and yearling operation. The widespread availability of sheep/lambs as a prey source within the Project Site over the decades created more forage resources to potentially support a larger golden eagle population than has been observed over the three years of eagle surveys conducted by WEST and SWCA for the Project. In 1996 when the Ranch was converted from a sheep to a cow-calf and yearling operation, this change dramatically decreased potential foraging opportunities for eagles as cattle are not preyed upon by eagles, and predation on domestic calves occurs only occasionally and is not well documented (Avery 2004, Phillips 1996). While there was still potential for eagles and other raptors to scavenge on the afterbirth left behind after calving, or to scavenge on the occasional carcass, the overall decreased prey density caused by the end of sheep rearing likely led to more competition for restricted resources, thereby causing fewer golden eagles to utilize the ranch for nesting and foraging. Recently, the Ranch has been converted to a yearling only operation further reducing foraging opportunities for eagles by eliminating calving remnants and very young calves.

Waterbirds are only an available source of prey during the spring, summer and fall months. During these months, waterbirds occur on all of the four reservoirs in the Central Basin of the Project Site which are located in PCW's identified Turbine No-Build Areas in the Project ECP. Highest concentrations of waterbirds occur on Kindt and Rasmussen reservoirs. However, during drought conditions such as those in 2012, Kindt Reservoir is largely drained and very few waterbirds and waterfowl utilize the reservoir. Waterbird concentrations reached their highest level at these two reservoirs in fall as adults and juveniles prepared for southerly migration. Observational data have shown that Rasmussen reservoir was a utilized foraging area for the bald eagle pair who nested south of the Sierra Madre WDA in 2011 and 2012, and that Kindt reservoir was a utilized foraging area for a golden eagle pair who nested along the southern edge of the Chokecherry WDA in 2011.

3.1 FORAGING HABITAT

There are a number of species available as prey base for eagles and other raptors within the vicinity of the Project Site; however, none of these species alone occur at the necessary densities required to consistently attract eagles within the Project Site. The majority of prey base and foraging opportunities occur within areas immediately surrounding the Project Site in portions of the Central Basin and along the North Platte River corridor, with very limited and dispersed foraging opportunities available outside of these two areas. Three potential foraging areas, as determined by overlapping resources and seasonal availability of prey base, occur within the Project Site or in the immediate surrounding areas (Figure 8). The North Platte River corridor, the Kindt Reservoir area, and the Bolten Road-Teton Reservoir area provide overlapping opportunities of several potential prey species that could be utilized by eagles and other raptors.

The highest quality foraging habitat for bald and golden eagles was determined using a stepwise approach, identifying key prey species, their availability on the landscape, and the seasonal availability within the Project Site and in the immediate surrounding areas. Habitat type, water resources, and management areas were also considered and included in the foraging area delineation process. The following parameters were evaluated to determine foraging habitat for bald and golden eagles:

- Large reservoirs (Kindt, Rasmussen, Teton, and Sage Creek) and waterbird survey results;
- North Platte River corridor;
- Active agricultural areas (hay meadows and stockyards);
- Prairie dog colonies identified as having minimal foraging potential for eagles;
- WGFD ungulate crucial winter range boundaries;
- WGFD greater sage-grouse core areas;
- Major highway corridors, and,
- Potential movement corridors between these locations.

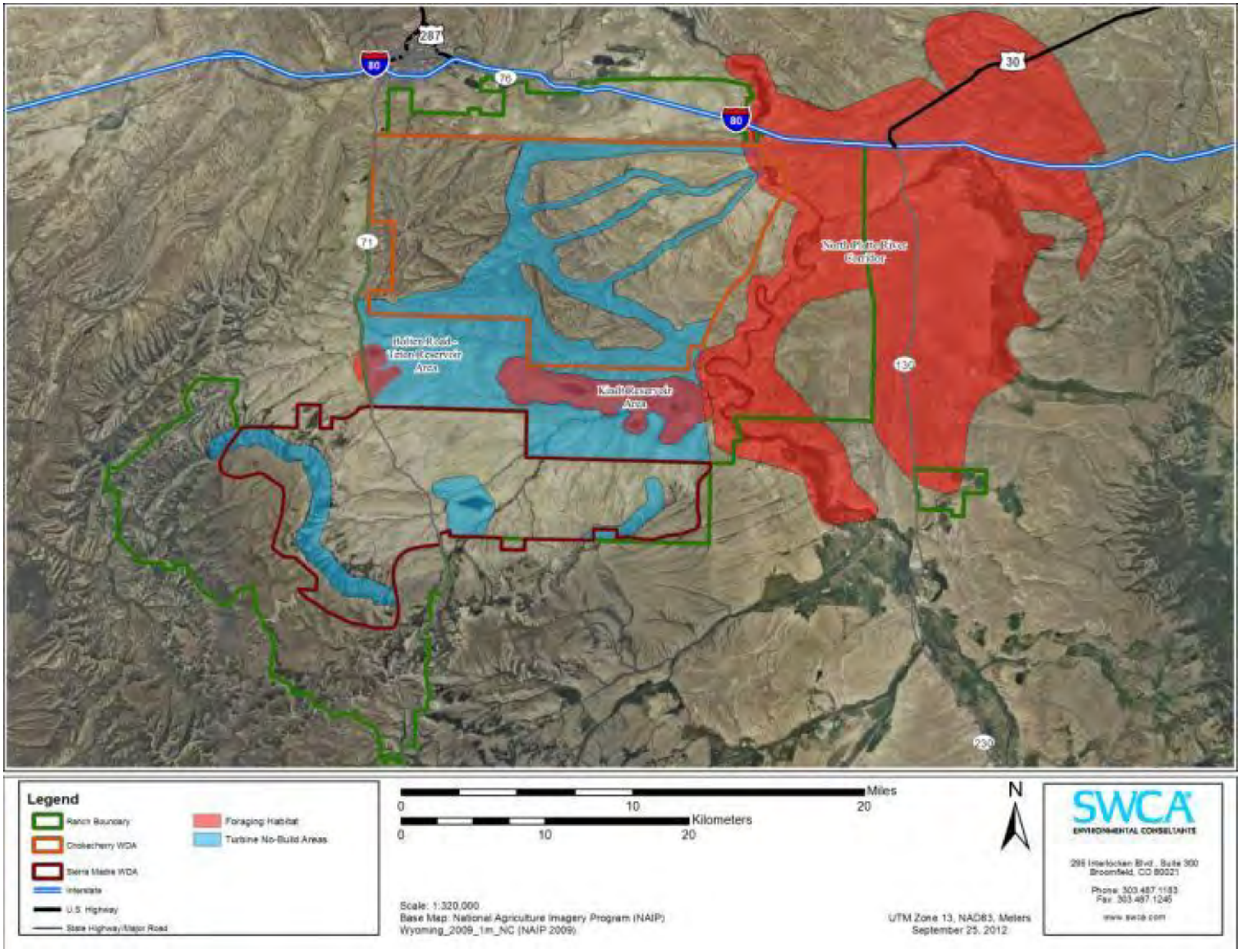

Figure 8. Turbine no-build areas and areas representing potential foraging areas in the Project Site and the surrounding areas.

The first step in determining the most likely foraging habitats includes identification of all potential foraging areas that support prey species. Reservoirs within the Project Site and in the immediate surrounding area provide a food source (waterbirds) during spring, summer, and fall months. Active prairie dog colonies and dispersed ground squirrel population provide a prey base between early spring and late summer but are seasonally unavailable beginning in late July through mid-March. Major highways (I-80, HWY 130, and WY 71) provide road kill and carrion throughout the year, although abundance typically increases during late fall and winter. Crucial winter range of ungulate species provides scavenging opportunities during winter. Sage-grouse core areas maintain sufficient populations of grouse during all seasons. Although these different habitats may support some level of opportunistic foraging for bald and golden eagles, foraging opportunities are greatest in areas where the above prey sources overlap. The second step in determining the most likely foraging habitats includes identifying areas that support multiple prey species. Areas where concentrations of prey are diffuse, scattered, and/or limited likely do not represent focused foraging areas for eagles. Overlapping habitat and/or seasonal ranges of multiple prey species represent likely areas where prey is more abundant and, collectively, not as dispersed.

As a result of this analysis, two potential areas that have adequate prey base to represent possible important eagle foraging areas occur within the vicinity of the Project Site (Figure 8). The North Platte River corridor and the Bolten Road corridor represent the only areas within or surrounding the Project Site with multiple overlapping prey base resources for bald and golden eagles.

The North Platte River corridor (Figure 8) provides a number of habitat types to support leporids, waterbirds, mule deer, pronghorn, sage-grouse, and Wyoming ground squirrel. The river corridor includes crucial winter range for mule deer and pronghorn along with sage-grouse core area. In addition, this area provides sufficient winter roost opportunities within cottonwood galleries and riparian vegetation along the North Platte River. The Bolten Road area includes habitat types to support white-tailed prairie dogs, leporids, waterbirds, pronghorn, and Wyoming ground squirrel. These habitats include grass hay agricultural areas and three reservoirs (Sage Creek, Kindt, and Teton).

Both of these foraging areas also provide unique hunting perch locations that are not available elsewhere in the Project Site. The North Platte and Bolten corridors are adjacent to rock faces that provide perch locations that can be utilized by eagles and other raptors to survey potential foraging locations. These features are unique to these two foraging areas and provide a mechanism for eagles to expend less energy for foraging activities; other areas in the Project Site require powered flight through less suitable foraging habitats.

These areas are also consistent with known active nesting locations for eagles. The North Platte River corridor and the eastern half of the Bolten Rim above Kindt Reservoir contain the majority of bald and golden eagle nests identified within the vicinity of the Project Site. Additionally, bald eagle foraging activities associated with the nest south of the Sierra Madre WDA have been documented at Rasmussen Reservoir.

The correspondence of these foraging areas with eagle nest locations and perch and roost locations demonstrate that these areas (Figure 8) provide the most important foraging locations for eagles in the Project Site and vicinity. Additionally, these areas and corridors connecting these areas are located outside of the WDAs or in Turbine No-Build Areas identified in PCW's ECP. This will enable continued use of these foraging locations without increasing eagle exposure in the turbine development areas.

4.0 REFERENCES

Armstrong, D.M., J.P, Fitzgerald, and C.A. Meaney. 2011. Mammals of Colorado. 2nd ed. Denver Museum of Nature and Science, University Press of Colorado, Boulder, CO. 620+ pp.

Avery, M.L. and J.L Cummings., 2004. Livestock Depredations by Black Vultures and Golden Eagles. USDA National Wildlife Research Center - Staff Publications. Paper 76. Available online at: http://digitalcommons.unl.edu/icwdm_usdanwrc/76. Accessed September 2012.

Barclay, D. 2011. A historical assessment of Overland Trail Segments from the Sulphur Springs Stage Station to the North Platte River, Carbon County, Wyoming. Unpublished. Golden, CO.

Bates, J.W. and M.O. Moretti. 1994. Golden eagle (Aquila chrysaetos) population ecology in eastern Utah. Great Basin Naturalist 54(3):248-255.

Beauvais, G.P. and D.N. Dark-Smiley. 2005. Species assessment for Wyoming pocket gopher (*Thomomys clusius*) in Wyoming. Report prepared for U.S. Department of the Interior, Bureau of Land Management, Wyoming State Office, Cheyenne.

Behl, M.J. and D.P. Kane. 2003. Conceptual plans for assessing aerial mapping of black-footed ferret habitat in the Continental Divide/Wamsutter II project area. Unpublished proposal prepared by Sage Ecological Services, Erie, CO and Kane & Associates, Golden, CO, 24 April 2003. 9p.

Bent, A.C. 1937. Life histories of North American birds of prey, part 1. U.S. National Museum Bulletin 167:1-398.

Biggins, D.E., B.J. Miller, L.R. Hanebury, B. Oakleaf, A.H. Farmer, R. Crete, and A. Dood. 1993. A technique for evaluating black-footed ferret habitat. Pp. 73–88. *in* J.L. Oldemeyer, D.E. Biggins, B.J. Miller, and R. Crete *eds*. Management of prairie dog complexes for the reintroduction of the black-footed ferret: Washington, D.C., U.S. Fish and Wildlife Service, Biological Report 13.

Campbell, T.M., and T.W. Clark. 1981. Colony characteristics and vertebrate associates of white-tailed and black-tailed prairie dogs in Wyoming. American Midland Naturalist 105(2): 269-276.

Clark, T.W. 1973. Prairie dogs and black-footed ferrets in Wyoming. Pp. 88-101. *in* R.L. Linder and C.N. Hillman *eds*. Proceedings of the Black-Footed Ferret and Prairie Dog Workshop. South Dakota State University, September 4-6, 1973, Rapid City, South Dakota.

Clark, T.W. and M.R. Stromberg. 1987. Mammals in Wyoming. University Press of Kansas, Lawrence, Kansas. 314p.

Cooke, L. A., and S. R. Swiecki. 1992. Structure of a white-tailed prairie dog burrow. Great Basin Naturalist 52: 288-289.

Deblinger, R.D. and A.W. Alldredge. 1996. Golden eagle predation on pronghorns in Wyoming's Great Basin Divide. Journal of Raptor Research 30(3): 157-159.

Fitzgerald, J.P., C.A. Meaney, AND D.M. Armstrong. 1994. *Spermophilus franklinii*. Pp. 172–173 in Mammals of Colorado. Denver Museum of Natural History and University Press of Colorado, Niwot, Colorado.

Hunt, G. 2002. Golden eagles in a perilous landscape: predicting the effects of mitigation for wind turbine blade-strike mortality. P500-02-043F. Prepared for Public Interest Energy Research (PIER) – Environmental Data, California Energy Commission, July 2002. 72 pp.

Hunt, G. and L. Culp. 1997. The influence of high ground squirrel densities on the occurrence of golden eagles on Altamont Ownership Consortium property. Prepared for the Altamont Avian Plan, Altamont Ownership Consortium. Predator Bird Research Group, University of California, Long Marine Lab, Santa Cruz, CA. 18 pp.

Johnsgard, P.A. 1990. Hawks, eagles, & falcons of North America. Smithsonian Institution Press, Washington.

Keinath, D.A. 2004. Species assessment for white-tailed prairie dog (*Cynomys leucurus*) in Wyoming. Prepared for U.S. Department of the Interior, Bureau of Land Management, Wyoming State Office, Cheyenne, Wyoming. Wyoming Natural Diversity Database, University of Wyoming, Laramie, Wyoming. 47p.

Kochert, M.N., K. Steenhof, C.L. McIntyre, and E.H. Craig. 2002. Golden eagle (*Aquila chrysaetos*). The Birds of North America Online (A. Poole, ed.). Ithaca: Cornell Lab of Ornithology. Available online at: http://bna.birds.cornell.edu/bna. Accessed July 2012.

MacLaren, P.A., S.H. Anderson, and D.E. Runde. 1996. Food habits and nest characteristics of breeding raptors in southwestern Wyoming. Great Basin Naturalist 48(4): 548-553.

Marzluff, J.M., S.T. Knick, M.S. Vekasy, L.S. Schueck, and T.J. Zarriello. 1997. Spatial use and habitat selection of golden eagles in southwestern Idaho. Auk 11: 673-687.

Menkens, E. George, Jr., B.J. Miller, and S.H. Anderson. 1987. White-tailed prairie dog ecology in Wyoming. Great Plains Wildlife Damage Control Workshop Proceedings. Paper 83. Available online: http://digitalcommons.unl.edu/gpwdcwp/83. Accessed July 2012.

McDonald, L.L., T.R. Stanley, D.L. Otis, D.E. Biggins, P.D. Stevens, J.L. Koprowski, and W. Ballard,. 2011. Recommended methods for range-wide monitoring of prairie dogs in the United States: U.S. Geological Survey Scientific Investigations Report 2011–5063, 36p.

O'Gara, B.W. 1978. Sheep depredation by golden eagles in Montana. Proceedings of the 8th Vertebrate Pest Conference (1978). Paper 37. Available online at: http://digitalcommons.unl.edu/vpc8/37. Accessed September 2012.

Olendorff, R.R. 1976. The food habits of North American golden eagles. American Midland Naturalist 95: 231-236.

Pauli, J.N, S.W. Buskirk, E.S. Williams, and W.H. Edwards. 2006. A plague epizootic in the black-tailed prairie dog (*Cynomys ludovicianus*). Journal of Wildlife Diseases 42: 74–80.

Phillips, R.L. and A.E. Beske. 1990. Distribution and abundance of golden eagles and other raptors in Campbell and Converse Counties, Wyoming. Fish and Wildlife Technical Report 27. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

Phillips, R.L., J.L. Cummings, G. Notah, and C. Mullis. 1996. Golden eagle predation on domestic calves. Wildlife Society Bulletin 24(3): 468-470.

Preston, C.R. 2011. Golden eagle nesting ecology in the Bighorn Basin: influence of landscape composition, energy development, and other human activity on golden eagle nesting distribution, success, productivity, and diet 2010-2013. 2011 Progress Report. Available online at: http://www.bbhc.org/explore/greater-yellowstone-natural-history/research/. Accessed July 2012.

Reid, F.A. 2006. A Field Guide to Mammals of North America North of Mexico. 4th ed. The Peterson Field Guide Series. Houghton Mifflin Company, Boston, MA. 579 pp.

Rogowitz, G.L., and M.L. Wolfe. 1991. Intraspecific variation in life-history traits of the white-tailed jackrabbit (*Lepus townsendii*). Journal of Mammalogy 72(4): 796-806.

Seglund, A.E., A.E. Ernst, M. Grenier, B. Luce, A. Puchniak and P. Schurr. 2004. White-tailed prairie dog conservation assessment.

Severson, K.E., and G.E. Plumb. 1998. Comparison of methods to estimate population densities of black-tailed prairie dogs. Wildlife Society Bulletin 26: 859–866.

Sherrod, S.K. 1978. Diets of North American Falconiformes. Raptor Research 12:49-121.

Smith Environmental and Engineering (SMITH). 2010. White-tailed prairie dog town inventory and assessment on the Bolton Ranch Black-Footed Complex in Carbon County, Wyoming. Draft Report. Prepared for Bureau of Land Management Rawlins Field Office. Smith Project NO. 2009-429. Smith Environmental and Engineering, Westminster, CO. September 17, 2010.

Stalmaster, M.V. 1987. The bald eagle. Universe Books, New York.

Steenhof, K., M.N. Kochert, and T.L. McDonald. 1997. Interactive effects of prey and weather on golden eagle reproduction. Journal of Animal Ecology 66:350-362.

Streubel, D. 2000a. *Spermophilus elegans* (Wyoming Ground Squirrel). Digital Atlas of Idaho, Idaho's natural history online. Available online at: http://imnh.isu.edu/digitalatlas/bio/mammal/Rod/squir/wygr/wgsqfrm.htm. Accessed August 2012.

Streubel, D. 2000b. *Lepus townsendii* (White-tailed Jackrabbit). Digital Atlas of Idaho, Idaho's natural history online. Available online at: http://imnh.isu.edu/digitalatlas/bio/mammal/Lagom/whja/wtja.htm. Accessed August 2012.

U.S. Dept. of Interior. 1978. Seven Lakes grazing environmental impact statement. U.S. Bureau of Land Management, Washington, D.C.

U.S. Fish and Wildlife Service (Service). 2003. Statewide Programmatic Bald Eagle Biological Assessment. Final Report submitted to the BLM Wyoming State Office. Cheyenne, Wyoming. 270 pp.

———. 2010. Endangered and Threatened Wildlife and Plants; 12–month Finding on a Petition to List the White-tailed Prairie Dog as Endangered or Threatened. 50 CFR Part 17. Federal Register 75(104): 30,333-30,363.

Waite, B.C. and R.L. Phillips. 1994. An approach to controlling golden eagle predation on lambs in South Dakota. *in* W.S. Halverson & A.C. Crabb, eds. Proceedings of the 16th Vertebrate Pest Conference. University of California – Davis. Pp. 28-30.

Western EcoSystems Technology, Inc. (WEST). 2008. Prairie Dog and Black-footed Ferret Habitat Assessment Summary Chokecherry and Sierra Madre Wind Resource Areas. Carbon County, Wyoming. Prepared by Western EcoSystems Technology, Inc.

Wyoming Water Development Office. 2012. Drought. Wyoming Water Development Office, University of Wyoming, Laramie, WY. Available online at: http://www.wrds.uwyo.edu/sco/drought/drought.html. Accessed September 2012.

Yensen, E., and P. W. Sherman. 2003. Ground squirrels. Pp. 211-231 *in* G. A. Feldhamer, B. C. Thompson, and J. A. Chapman *eds*. Wild mammals of North America: biology, management, and conservation. 2nd ed. Johns Hopkins University Press, Baltimore, Maryland.

Zegers, D.A. 1984. Spermophilus elegans. Mammalian Species 214: 1-3.

Appendix A

Results of 2012 Prey Base Assessment Surveys

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1.0 PURPOSE

Smith Environmental and Engineering (SMITH) was selected by the Bureau of Land Management (BLM) Rawlins Field Office to re-evaluate existing white-tailed prairie dog (*Cynomys leucurus*) towns across the Black-footed Ferret Bolten Ranch Complex (hereafter, Bolten complex) in south-central Carbon County, Wyoming (SMITH 2010). The primary objective of SMITH's efforts was to record white-tailed prairie dog town locations and calculate associated burrow densities. SMITH (2010) concluded that the Bolten Complex consists of suitable habitat characteristics for reintroduction of the black-footed ferret (*Mustela nigripes*). This conclusion is based on identification of 198 white-tailed prairie dog colonies that comprised, in part, one complex (7-kilometer [km] criterion; Biggins et al. 1993) and two sub-complexes (1.5-km criterion; Biggins et al. 2006).

The findings of SMITH (2010) contradict numerous other evaluations of white-tailed prairie dog communities in the Bolten Complex. Other evaluations have found only small areas of low-density dispersed use (Western EcoSystems Technology, Inc. [WEST] 2008, WGFD spatial data per BLM). WGFD provided initial maps of white-tailed prairie dog colonies in the Bolten Complex from data collected approximately between 1999 and 2000 (Figure 1, Heath Cline, BLM Rawlins Field Office Biologist, personal communication). These mapping efforts identified a number of active prairie dog colonies at the base of the Bolten Rim near Teton and Kindt reservoirs and in the Central Basin north of Sage Creek.

WEST collected general wildlife data beginning in 2008 (WEST 2008) as part of their baseline wildlife surveys for the Chokecherry and Sierra Madre Wind Energy Project Environmental Impact Statement (EIS). WEST reported that virtually all potential prairie dog habitat within the original Sierra Madre Wind Development Area (WDA) was incidentally searched while conducting mountain plover surveys, greater sage-grouse brood surveys, or during travel for avian point counts. In addition, two areas of potential prairie dog activity were identified near proposed transportation and power line corridors between the Chokecherry and Sierra Madre WDAs in the Central Basin.

SWCA Environmental Consultants (SWCA) provides support services to the Power Company of Wyoming LLC (PCW) by collecting and analyzing baseline information used for guiding the development of the proposed Chokecherry and Sierra Madre Wind Energy Project (Project). These services have included ongoing vegetation, wildlife, and avian surveys throughout the Project Site since 2009 to inform development decisions regarding turbine layout and micro-siting to avoid or minimize disturbance to the area's wildlife resources. During the course of conducting surveys, multiple professional biologists traverse the Project Site, particularly during the months of expected prairie dog activity (April-October) in 2010 and 2011. Although none of these surveys were specifically for prairie dogs, SWCA biologists have noted presence/absence of prairie dogs and areas of burrow activity (recent or old) incidental to other survey activities. These observations suggest that active prairie dog colonies are primarily restricted to the Central Basin between the WDAs. Since findings reported in WEST (2008) and SWCA's experience in the Project Site substantially differed from those reported in SMITH (2010), SWCA performed additional surveys in areas delineated by SMITH (2010) to identify prairie dog colonies and determine occupancy and relative density.

Surveys were conducted during the period of August 2 to August 13, 2012 by SWCA biologists to assess golden eagle prey base throughout the Project Site and to identify towns, determine occupancy, and describe relative density of white-tailed prairie dog colonies. Surveys were designed to assess the extent of burrowing mammal activity with focus on white-tailed prairie dogs in relation to other fossorial species in the general area. Sites were selected to evaluate town locations identified by SMITH (2010) because distributions and densities reported were inconsistent with incidental observations made by SWCA while conducting vegetation and wildlife surveys in the area from 2009-2012.

1.1 PHYSIOGRAPHIC SETTING

The Ranch is dominated by three topographic features, Miller Hill, Chokecherry Plateau, and Sage Creek Rim, separated by a Central Basin. To the north, Chokecherry Plateau consists of ridges and rolling hills that generally slope northeasterly downward to the North Platte River. Approximately 25 miles of the North Platte River flow along the eastern edge of Chokecherry. Most of the northern portion of Chokecherry is defined by a small, east/west ridge commonly known as the Hogback, which is approximately 10 miles long, and the southern portion is defined by a cliff edge commonly referred to as the Bolten Rim, which is approximately 20 miles long. A prominent north/south ridge cut by three ephemeral drainages, Smith Draw, Hugus Draw, and Iron Springs Draw, bisects Chokecherry for approximately 12 miles.

The southwestern portion of the Ranch is dominated by a steep-sloped mesa commonly known as Miller Hill. This predominant feature slopes gently toward the south and southwest, with relatively level terrain near the edge of the rim and becoming increasingly undulated towards the southwest. Only a small portion of Miller Hill is within the Project Site.

The southeastern portion of the Ranch includes Sage Creek Rim, which has similar characteristics to Miller Hill, although this feature is not as large or high. Only a small portion of the top of the Sage Creek Rim is within the Project Site.

The area between these features (Central Basin) is a high desert basin transected by Sage Creek and several smaller ephemeral tributaries. Traversing the Central Basin is the Bolten Road, which bisects the basin into its northern and southern portions. Much of this basin is outside the WDAs; however, the Project haul road and internal transmission line will traverse the Central Basin and interconnect the WDAs. Larger waterbodies, which include Kindt, Rasmussen, Sage Creek, and Teton Reservoirs, are interspersed throughout this arid landscape.

1.2 ADDITIONAL SURVEY EFFORTS

WGFD provided initial maps of white-tailed prairie dog colonies in the Bolten Complex from data collected in approximately the year 2000 (Figure 1, Heath Cline, BLM Rawlins Field Office Biologist, personal communication). These mapping efforts identified several active prairie dog colonies at the base of the Bolten Rim near Teton and Kindt reservoirs and in the Central Basin north of Sage Creek.

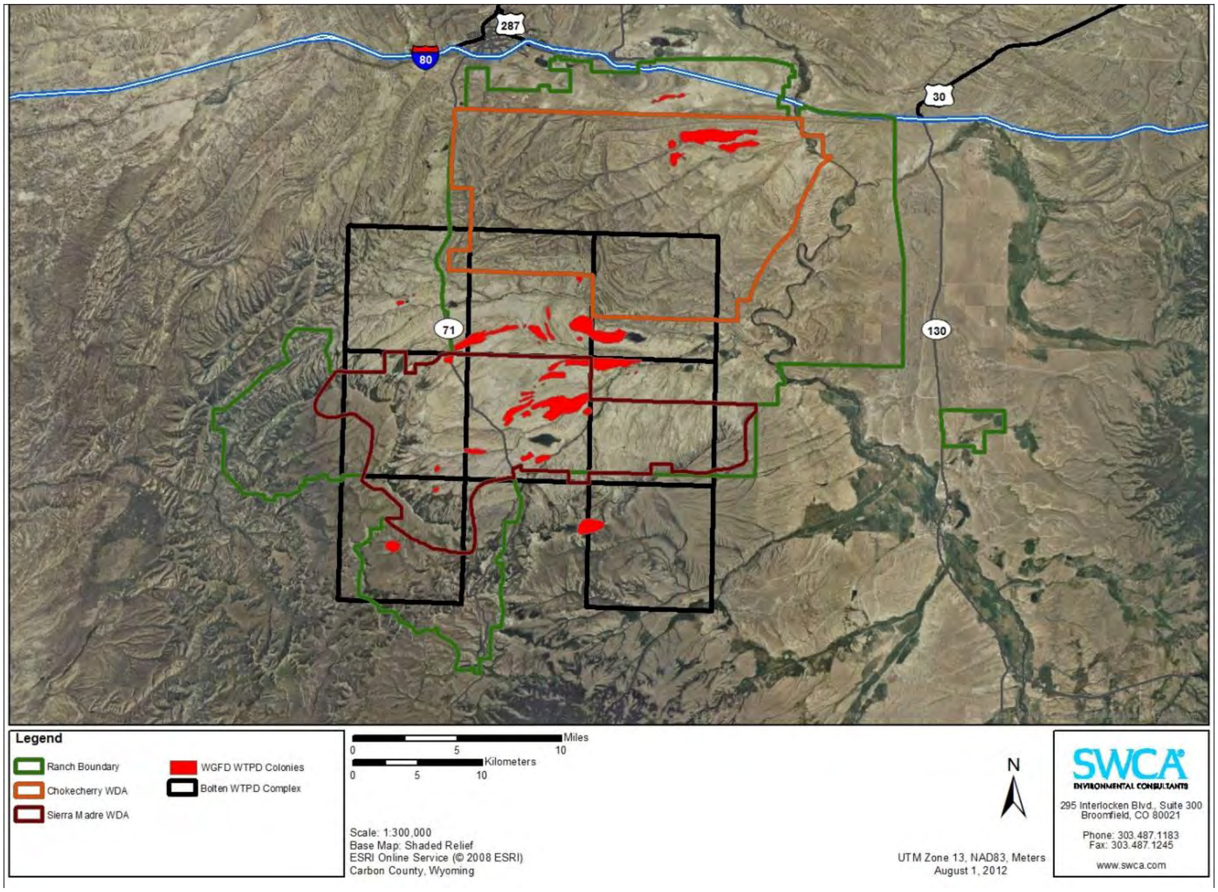

Figure 1. White-tailed prairie dog colonies in and surrounding the Bolten Complex (WGFD 2000).

WEST collected general wildlife data beginning in 2008 as part of their baseline wildlife surveys for the Project Environmental Impact Statement (WEST 2008). WEST reported that virtually all potential prairie dog habitat within the original Sierra Madre WDA was incidentally searched while conducting mountain plover surveys, greater sage-grouse brood surveys, or during travel for avian point counts. WEST (2008, p.5) concluded that "there is no physical evidence to suggest that colonies within the 'non block-cleared' areas of the project boundaries ever supported anything but small, perhaps ephemeral, scattered pockets of prairie dogs and would be of poor quality for black-footed ferrets." In addition, two areas of potential prairie dog activity were identified near proposed transportation and power line corridors between the Chokecherry and Sierra Madre WDAs in the Central Basin. WEST (2008) noted that the Central Basin between the WDAs supports prairie dog colonies and that two general areas of colonies may exceed 1,500 and 2,000 acres, respectively. WEST further noted that burrows in those two areas were scattered in distribution. These areas correspond to those that were identified by WGFD (Figure 1) along the Bolten Road.

Initially, SWCA conducted a full Project Site reconnaissance to formally assess the potential accuracy of the SMITH (2010) data and conclusions. From June 4 to June 8, 2012, an SWCA biologist surveyed 27 sites located with the polygons identified in SMITH (2010) (Figure 2).

Reconnaissance level surveys consisted of locating burrows, determining current or historical use (recent diggings, old or recent scat), recording presence of any small mammals in the area, and measuring burrow entrance diameters to aid in species identification. Adapting the modified Biggins et al. (1993) burrow criteria described in Behl and Kane (2003) to reduce potential biases in data collection and results, SWCA assessed potential species use of burrows by evaluating burrow characteristics and by measuring burrow entrance size.

Surveys conducted at 12 sites on Miller Hill resulted in no detections of prairie dogs at any of those sites. Wyoming ground squirrels were observed at six sites. One site appeared to have burrows consistent in size and appearance for white-tailed prairie dogs, but burrow entrance sizes were less than 7 cm indicating use by Wyoming ground squirrels. Wyoming ground squirrel was found throughout the area. Pocket gopher burrows and activity were also noted, primarily on shaded slopes and along drainages.

Eleven sites were surveyed south of the Bolton Road in the Central Basin. All of these sites had evidence of historic burrowing. Six sites were currently occupied by active WTPD colonies. An overall assessment of the Central Basin indicated widespread, scattered distribution of historic or current white-tailed prairie dog colonies. Most of these sites, however, were currently unoccupied or occupied in low densities. A few sites were considered to have moderate or high occupancy and burrow densities.

SWCA surveyed four sites south of the Sage Creek Rim. None of these sites, or surrounding areas, had evidence of historic or current white-tailed prairie dog activity. Wyoming ground squirrel and American badger dig-out activity was widespread across the area at low burrow densities. Wyoming ground squirrel burrows dug out by American badgers were similar in appearance to WTPD mound complexes, but each burrow entrance (beyond the badger scrapings) was measured and considered consistent with that for Wyoming ground squirrel.

Generally, prairie dog colonies surveyed in the Central Basin were less than one acre in size, including those with high burrow densities (i.e., maximum estimate of approximately 157 burrows per acre). Colonies were considered localized with burrows concentrated in clusters and large areas devoid of burrows between colonies.

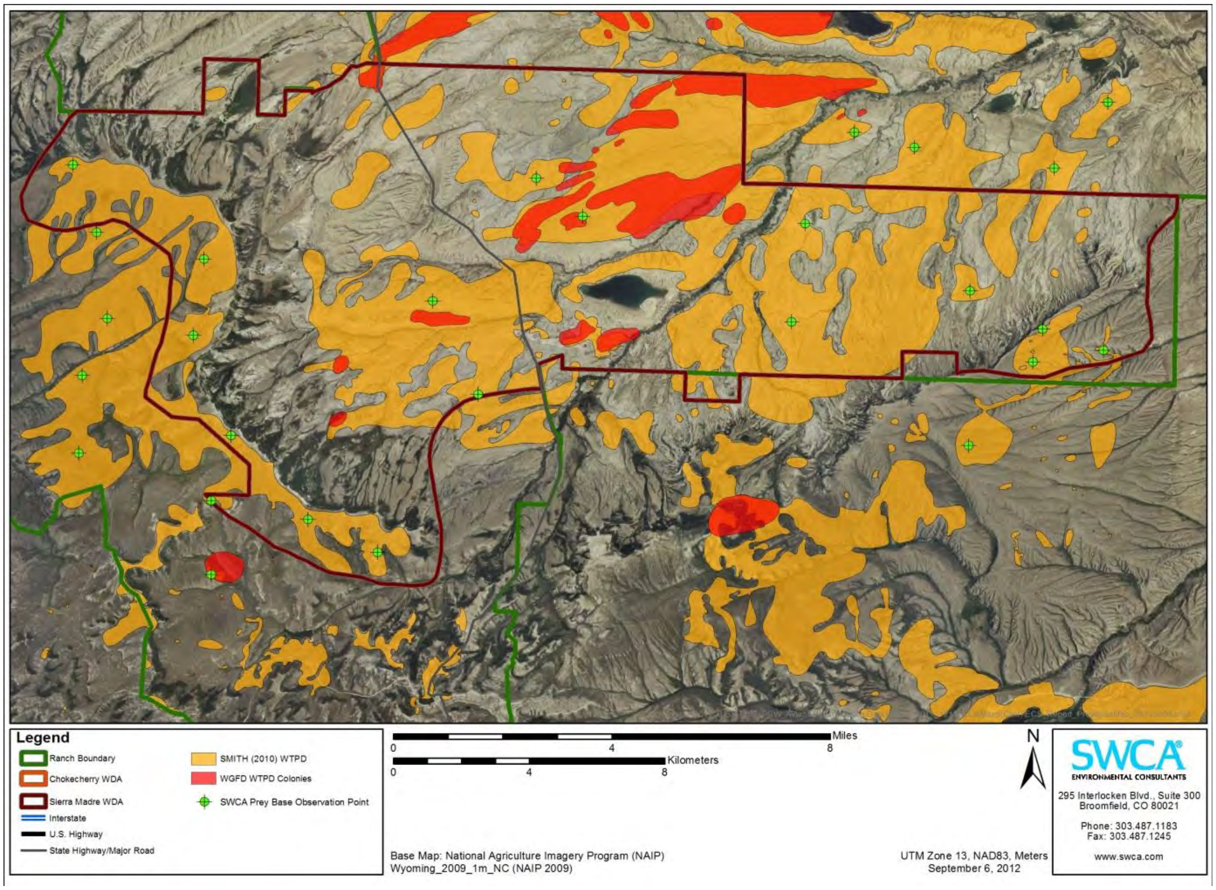

Figure 2. SWCA white-tailed prairie dog reconnaissance and observation locations.

2.0 SURVEY APPROACH

SWCA conducted 74 survey transects to assess fossorial mammal activity in the Project Site (Figure 3). Survey protocols followed U.S. Fish and Wildlife Service (Service) recommendations (McDonald et al. 2011) and were adapted from Biggins et al. 1993 (Attachment A). Surveys consisted of locating burrows, determining current or historical use (recent diggings, old or recent scat), recording presence of any small mammals in the area, and measuring burrow entrance diameters to aid in species identification. Adapting the modified Biggins et al. (1993) burrow criteria described in Behl and Kane (2003) to reduce potential biases in data collection and results, SWCA determined occupancy of white-tailed prairie dog and Wyoming ground squirrel (*Urocitellus elegans*) burrows by presence of individuals and burrow entrance size. White-tailed prairie dog burrows (8-12 centimeter [cm] in diameter) often have distinctive mounds of dirt at the entrances (Cooke and Swiecki 1992, Menkens et al. 1987); Wyoming ground squirrel burrows (5-8 cm) rarely have distinct mounding at the entrance (Yensen and Sherman 2003). Pocket gopher (*Thomomys* spp.) burrows and tunneling activity were identified by their distinct above surface dirt remnants from snow tunneling, rounded dirt mounds, and small burrow entrances (less than 7 cm) which are kept plugged with loose soil (Beauvais and Dark-Smiley 2005). American badger (*Taxidea taxus*) burrows were primarily identified by entrance diameter (greater than 12 cm).

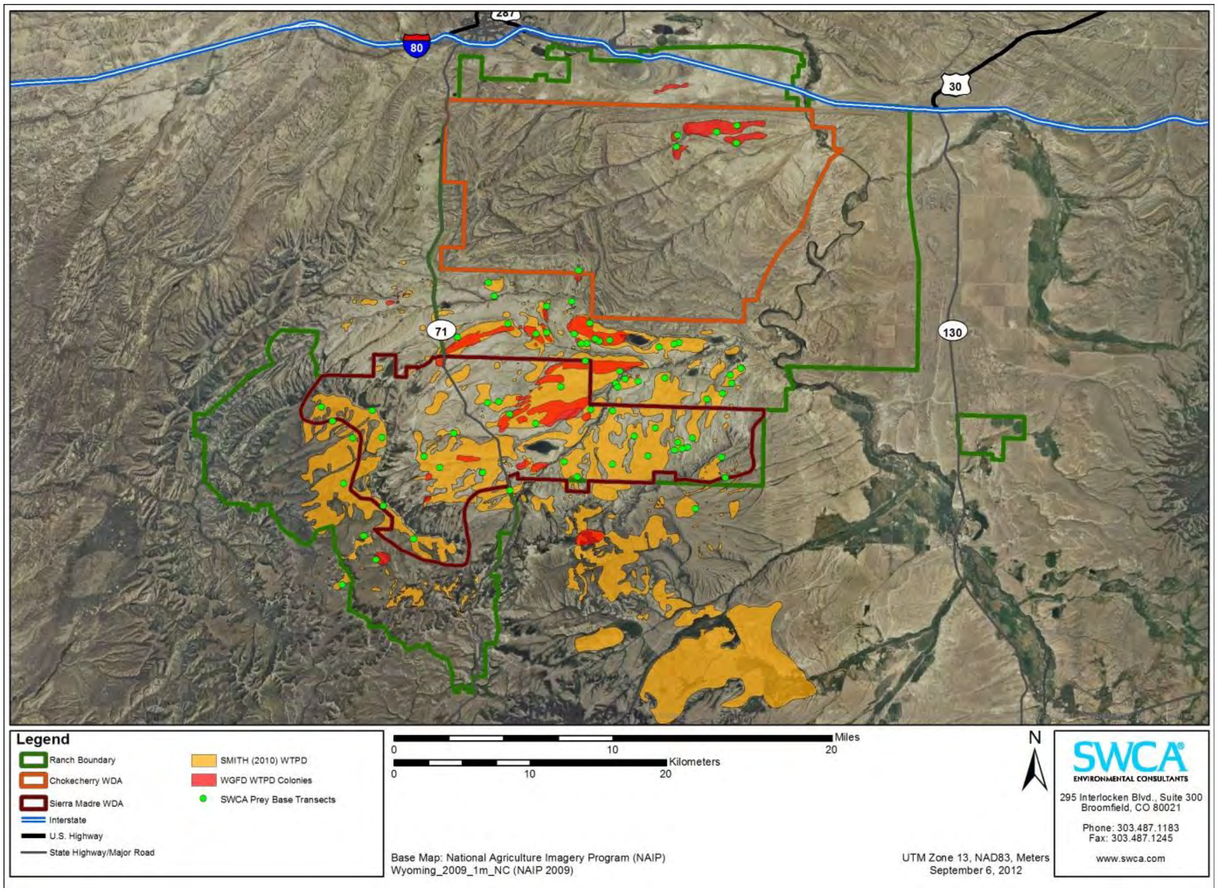

Figure 3. Prey base survey locations across the Ranch.

3.0 RESULTS

3.1 BOLTEN ROAD

Twenty-six transects were surveyed in the Bolten Road area (Figure 4; Attachment B), where the highest abundance of white-tailed prairie dogs and burrowing activity was observed (Table 1). Overall, burrow density for all fossorial mammals was approximately 20.5 burrows per acre. Inactive and historic prairie dog colonies accounted for approximately 44% of all burrow observations. White-tailed prairie dog activity was the highest observed, with approximately 2.6 active burrows per acre (13% of all burrowing activity). White-tailed prairie dog activity in this area ranged from 0.0-10.6 burrows per acre, with total burrowing activity (active + inactive burrows) reaching a 19.1 burrow per acre maximum. Habitat in the area may potentially support larger colonies of white-tailed prairie dog, with large areas covered with low growing vegetation (*Atriplex gardneri* and *Artemisia pedatifida*) and sparsely growing grasses and forbs. This area also included high burrowing activity for badgers.

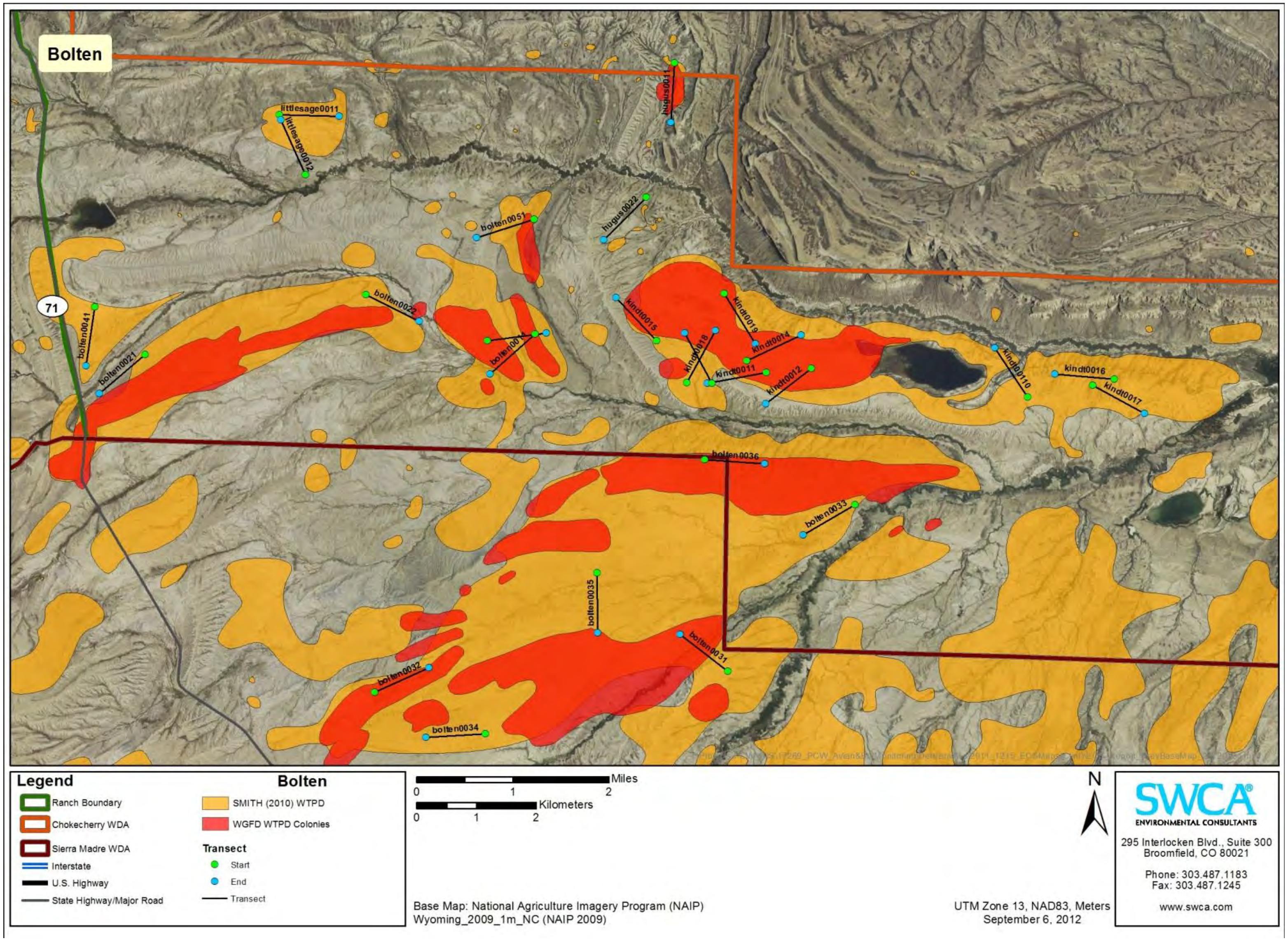

Figure 4. Prey base survey locations in the Bolten Road area.

Table 1. Burrow densities of white-tailed prairie dogs and other fossorial mammals throughout the Project Site.

Location	Transects (*n*)	Total burrows (burrow/acre)		Total WTPD burrows (burrow/acre)		Active WTPD burrows (burrow/acre)	
		Average	95% CI	Average	95% CI	Average	95% CI
Bolten	26	20.5	3.4	9.0	2.1	2.6	1.4
Central Basin	29	20.9	3.5	7.1	2.5	1.6	2.0
Miller Hill	11	22.5	6.9	1.8	1.4	0.0	-
Sage Creek Rim	3	22.9	10.8	7.9	5.4	0.0	-
Severson	5	17.9	4.0	6.7	2.1	0.1	0.3

3.2 CENTRAL BASIN

Overall, 29 surveys were completed in the Central Basin (Figure 5; Attachment B). Although total white-tailed prairie dog burrow density was comparable to other areas within the Project Site with the exception of Miller Hill (7.1 burrows per acre; Table 1), active burrows (1.6 burrows per acre) within these colonies were considerably lower than areas outside the Project Site and along the Bolten Road. This lower active burrow density was a result of the number of inactive and/or historic prairie dog colonies surveyed during transects; however, one transect (centralbasin004-03 [Attachment B] – selected opportunistically for survey during field work based on high density of activity) had a burrow density of 29.0 burrows per acre, which was the highest density recorded by SWCA anywhere in or surrounding the Bolten Complex.

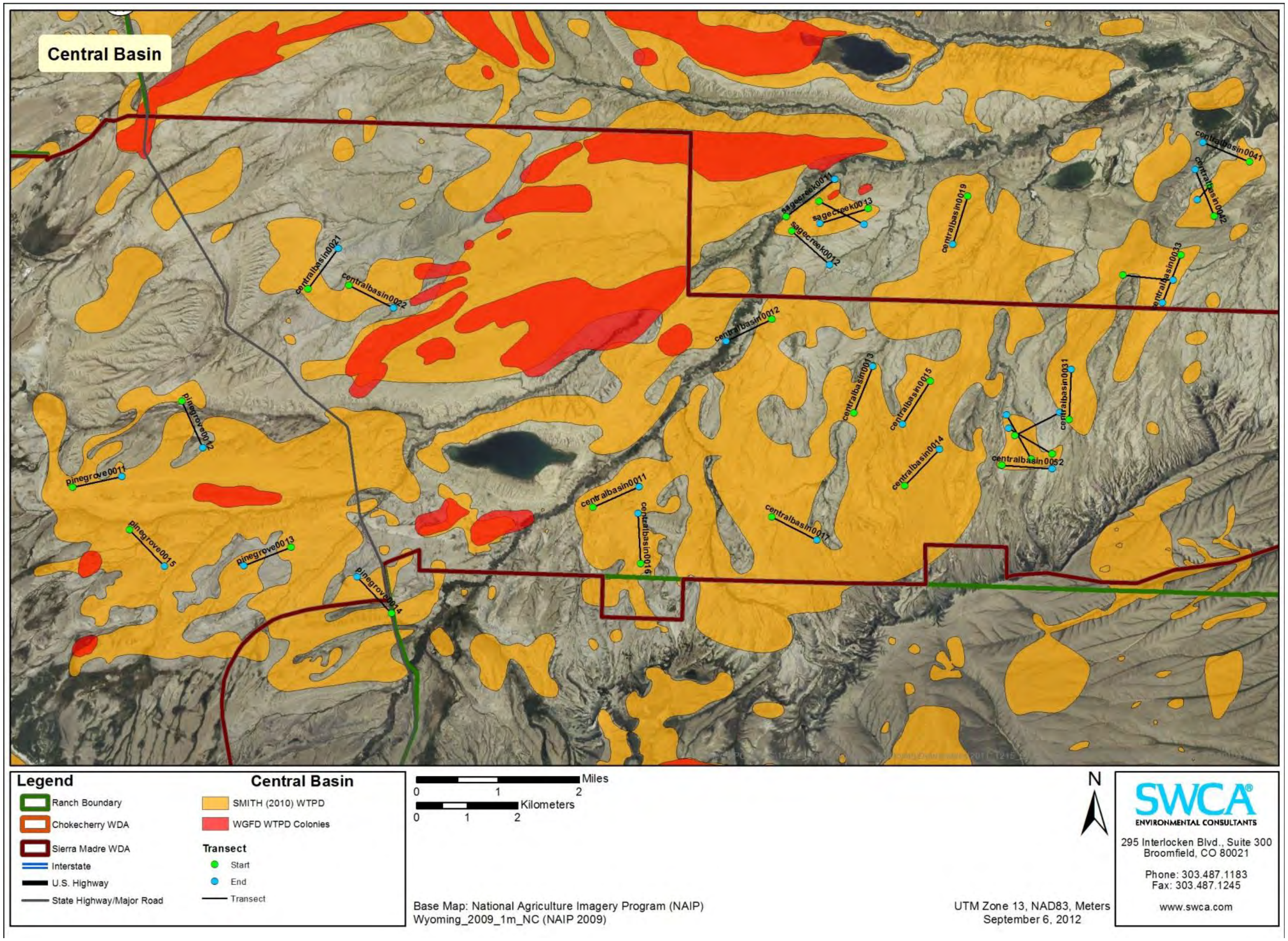

Figure 5. Prey base survey locations in the Central Basin.

3.3 MILLER HILL

Eleven transects were completed on Miller Hill and no active white-tailed prairie dog colonies or individuals were detected (Figure 6; Attachment B). Wyoming ground squirrel activity accounted for the majority of burrowing activity. Overall, burrow density for all fossorial mammals was approximately 22.5 burrows per acre. Inactive and historic white-tailed prairie dog burrows were observed on Miller Hill (1.78 burrows/acre; Table 1); however, burrows were highly scattered and the majority of burrows were old and inactive or collapsed. Historic and/or inactive White-tailed prairie dog burrows accounted for 7.9% of all burrow observations (no active borrows were found). Habitat in the area consisted of expansive extents of tall and dense mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*) compared to other locations in the Project Site. Other areas on Miller Hill supported dense collections of pocket gopher burrows and activity. These sites were primarily located on shaded slopes and along drainages with grass present.

3.4 SAGE CREEK RIM

Three transects were surveyed south of Sage Creek Rim (Figure 7; Attachment B). No recent white-tailed prairie dog activity was observed at or surrounding any of the transect locations (Table 1). Historic and/or inactive prairie dog burrows (7.9 burrows/acre) accounted for approximately 35% of all burrow observations. American badger and Wyoming ground squirrel activity was widespread across the area (14.9 burrows/acre). Wyoming ground squirrel burrows dug out by American badger were similar in appearance to white-tailed prairie dog mound complexes, but each burrow was identified as Wyoming ground squirrel following closer inspection (based on adjacent burrow entrance diameters – 5-8 cm in diameter).

3.5 SEVERSON

Five transects were surveyed in the Severson Flat area of the Project Site, in white-tailed prairie dog colonies identified by the Wyoming Game and Fish Department and during baseline studies for the EIS (WEST 2008) (Figure 8; Attachment B). These areas were not surveyed as part of the SMITH Report because they are located outside of the Bolten Complex (SMITH 2010). Although colonies exhibited comparable burrow densities to other areas in the Project Site (6.7 burrows/acre; Table 1), total active white-tailed prairie dog burrows were considerably lower (0.13 burrow/acre – 1.9% active burrows). Total active burrows ranged from 0.0-0.67 burrow per acre, indicating very low activity within the surveyed colonies.

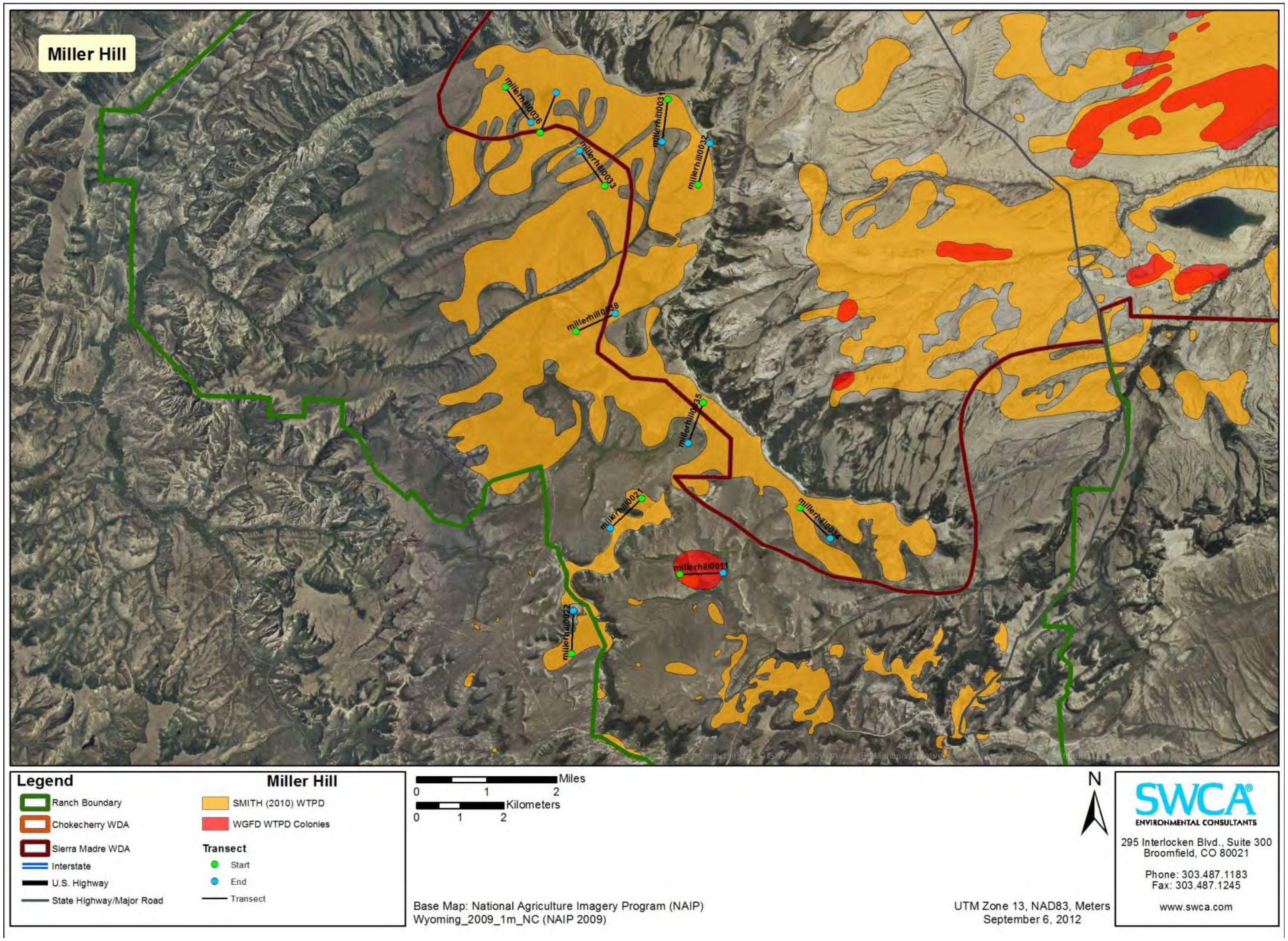

Figure 6. Prey base survey locations on Miller Hill.

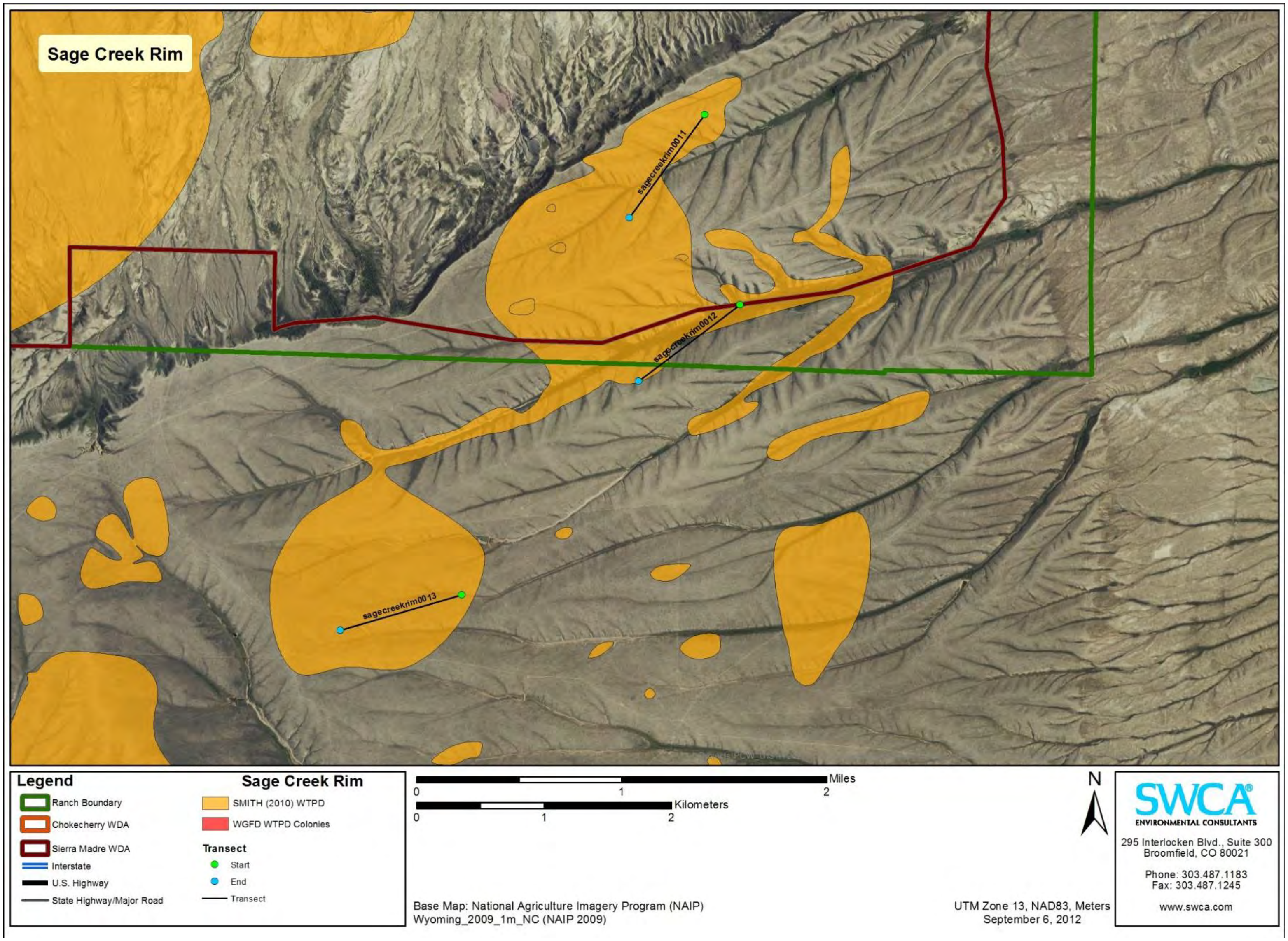

Figure 7. Prey base survey locations in Sage Creek Rim area.

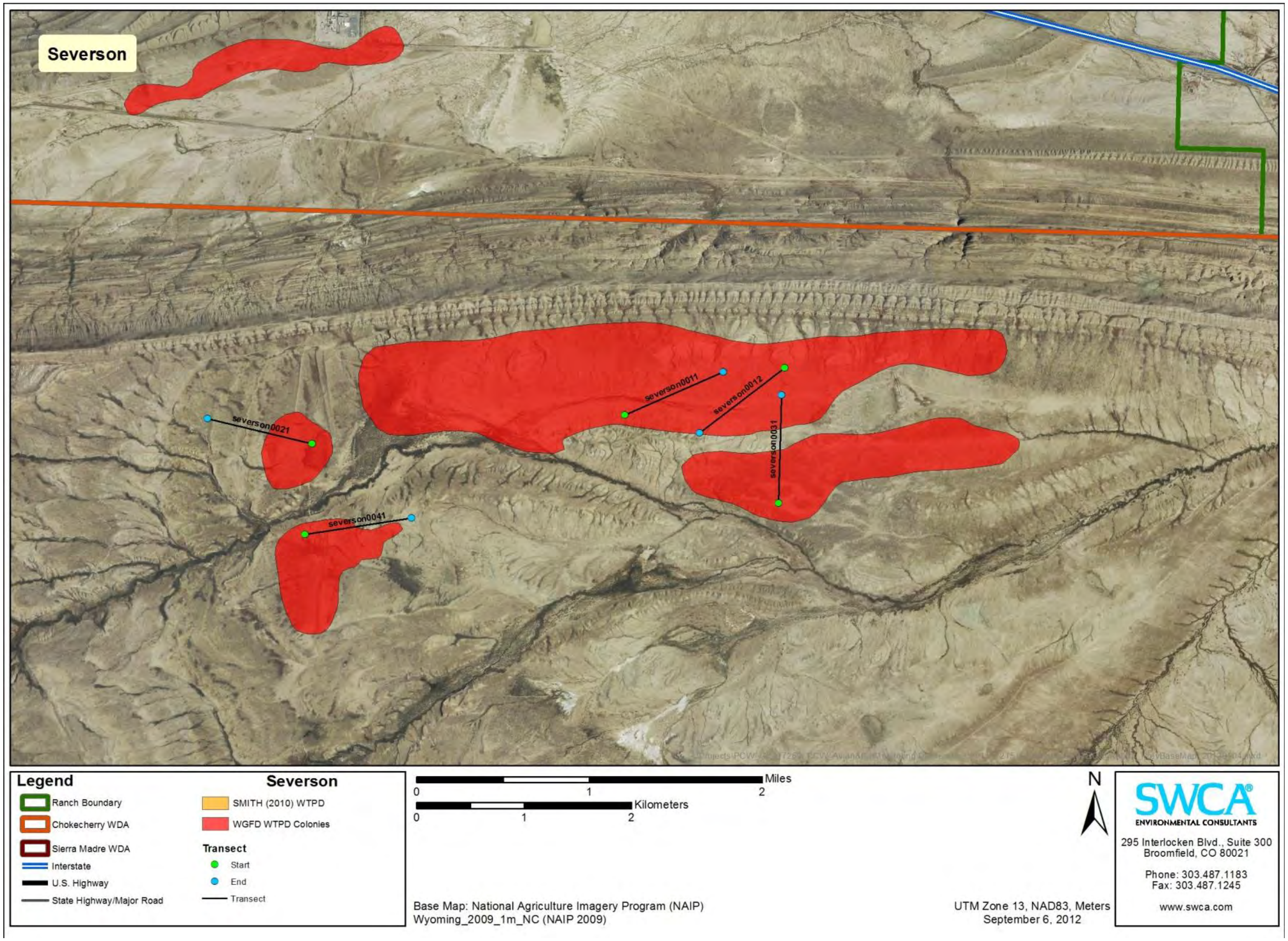

Figure 8. Prey base survey locations in Severson Flats area.

4.0 DISCUSSION

Bolten Road. White-tailed prairie dogs are most abundant in colonies along the Bolten Road (Table 1). Habitat in the area includes large expanses of flat and gently rolling terrain with large areas of low growing shrubs (Gardner's saltbush), sub-shrubs (birdsfoot sagebrush), and sparsely growing grasses and forbs. White-tailed prairie dog activity is highest in areas adjacent to suitable habitat surrounding Kindt Reservoir. Active burrows in this area account for 13% of all burrowing activity in the Bolten Road area, which is the largest proportion of activity compared to other areas on the Ranch. Active colonies in this area are concentrated in clusters throughout suitable habitat (low growing shrubs/sub-shrubs and sparse vegetation cover), surrounded by expanded areas of inactive and historic prairie dog colonies (44% of all burrow observations). Bolten Road (including areas surrounding Kindt Reservoir) supports the largest number of white-tailed prairie dog activity across the Ranch.

Central Basin. White-tailed prairie dog colonies are located along the flats within the Central Basin with their range extending to the eastern boundary of the Ranch along Bolten Road, west to the Pine Grove area, north to the base of the Bolten Rim, and south to the base of the Sage Creek Rim. The majority of burrows have visible mounding at the entrance and the burrow entrance size in active colonies ranges from 8-12 cm. Colonies are generally localized with burrows concentrated in clusters surrounded by larger areas devoid of burrows between colonies. Burrow densities in areas supporting the highest number of white-tailed prairie dogs are approximately 29 burrows per acre; colony size, including high burrow density colonies, is generally less than one acre. Burrow densities in other suitable habitats range from 6.7-8.8 total burrows per acre and 0.0-3.3 active burrows per acre (Table 1).

Miller Hill. Active white-tailed prairie dog colonies are not present on Miller Hill. However, several locations have inactive burrows with the necessary burrow entry size (8-12 cm), which may suggest potential historic white-tailed prairie dog occupancy.

Sage Creek Rim. In addition, white-tailed prairie dogs are not present in the area south of Sage Creek Rim, although some scattered clusters of badger mounds have similar characteristics to white-tailed prairie dog mounding.

Severson. White-tailed prairie dogs occupy suitable habitat in Severson (Table 1); however, activity is substantially lower when compared to other areas with active colonies. Although burrow densities for white-tailed prairie dog (6.7 burrows per acre) are comparable to other areas in the Ranch, total activity (0.13 active burrows per acre) is the lowest level of activity in the Project Site where active colonies are found. Total active burrows range from 0.0-0.67 per acre, indicating very low activity within the surveyed colonies.

Wyoming ground squirrels. Wyoming ground squirrel burrows, signs of recent activity, and individuals are commonly observed on Miller Hill, supporting the highest distribution and density of active burrows within the Project Site. Burrow entrances did not include any mounding and range in diameter from 5-8 cm. Unlike white-tailed prairie dogs, Wyoming ground squirrels appear to colonize areas of tall sagebrush and dense vegetation cover. However, Wyoming ground squirrels also use open areas with mixed vegetation cover and inhabit areas with occupied and unoccupied white-tailed prairie dog burrows. Occasionally, Wyoming ground squirrels occupy historic white-tailed prairie dog burrows.

American badgers. American badger burrow distribution is typically ubiquitous throughout the Ranch. Burrow entrances are distinctly large and typically greater than 12 cm. Recently excavated burrows are readily identified by large scraping marks on the inner wall of the burrow. Since American badgers feed extensively on fossorial mammals, it is common to observe American badger burrowing activity in areas supporting large populations of the smaller rodents. Several white-tailed prairie dog burrows appeared excavated by American badger and as a result these burrows have scoured entrances greater than 12 cm.

Pocket gophers. Pocket gophers occur throughout the Project Site in deep, loamy soils that support large shrub cover (basin big sagebrush, saltbush, and greasewood), typically on gently rising slopes off swales, draws, and rises. Burrows and tunneling activity are distinct, with above surface dirt remnants from snow tunneling, rounded dirt mounds, and small burrow entrances (less than 7 cm) typically plugged with loose soil (Beauvais and Dark-Smiley 2005). Pocket gophers in this area are generally much smaller than sciurids and seldom seen aboveground. Presence is generally assumed from recent burrowing and tunneling activity.

Leporids. The leporids commonly found on the Project Site are white-tailed jackrabbit, desert cottontail (*Sylvilagus audubonii*) and mountain cottontail (*Sylvilagus nuttallii*). All three species are crepuscular, feeding predominantly during the early morning and late evening hours; however white-tailed jackrabbits are known to forage throughout the night as well. These three species appear to be diffuse and widespread across the Project Site. All three species tend to inhabit areas with moderate shrub densities for use as cover from predators. White-tailed jackrabbit typically inhabit the lower-lying Central Basin of the Project Site, which is comprised if salt desert scrub and dense sagebrush steppe vegetation assemblages, but may also be found in higher areas of the Project Site. Desert cottontail may also be found in the Central Basin, the North Platte River corridor, and to a lesser extent on the Chokecherry plateau and Miller Hill, while mountain cottontail mainly occur on Miller Hill and to a lesser extent on the higher elevations of Chokecherry.

5.0 CONCLUSIONS

Overall, Wyoming ground squirrel, American badger, and pocket gopher burrows are more frequently observed than white-tailed prairie dog at most areas across the Project Site. Higher elevation areas on Miller Hill and south of Sage Creek Rim consist of large areas of rocky soils and dense sagebrush that is typically unsuitable for white-tailed prairie dogs. Upland areas with loamy soils and saltbush scrub along Bolten Road and the Central Basin provide more suitable habitat. In these areas, white-tailed prairie dogs colonies are distributed over wide ranges supporting several inactive burrows and generally low populations in occupied colonies. Sylvatic plague may potentially be responsible for the current lack of white-tailed prairie dog activity and the number of inactive colonies in this area, since the Project Site has very little development and recreational shooting is controlled. Sylvatic plague is known to have large scale effects on white-tailed prairie dog populations within its range (Menkens et al 1987, Behl and Kane 2003, Keinath 2004, Seglund et al. 2004, Pauli et al. 2006).

Wyoming ground squirrels are widespread across most habitat types in the Project Site. Miller Hill supports the highest density of Wyoming ground squirrel primarily due to their ability to colonize tall and dense sagebrush communities. In addition, Wyoming ground squirrels occupy areas with rockier substrate and are able to burrow underneath larger rocks and dense shrubs. White-tailed prairie dogs appear to avoid these habitat conditions.

WEST (2008) and SWCA (2012) survey results are contradictory to those provided in SMITH (2010). Also noteworthy is the lack of prairie dog observations within the Sierra Madre WDA by SWCA biologists during extensive vegetation and wildlife surveys from September 2009 to the present. Resolving this contradiction and accurately determining locations of active prairie dog colonies within the Project Site is important in evaluating golden eagle prey base potential within the Project Site. As stated above, the Smith (2010) data do not provide a count or density calculation of prairie dogs for individual colonies or collectively; nor can a population estimate be calculated from a count of active burrows. The assumption that delineated prairie dog colonies in SMITH (2010) contain a viable prey source for golden eagles is not valid. Prey base assessments should be conducted based on the revised burrow density estimates from this report. These data represent the best available scientific data and clearly demonstrate that the SMITH (2010) data are inadequate to address white-tailed prairie dog activity and prey base within the Project Site.

6.0 REFERENCES

Beauvais, G.P. and D.N. Dark-Smiley. 2005. Species assessment for Wyoming pocket gopher (*Thomomys clusius*) in Wyoming. Report prepared for U.S. Department of the Interior, Bureau of Land Management, Wyoming State Office, Cheyenne.

Behl, M.J. and D.P. Kane. 2003. Conceptual plans for assessing aerial mapping of black-footed ferret habitat in the Continental Divide/Wamsutter II project area. Unpublished proposal prepared by Sage Ecological Services, Erie, CO and Kane & Associates, Golden, CO, 24 April 2003. 9p.

Biggins, D.E., B.J. Miller, L.R. Hanebury, B. Oakleaf, A.H. Farmer, R. Crete, and A. Dood. 1993. A technique for evaluating black-footed ferret habitat. Pp. 73–88. *in* J.L. Oldemeyer, D.E. Biggins, B.J. Miller, and R. Crete *eds*. Management of prairie dog complexes for the reintroduction of the black-footed ferret: Washington, D.C., U.S. Fish and Wildlife Service, Biological Report 13.

Biggins, D. E., J. G. Sidle, D. Seery, B, and A. Ernst, E. 2006. Estimating the abundance of prairie dogs. Pages 94-108 in J. L. Hoogland, editor. Conservation of the black-tailed prairie dog: saving North America's western grasslands. Island Press, Washington D.C.

Cooke, L. A., and S. R. Swiecki. 1992. Structure of a white-tailed prairie dog burrow. Great Basin Naturalist 52: 288-289.

Keinath, D.A. 2004. Species assessment for white-tailed prairie dog (*Cynomys leucurus*) in Wyoming. Prepared for U.S. Department of the Interior, Bureau of Land Management, Wyoming State Office, Cheyenne, Wyoming. Wyoming Natural Diversity Database, University of Wyoming, Laramie, Wyoming. 47p.

McDonald, L.L., T.R. Stanley, D.L. Otis, D.E. Biggins, P.D. Stevens, J.L. Koprowski, and W. Ballard,. 2011. Recommended methods for range-wide monitoring of prairie dogs in the United States: U.S. Geological Survey Scientific Investigations Report 2011–5063, 36p.

Menkens, E. George, Jr., B.J. Miller, and S.H. Anderson. 1987. White-tailed prairie dog ecology in Wyoming. Great Plains Wildlife Damage Control Workshop Proceedings. Paper 83. Available online: http://digitalcommons.unl.edu/gpwdcwp/83. Accessed July 2012.

Pauli, J.N, S.W. Buskirk, E.S. Williams, and W.H. Edwards. 2006. A plague epizootic in the black-tailed prairie dog (*Cynomys ludovicianus*). Journal of Wildlife Diseases 42: 74–80.

Seglund, A.E., A.E. Ernst, M. Grenier, B. Luce, A. Puchniak and P. Schurr. 2004. White-tailed prairie dog conservation assessment.

Severson, K.E., and G.E. Plumb. 1998. Comparison of methods to estimate population densities of black-tailed prairie dogs. Wildlife Society Bulletin 26: 859–866.

Western EcoSystems Technology, Inc. (WEST). 2008. Prairie Dog and Black-footed Ferret Habitat Assessment Summary Chokecherry and Sierra Madre Wind Resource Areas. Carbon County, Wyoming. Prepared by Western EcoSystems Technology, Inc.

Yensen, E., and P. W. Sherman. 2003. Ground squirrels. Pp. 211-231 *in* G. A. Feldhamer, B. C. Thompson, and J. A. Chapman *eds*. Wild mammals of North America: biology, management, and conservation. 2nd ed. Johns Hopkins University Press, Baltimore, Maryland.

ATTACHMENT A

Survey Protocols

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White-tailed Prairie Dog (*Cynomys leucurus*) – Survey Protocols (from McDonald et al. 2011 – Appendix 6)

Ground Survey Procedure for Identifying Occupancy and Activity of Colonies

Abundance of burrows often has been used as an index to the abundance of their inhabitants; however, previous studies of this relationship have produced variable results (McDonald et al. 2011). A significant positive correlation between densities of occupied burrows and prairie dogs was estimated for WTPDs (Biggins et al. 1993) and BTPDs (Biggins et al. 1993, Johnson and Collinge 2004, Chipault 2010) although others have failed to detect such a relationship (Powell et al. 1994, Severson and Plumb 1998). Although it is intuitive that a positive correlation exists because prairie dogs are notably burrowing mammals and occupied prairie dog burrows cannot exist without prairie dogs (recently present, at least), we do not suggest that statistically valid inferences regarding population abundance can be extrapolated from our survey methods. Our primary purpose for assessing prairie dog burrows will be to estimate the proportion of a sampled colony on which prairie dogs recently were present. Because catastrophic losses of prairie dogs due to poisoning or plague can happen quickly (weeks or even days), and scat can appear relatively fresh for somewhat longer periods of time, the term recent implies occupancy within the past couple of months.

We propose use of belt transects to sample densities of burrow openings (occupied and unoccupied) on colonies selected for ground truthing. Before completing these activities, it will be necessary to determine the colonies to be sampled and secure permission to access private lands. Although weather patterns can affect results, sampling should not be inordinately sensitive to minor variations in prairie dog activity due to weather during this spring-summer period. However, long spells of extreme drought and periods of extreme thunderstorm activity should be avoided. The former might cause reduced activity in prairie dogs and flooding during the latter can destroy or re-distribute scat.

The following methodology was adapted from transect procedures described by Biggins and others (1993):

1. A prairie dog burrow opening is defined as an opening of diameter ≥ 7 cm with a tunnel extending beyond view. Large, badger-reamed burrows are included because prairie dogs often continue to use these burrows after the badger departs.
2. A burrow is classified as occupied if it has white-tailed prairie dog activity and/or fresh scat within 0.5 m of the opening. Fresh scat is defined as droppings that are not dried hard and bleached white but are greenish, black or dark brown. A close, detailed inspection of each burrow is not necessary or desirable. A maximum of 10 seconds per burrow is sufficient, and active burrows are often obvious at a glance.
3. Belt transects are 6 meters in width, with a length of 1,000 m (0.6 ha transects). The width is maintained by the operator (on foot or on an ATV).
4. Operator should record the coordinates of begin and end points of each transect, and each burrow opening is coded as occupied or unoccupied (*see* **Datasheet**).
5. Operator determines course direction (e.g., 180 degrees) and picks a corresponding landmark far ahead to maintain bearing (something on the horizon or at least several kilometers away). Concentration is maintained on the navigation landmark rather than on

burrow openings in the vicinity of the observer or immediately ahead. Peripheral vision is used to determine when to stop and examine a burrow opening for inclusion (that is, when more than half the burrow opening is inside the end of the bar). The long, narrow plots have a great deal of edge, so extreme care must be used to avoid biasing the decision regarding inclusion of burrow openings. Avoid letting any burrow opening influence direction of travel. This procedure sounds onerous and time consuming, but close calls will not be common, and a rapid pace usually is easy to maintain. Routinely, 10-15 km of transects can be completed per person per day.

The above steps describe collection of quantitative information. Also collect qualitative notes on sensitive species occurrence (e.g., mountain plover, Wyoming pocket gopher, pygmy rabbit) other prey base species (ground squirrels, pocket gophers, other rodents, lagomorphs, etc.), observations of digging, plugged burrows, burrows with spider webs, prairie dogs seen (dead or alive), clipped vegetation, evidence of poisoning (flagging, bait remnants, soil shoveled into burrows), and mounds with crusted soil (*see* **Datasheet**).

References

Biggins, D., Miller, B., Hanebury, L., Oakleaf, R., Farmer, A., Crete, R., and Dood, A. 1993. A technique for evaluating black-footed ferret habitat. Pp 73-88. *in* Oldemeyer, J., Biggins, D., Miller, B., and Crete, R., *eds*. Management of prairie dog complexes for reintroduction of the black-footed ferret. Biological Report 13. U.S. Fish and Wildlife Service, Washington, D.C.

Chipault, J.G. 2010. Fine-scale habitat use by black-footed ferrets (*Mustela nigripes*) released on black-tailed prairie dog (*Cynomys ludovicianus*) colonies in New Mexico: Fort Collins, Colorado State University, master’s thesis, 77 p.

Johnson, W.C., and Collinge, S.K. 2004. Landscape effects on black-tailed prairie dog colonies. Biological Conservation 115:487–497.

McDonald, L.L., T.R. Stanley, D.L. Otis, D.E. Biggins, P.D. Stevens, J.L. Koprowski, and W. Ballard,. 2011. Recommended methods for range-wide monitoring of prairie dogs in the United States: U.S. Geological Survey Scientific Investigations Report 2011–5063, 36p.

Powell, K.L., Robel, R.J., Kemp, K.E., and Nellis, M.D. 1994. Aboveground counts of black-tailed prairie dogs— temporal nature and relationship to burrow entrance density. Journal of Wildlife Management 58: 361–366.

Severson, K.E., and Plumb, G.E. 1998. Comparison of methods to estimate population densities of black-tailed prairie dogs: Wildlife Society Bulletin. 26: 859–866.

WTPD Survey Data Sheet (2012)

Transect ID		Survey Date	
Observer		Survey Time	
Begin UTM	N	End UTM	N
	E		E
Survey azimuth		Temperature	
Survey Length (m)		Wind Speed	
		Cloud	
		Precipitation	

WTPD Burrows		TOTAL	Other Burrows		TOTAL
Active			WYGS		
Inactive			POGO		
			Badger		
	TOTAL		Collapsed		

		TOTAL			
WTPD Individuals			Preybase		TOTAL
			WYGS		
			Lagomorphs		

Sensitive Species				Other		
MOUP		GOEA				
PYRA		BUOW				
WYPG		Other				

Notes:

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ATTACHMENT B

Field Observations

Area	Transect	Tran ID	Observer	Date	Time	Bearing	Length (m)	Area (m^2)	Burrow Counts								Burrow Density		
									WTPD (active)	WTPD (inactive)	WYGS	POGO	BADG	Collapsed	WTPD (TOTAL)	TOTAL	WTPD (active)	WTPD (TOTAL)	TOTAL
Bolten Road	hugus001	01	RBD	08/08/2012	17:25	183	999.86	5999	0	1	1	3	1	9	1	15	**0.000**	**0.675**	**10.119**
Bolten Road	hugus002	02	RBD	08/08/2012	18:57	212	1002.68	6016	0	1	5	2	2	9	1	19	**0.000**	**0.673**	**12.781**
Bolten Road	kindt001	01	JWW	08/04/2012	11:25	254	1005.79	6035	13	7	5	3	0	2	20	30	**8.718**	**13.412**	**20.118**
Bolten Road	kindt001	02	JWW	08/04/2012	12:50	228	996.54	5979	0	22	1	0	1	11	22	35	**0.000**	**14.890**	**23.689**
Bolten Road	kindt001	03	JWW	08/03/2012	13:18	333	971.64	5830	12	13	7	0	3	2	25	37	**8.330**	**17.354**	**25.684**
Bolten Road	kindt001	04	JWW	08/04/2012	12:09	057	955.72	5734	15	12	0	3	0	10	27	40	**10.586**	**19.055**	**28.229**
Bolten Road	kindt001	05	JWW	08/04/2012	13:47	317	1017.18	6103	7	6	11	7	1	9	13	41	**4.642**	**8.620**	**27.186**
Bolten Road	kindt001	06	JWW	08/10/2012	15:53	275	997.55	5985	13	15	1	0	0	3	28	32	**8.790**	**18.932**	**21.636**
Bolten Road	kindt001	07	JWW	08/10/2012	12:15	117	1000.79	6005	13	5	0	0	0	3	18	21	**8.761**	**12.131**	**14.153**
Bolten Road	kindt001	08	JWW	08/10/2012	10:00	029	996.09	5977	4	1	5	0	3	7	5	20	**2.708**	**3.386**	**13.542**
Bolten Road	kindt001	09	JWW	08/10/2012	10:48	145	1003.14	6019	7	19	9	2	2	4	26	43	**4.707**	**17.481**	**28.912**
Bolten Road	kindt001	10	JWW	08/10/2012	13:25	325	993.43	5961	3	8	0	0	0	0	11	11	**2.037**	**7.468**	**7.468**
Bolten Road	littlesage001	01	RBD	08/09/2012	15:05	090	1002.34	6014	0	8	13	0	5	14	8	40	**0.000**	**5.383**	**26.916**
Bolten Road	littlesage001	02	RBD	08/09/2012	14:10	337	1006.72	6040	0	3	5	2	3	5	3	18	**0.000**	**2.010**	**12.060**
Bolten Road	bolten001	01	RBD	08/08/2012	12:01	228	1007.18	6043	2	5	6	0	3	6	7	22	**1.339**	**4.688**	**14.733**
Bolten Road	bolten001	02	RBD	08/08/2012	11:25	081	1001.60	6010	0	8	3	0	1	4	8	16	**0.000**	**5.387**	**10.774**
Bolten Road	bolten002	01	MJP	08/07/2012	15:45	228	1009.49	6057	0	3	7	0	0	4	3	14	**0.000**	**2.004**	**9.354**
Bolten Road	bolten002	02	RBD	08/07/2012	14:02	115	1000.42	6003	0	11	3	3	1	9	11	27	**0.000**	**7.416**	**18.203**
Bolten Road	bolten003	01	JWW	08/14/2012	15:33	308	1006.34	6038	0	4	7	0	2	1	12	22	**0.000**	**8.043**	**14.745**
Bolten Road	bolten003	02	RBD	08/15/2012	6:54	064	1002.48	6015	0	16	9	0	2	42	13	66	**0.000**	**8.747**	**44.405**
Bolten Road	bolten003	03	JWW	08/14/2012	14:44	237	1006.03	6036	0	10	8	15	0	12	14	49	**0.000**	**9.386**	**32.851**
Bolten Road	bolten003	04	RBD	08/14/2012	12:53	268	1002.98	6018	0	2	7	0	0	14	15	36	**0.000**	**10.087**	**24.209**
Bolten Road	bolten003	05	JWW	08/14/2012	13:11	178	1006.01	6036	0	1	4	12	0	8	16	40	**0.000**	**10.727**	**26.818**
Bolten Road	bolten003	06	JWW	08/14/2012	14:05	093	1005.51	6033	4	10	8	0	1	7	17	33	**2.683**	**11.403**	**22.136**
Bolten Road	bolten004	01	JWW	08/07/2012	12:09	188	1000.84	6005	7	9	9	3	1	11	16	40	**4.717**	**10.783**	**26.956**
Bolten Road	bolten005	01	RBD	08/08/2012	14:15	249	1012.26	6074	1	4	5	1	2	9	5	22	**0.666**	**3.332**	**14.659**
Central Basin	pinegrove001	01	JWW	08/06/2012	14:04	078	1000.16	6001	0	2	4	0	3	3	2	12	**0.000**	**1.349**	**8.092**
Central Basin	pinegrove001	02	JWW	08/06/2012	15:15	157	1014.15	6085	0	0	2	0	2	1	0	5	**0.000**	**0.000**	**3.325**
Central Basin	pinegrove001	03	JWW	08/07/2012	15:14	248	1001.46	6009	0	13	2	7	0	3	13	25	**0.000**	**8.755**	**16.837**
Central Basin	pinegrove001	04	JWW	08/07/2012	14:08	316	995.90	5975	1	21	20	9	0	19	22	70	**0.677**	**14.900**	**47.408**
Central Basin	pinegrove001	05	JWW	08/06/2012	16:01	136	999.99	6000	0	9	3	0	1	5	9	18	**0.000**	**6.070**	**12.141**
Central Basin	sagecreek001	01	RBD	08/12/2012	16:40	039	1221.92	7332	0	5	6	1	1	14	5	27	**0.000**	**2.760**	**14.903**
Central Basin	sagecreek001	02	JWW	08/08/2012	10:42	132	1001.89	6011	0	18	7	0	0	9	18	34	**0.000**	**12.118**	**22.889**
Central Basin	sagecreek001	03	RBD	08/10/2012	11:25	251	1002.76	6017	0	2	3	0	2	7	2	14	**0.000**	**1.345**	**9.417**
Central Basin	sagecreek001	04	RBD	08/10/2012	12:40	118	1001.34	6008	0	0	5	0	1	9	0	15	**0.000**	**0.000**	**10.104**

Area	Transect	Tran ID	Observer	Date	Time	Bearing	Length (m)	Area (m^2)	Burrow Counts								Burrow Density		
									WTPD (active)	WTPD (inactive)	WYGS	POGO	BADG	Collapsed	WTPD (TOTAL)	TOTAL	WTPD (active)	WTPD (TOTAL)	TOTAL
Central Basin	centralbasin001	01	JWW	08/02/2012	11:22	066	999.61	5998	0	7	7	0	4	19	7	37	**0.000**	**4.723**	**24.965**
Central Basin	centralbasin001	02	JWW	08/02/2012	13:36	244	1005.92	6036	0	1	3	0	1	7	1	12	**0.000**	**0.671**	**8.046**
Central Basin	centralbasin001	03	JWW	08/02/2012	14:58	020	1000.01	6000	0	11	5	1	3	18	11	38	**0.000**	**7.419**	**25.630**
Central Basin	centralbasin001	04	JWW	08/02/2012	16:36	044	1001.43	6009	0	18	6	0	1	7	18	32	**0.000**	**12.123**	**21.552**
Central Basin	centralbasin001	05	JWW	08/02/2012	15:58	208	1010.32	6062	0	0	14	1	4	4	0	23	**0.000**	**0.000**	**15.354**
Central Basin	centralbasin001	06	RBD	08/14/2012	16:00	360	1002.25	6013	0	4	6	0	1	19	1	27	**0.000**	**0.673**	**18.170**
Central Basin	centralbasin001	07	RBD	08/14/2012	18:41	116	1000.07	6000	0	5	6	0	1	13	2	22	**0.000**	**1.349**	**14.837**
Central Basin	centralbasin001	09	JWW	08/14/2012	11:06	197	1002.47	6015	0	37	12	0	3	17	3	35	**0.000**	**2.018**	**23.549**
Central Basin	centralbasin002	01	JWW	08/06/2012	12:00	037	998.40	5990	0	10	5	0	0	12	10	27	**0.000**	**6.756**	**18.240**
Central Basin	centralbasin002	02	JWW	08/06/2012	12:40	115	990.60	5944	5	22	8	1	0	7	27	43	**3.404**	**18.384**	**29.278**
Central Basin	centralbasin003	01	JWW	08/03/2012	13:30	002	999.65	5998	0	9	10	1	0	6	9	26	**0.000**	**6.072**	**17.543**
Central Basin	centralbasin003	02	JWW	08/03/2012	14:51	096	996.44	5979	0	9	7	0	0	6	9	22	**0.000**	**6.092**	**14.891**
Central Basin	centralbasin003	03	JWW	08/03/2012	11:45	192	1010.60	6064	2	2	7	6	1	22	4	40	**1.335**	**2.670**	**26.696**
Central Basin	centralbasin004	01	JWW	08/09/2012	11:15	292	1003.34	6020	3	20	13	0	2	14	23	52	**2.017**	**15.461**	**34.956**
Central Basin	centralbasin004	02	JWW	08/09/2012	10:26	338	999.43	5997	13	7	6	9	0	0	20	35	**8.773**	**13.497**	**23.620**
Central Basin	centralbasin004	03	JWW	08/09/2012	12:05	220	372.54	2235	16	0	2	0	0	2	16	20	**28.968**	**28.968**	**36.209**
Central Basin	centralbasin005	01	JWW	08/03/2012	17:30	301	997.95	5988	0	12	5	3	12	14	12	46	**0.000**	**8.110**	**31.090**
Central Basin	centralbasin005	02	JWW	08/03/2012	16:50	094	999.45	5997	0	14	7	0	4	16	14	41	**0.000**	**9.448**	**27.669**
Central Basin	centralbasin005	03	JWW	08/08/2012	14:12	331	998.19	5989	0	5	23	0	0	7	5	35	**0.000**	**3.378**	**23.649**
Central Basin	centralbasin005	04	JWW	08/08/2012	15:02	063	999.54	5997	2	14	10	3	0	7	16	36	**1.350**	**10.797**	**24.292**
Miller Hill	millerhill001	01	MJP	08/10/2012	13:59	086	1001.92	6012	0	5	5	4	2	3	3	17	**0.000**	**2.020**	**11.444**
Miller Hill	millerhill002	01	JWW	08/13/2012	16:57	225	1000.29	6002	0	0	3	3	7	5	0	18	**0.000**	**0.000**	**12.137**
Miller Hill	millerhill002	02	MJP	08/10/2012	11:01	001	997.97	5988	0	5	5	3	0	0	0	8	**0.000**	**0.000**	**5.407**
Miller Hill	millerhill003	01	MJP	08/09/2012	14:49	186	997.64	5986	0	10	14	4	3	7	10	38	**0.000**	**6.761**	**25.691**
Miller Hill	millerhill003	02	MJP	08/09/2012	15:30	014	997.94	5988	0	5	12	1	0	5	5	23	**0.000**	**3.379**	**15.545**
Miller Hill	millerhill003	03	MJP	08/09/2012	15:21	323	999.26	5996	0	0	11	3	3	10	0	27	**0.000**	**0.000**	**18.224**
Miller Hill	millerhill003	04	MJP	08/10/2012	15:00	134	998.47	5991	0	3	3	4	7	4	8	26	**0.000**	**5.404**	**17.563**
Miller Hill	millerhill003	05	JWW	08/13/2012	12:45	200	1001.56	6009	0	0	6	7	6	22	0	41	**0.000**	**0.000**	**27.610**
Miller Hill	millerhill003	06	JWW	08/13/2012	15:46	144	1004.67	6028	0	0	15	6	21	10	0	52	**0.000**	**0.000**	**34.910**
Miller Hill	millerhill003	07	JWW	08/13/2012	14:58	019	997.93	5988	0	3	23	0	21	9	3	56	**0.000**	**2.028**	**37.849**
Miller Hill	millerhill003	08	JWW	08/13/2012	13:56	064	1003.23	6019	0	0	6	25	13	17	0	61	**0.000**	**0.000**	**41.011**
Sage Creek Rim	sagecreekrim001	01	JWW	08/09/2012	13:45	216	1002.32	6014	0	5	7	2	0	9	5	23	**0.000**	**3.365**	**15.477**
Sage Creek Rim	sagecreekrim001	02	JWW	08/09/2012	14:20	242	1000.21	6001	0	19	6	0	11	14	19	50	**0.000**	**12.812**	**33.717**
Sage Creek Rim	sagecreekrim001	03	JWW	08/09/2012	15:25	255	997.40	5984	0	11	2	7	0	9	11	29	**0.000**	**7.439**	**19.611**
Severson	severson001	01	MJP	08/08/2012	12:31	065	999.93	6000	0	12	7	0	0	7	12	26	**0.000**	**8.094**	**17.538**

Area	Transect	Tran ID	Observer	Date	Time	Bearing	Length (m)	Area (m^2)	Burrow Counts								Burrow Density		
									WTPD (active)	WTPD (inactive)	WYGS	POGO	BADG	Collapsed	WTPD (TOTAL)	TOTAL	WTPD (active)	WTPD (TOTAL)	TOTAL
Severson	severson001	02	MJP	08/08/2012	11:02	231	999.07	5994	0	13	10	1	1	6	13	31	**0.000**	**8.776**	**20.928**
Severson	severson002	01	RBD	08/13/2012	13:49	284	1004.63	6028	1	10	6	2	2	9	11	30	**0.671**	**7.385**	**20.141**
Severson	severson003	01	MJP	08/08/2012	13:40	357	1006.31	6038	0	10	12	5	1	3	10	31	**0.000**	**6.702**	**20.778**
Severson	severson004	01	RBD	08/13/2012	15:00	083	1005.40	6032	0	4	2	4	0	5	4	15	**0.000**	**2.683**	**10.063**

Chokecherry and Sierra Madre Wind Energy Project

2013 White-tailed Prairie Dog Survey Report and Eagle Use Assessment

Prepared for

Power Company of Wyoming LLC

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1.0 INTRODUCTION

This document, the 2013 White-tailed Prairie Dog Survey Report and Eagle Use Assessment, (2013 CCSM Prey Base Report), updates and supplements the CCSM Project Eagle and Raptor Prey Base Assessment (SWCA 2012), provided to the U.S. Fish and Wildlife Service (the Service) in October 2012.

PCW's 2012 CCSM Project Eagle and Raptor Prey Base Assessment supplemented PCW's Eagle Conservation Plan meeting the Service's January 2011 Draft Eagle Conservation Plan Guidance which called for surveys documenting foraging areas that might represent "important eagle use areas" under the definitions provided in 50 CFR 22.3. In April 2013, the Service issued its Final Eagle Conservation Plan Guidance which confirmed the Draft ECP Guidance on this issue.

The 2013 CCSM Prey Base Report incorporates the field surveys and analysis completed in 2013, and focuses specifically on Phase I of the CCSM Project, as described in more detail below. The 2013 surveys were conducted in compliance with both the Draft and the Final ECP Guidance to determine locations and abundance of White-tailed Prairie Dogs in the vicinity of Phase I of the CCSM Project and to assess the potential of such prey species to support resident and non-resident eagles.

The 2013 survey data and analysis discussed below further supports the conclusions that SWCA outlined in the 2012 CCSM Project Eagle and Raptor Prey Base Assessment, including that eagle and raptor foraging opportunities associated with white-tailed prairie dogs is low across the Phase I CCSM Project Site based upon (i) the best available scientific data for the Project (WEST 2008, SWCA 2012, data collected in 2013), (ii) the location of the highest population densities outside of areas of likely turbine development, and (iii) seasonal absence during hibernation in the CCSM Project Site between approximately August and mid-late March.

2.0 PROJECT BACKGROUND

Power Company of Wyoming LLC (PCW) proposes to construct, operate, maintain and decommission the Chokecherry and Sierra Madre Wind Energy Project (CCSM Project), located in Carbon County, Wyoming. The CCSM Project consists of up to 1,000 wind turbines capable of generating approximately 2,000 to 3,000 megawatts (MW) of clean, renewable wind energy. The primary components of the CCSM Project include the wind turbine generators, an internal road network, a rail facility, a quarry, an internal electrical collection and transmission system, substations, and operations and maintenance buildings.

The CCSM Project is located south of the city of Rawlins, primarily within the bounds of the Overland Trail Ranch (Ranch). The Ranch is owned and operated by PCW affiliate, The Overland Trail Cattle Company LLC (TOTCO). The Ranch is situated within an area of alternating sections of private and federal lands commonly referred to as the "checkerboard." The vast majority of the private lands are owned by TOTCO and the federal lands are administered by the Bureau of Land Management (BLM) Rawlins Field Office (RFO). A small percentage of the land within the Ranch is owned by the State of Wyoming and is administered by the State Board of Land Commissioners. Finally, Anadarko Land Corporation owns some sections located on the periphery of the northwest boundary of the Ranch.

In 2008, PCW applied to BLM for right-of-way grants to construct, operate, maintain and decommission the CCSM Project on federal land within the CCSM Project Area. On June 29, 2012, the Notice of Availability for the Final EIS concerning the CCSM Project was published in the Federal Register (77 FR 63328). On October 9, 2012 the Secretary of the Interior signed the Record of Decision (ROD). In the ROD, BLM determined that over 200,000 acres located on the Overland Trail Ranch were suitable for wind energy development, subject to the requirements described under the Selected Alternative in the ROD: the Chokecherry wind development area (Chokecherry WDA) and the Sierra Madre wind development area (Sierra Madre WDA).

The Sierra Madre WDA consists of two distinct areas divided by Highway 71 (BLM 2012; Figure 3-1). The portion of the Sierra Madre WDA located west of Highway 71 is referred to as Miller Hill and the portion of Sierra Madre located east of Highway 71 is referred to as Sage Creek Basin (BLM 2012a; App. B at 4-25 and 4-26, Figure 4-10). The Chokecherry WDA is located entirely east of Highway 71, and is divided into Western and Eastern Chokecherry based on topography (BLM 2012a; App. B at 4-26, Figure 4-10).

Development of the CCSM Project will occur in two phases. Phase I of the CCSM Project (Phase I) will include development of Miller Hill (Upper and Lower), Western Chokecherry, and the portion of Eastern Chokecherry located west of the CCSM Project Haul Road (Figure 1). Phase II development will include Sage Creek Basin and the remainder of Eastern Chokecherry (Phase II).

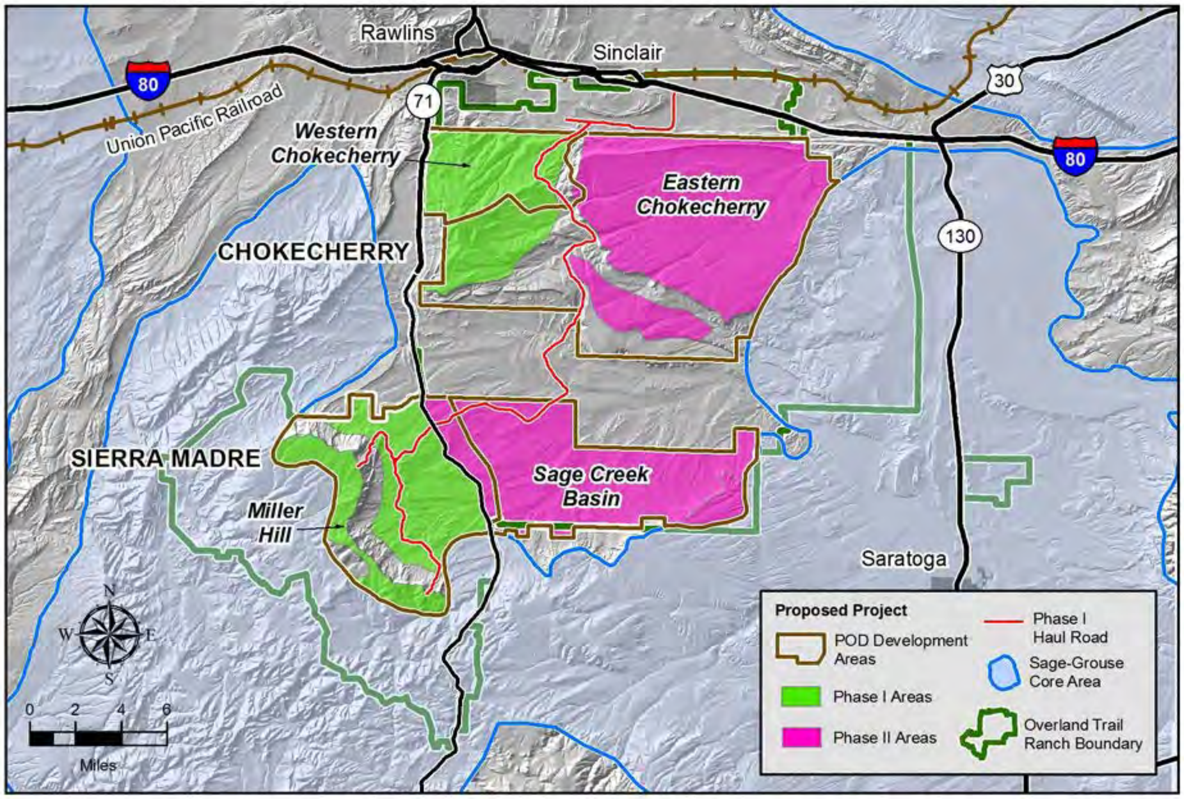

Figure 1. CCSM Project development areas and phasing

Surveys for white-tailed prairie dog (*Cynomys leucurus*; hereafter WTPD) activity were conducted from May 1 to August 30, 2013 to identify WTPD colonies, determine current occupancy, and describe the relative density of the colonies. The 2013 survey area included all of Phase I and limited portions of Phase II of the CCSM Project (Figure 2). The 2013 survey area was based on the limits of disturbance for the CCSM Project infrastructure, including a minimum of a 100 foot buffer around the limits of disturbance. Colonies extending outside of the survey area were delineated to their full extent. This report identifies areas located during the 2013 survey where there is evidence of historic and current WTPD activity and refines the WTPD data presented in the CCSM Project Eagle and Raptor Prey Base Assessment (SWCA 2012).

The CCSM Project Eagle and Raptor Prey Base Assessment (SWCA 2012) describes the relationship of prey base to eagle use (SWCA 2012; Section 1.3). As detailed in the Final Eagle Conservation Plan Guidance issued by the Service in 2013, analysis of the data presented in this report will be used to inform the identification of important eagle use areas as part of a Stage 2 Assessment. An important eagle-use area is defined in 50 CFR 22.3 as "an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost site that are essential for the continued viability of the site for breeding, feeding, or sheltering eagles."

For the purposes of this assessment, consistent, frequent, multi-year evidence of foraging and use by eagles would be required to identify a WTPD colony as an important eagle use area. This report uses the additional 2013 WTPD survey data in connection with eagle flight pathways collected from 2011 to 2013 to determine if there is a pattern of association with delineated WTPD colonies. Comparing colony locations to eagle flight paths provides evidence of either foraging and use by eagles or the lack thereof.

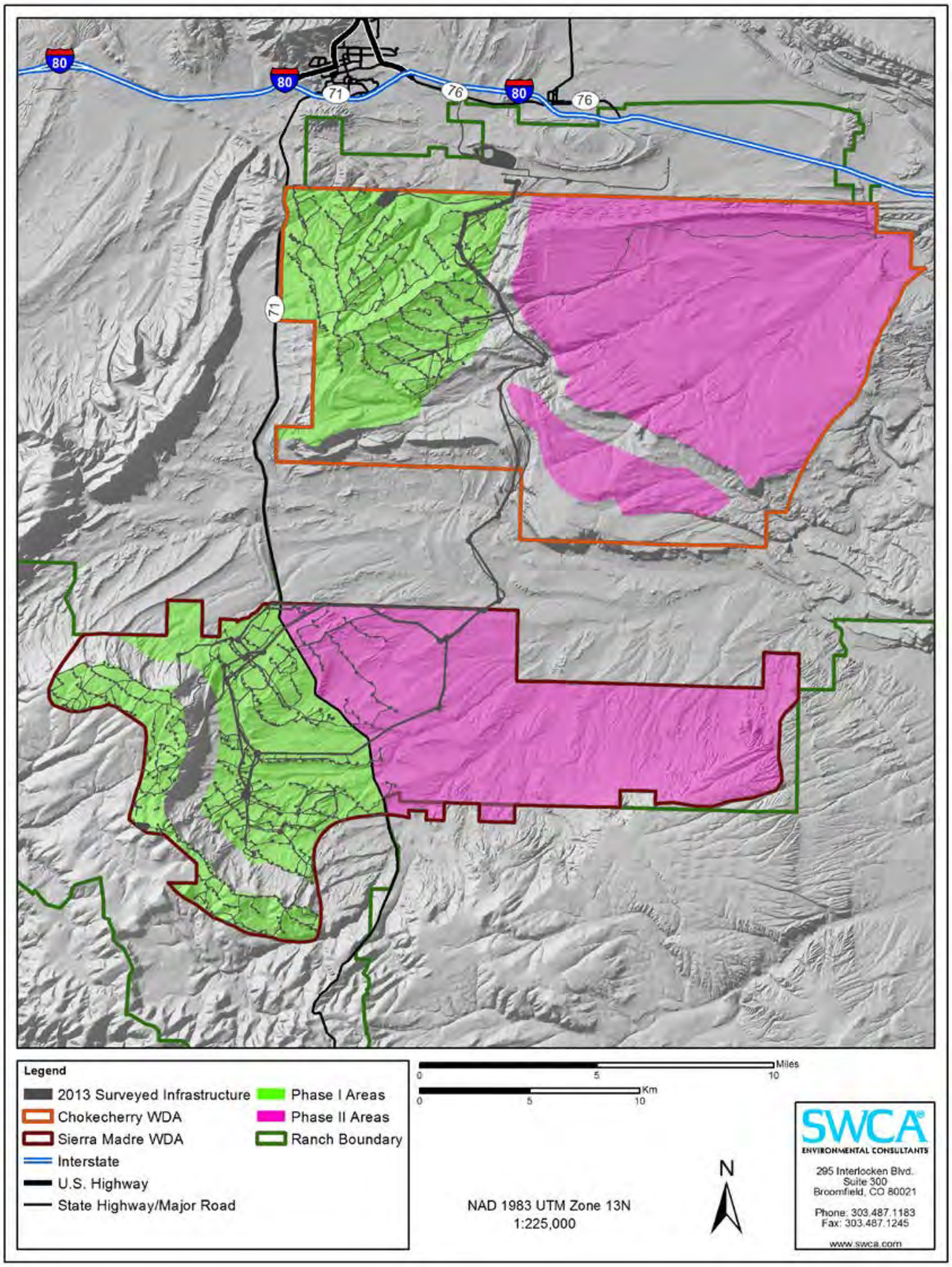

Figure 2. 2013 survey area in relation to CCSM Project phasing.

Physiographic Setting

The CCSM Project Site is dominated by three topographic features: Chokecherry Plateau, Miller Hill, and Sage Creek Rim, which are separated by a Central Basin (Figure 3).The Chokecherry Plateau, located in the northern portion of the CCSM Project Site, consists of ridges and rolling hills that generally slope down to the northeast to the North Platte River. Most of the northern extent of the Chokecherry Plateau is defined by a ridge that runs east/west, commonly known as the Hogback, which is approximately 10 miles long; the southern portion is defined by a sheer cliff known as the Bolten Rim, which is approximately 20 miles long.

The southwestern portion of the CCSM Project Site is dominated by a steep-sloped mesa known as Miller Hill. This predominant feature slopes down to the southwest, with relatively level terrain near the edge of the rim which becomes increasingly undulated towards the southwest. Only a small portion of Miller Hill is within the CCSM Project Site. For reporting purposes, Miller Hill is divided into Upper Miller Hill and Lower Miller Hill (Figure 3).

The Central Basin, located between Chokecherry Plateau and Miller Hill, is a high desert basin transected by Sage Creek and several smaller perennial and ephemeral tributaries. Much of this basin is outside the WDAs; however, the CCSM Project Haul Road and internal transmission line will traverse the Central Basin and connect the WDAs. Larger water bodies, including Kindt, Rasmussen, Sage Creek, and Teton Reservoirs, are interspersed throughout this arid landscape.

Survey Approach

Survey protocols for white-tailed prairie dog complexes were consistent with those for the 2012 surveys (SWCA 2012; App. A) and were adapted from McDonald et al. (2011); surveys focused on areas with active and inactive WTPD burrows. Activity was determined by WTPD presence, fresh burrowing activity, or other signs of recent activity (fresh droppings, fresh scraping, reduced vegetative cover, etc.). For inactive sites, SWCA determined species identification based on burrow characteristics and entrance size. WTPD burrows often exhibit distinctive mounds of dirt with entrances measuring 8-12 centimeters in diameter (Cooke and Swiecki 1992, Menkens et al. 1987).

When WTPD burrows were encountered, the perimeter of each complex within the survey area was delineated with a global positioning system (GPS) device. Biologists also completed a visual scan of the colony to determine if satellite colonies were adjacent to the delineated colony. If present, the observer delineated adjacent satellite colonies. An approximate distance of 50 meters was used for determining separate colonies for delineation.

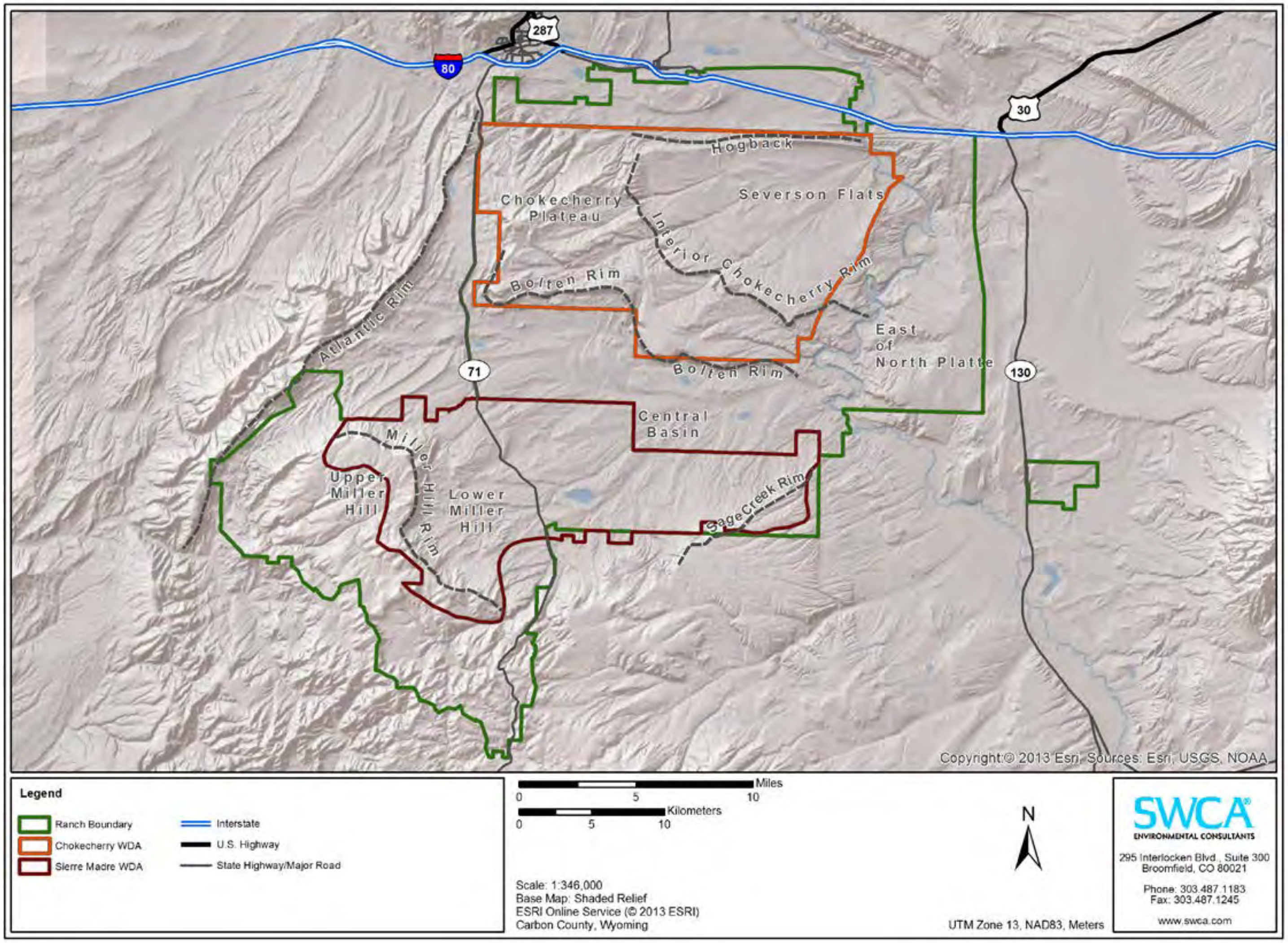

Figure 3. CCSM Project physiographic features

3.0 RESULTS AND DISUSSION

3.1 CHOKECHERRY

SWCA identified twelve WTPD colonies in the Chokecherry portion of the 2013 survey area, all of which were located outside of the Phase I turbine development in the Chokecherry WDA. Eleven of these colonies were found between Interstate 80 and the Hogback, and one colony was located approximately four miles east of the others on top of Chokecherry Plateau (Figure 4). Of the eleven colonies between Interstate 80 and the Hogback, ten were clustered in close proximity (Figure 4).

Five of the twelve colonies identified in the Chokecherry portion of the 2013 survey area contained at least one active WTPD burrow. All five active colonies were located between Interstate 80 and the Hogback outside of the Chokecherry WDA. A total of 88.2 acres, including the extent of all burrows (active and inactive), was delineated for the five active colonies. Six of the eleven colonies between Interstate 80 and the Hogback and the single colony on Chokecherry Plateau were determined to be inactive due to the lack of sign of recent activity or presence of prairie dogs (e.g., fresh scat or fresh digging).

All of the colonies identified in the Chokecherry portion of the 2013 survey area were located outside of the Phase I turbine development in the Chokecherry WDA (Figure 4); therefore, the Phase I portion of the Chokecherry WDA provides little to no eagle foraging opportunity associated with WTPD. As a result, no important eagle use areas have been identified in the Phase I portion of the Chokecherry WDA. The areas north of the Chokecherry WDA between Interstate 80 and the Hogback provide the most likely foraging locations for golden eagle nest 145 (active in 2008) and the other two active eagle nests along the northern edge of the Chokecherry WDA in Phase II (Figure 4).

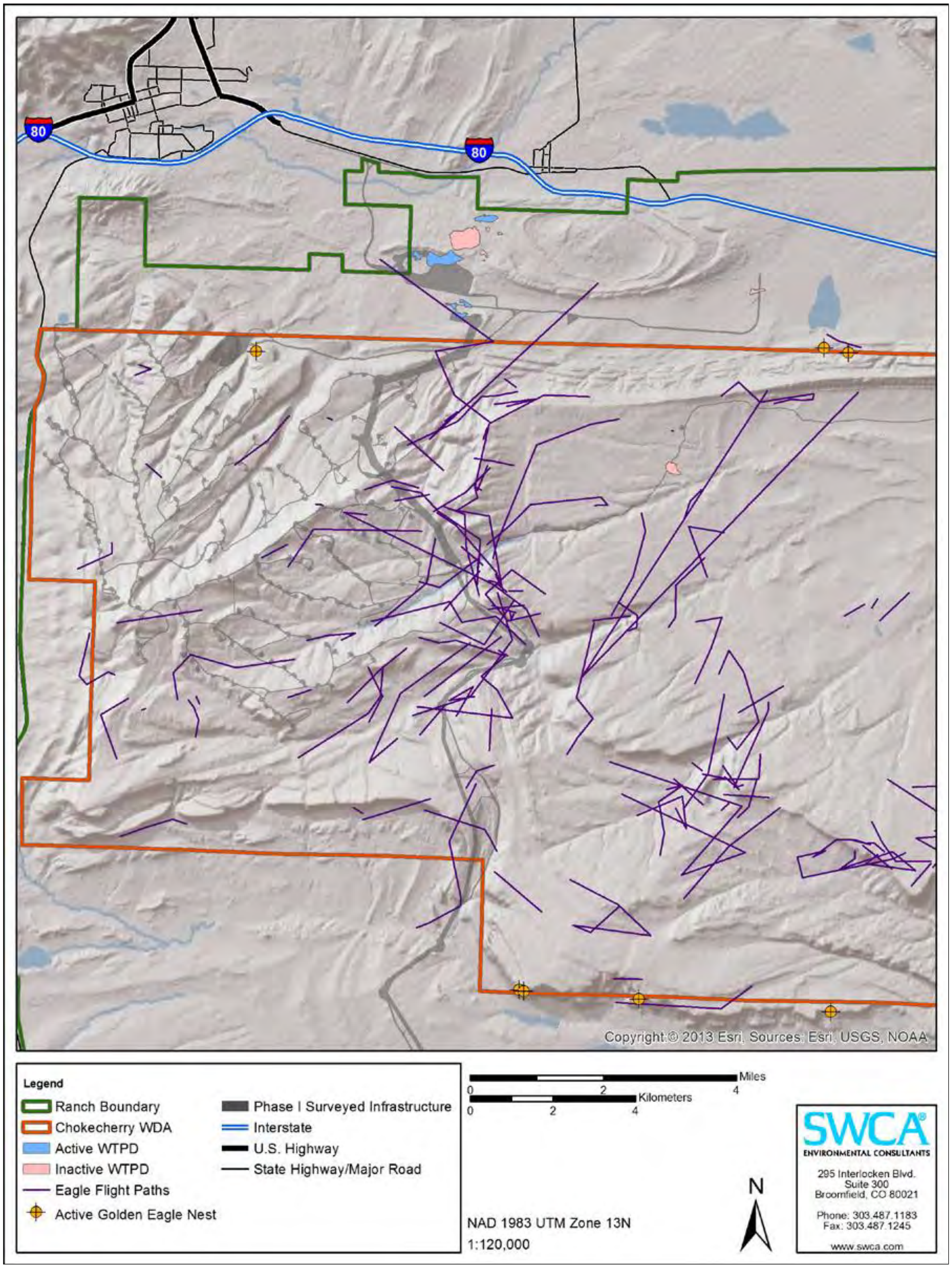

Figure 4. Eagle flight pathways and active eagle nest locations (2008, 2011, 2012, and 2013) in relation to WTPD colonies in the Chokecherry portion of the 2013 survey area.

3.2 UPPER MILLER HILL

Surveys on Upper Miller Hill[1] identified eight white-tailed prairie dog colonies, all very small and all within an approximate 1.8 mile stretch along the northern portion of Miller Hill Rim (Figure 5).

WTPDs or signs of recent activity were noted at three of the eight colonies; therefore, these are deemed active colonies. Two of the three active colonies contained only one active burrow and the population size of the other colony was estimated as being between 1 and 5 prairie dogs based on observations of individuals and burrowing activity. The collective acreage for all three active prairie dog colonies was 3.7 acres (average of less than 1 acre per colony). Five colonies, each consisting of a single prairie dog burrow, were determined to be inactive due to the lack of WTPDs and/or signs of recent activity.

Eagle flight pathways mapped on Upper Miller Hill show no pattern of association with the delineated WTPD colonies. Because WTPD hibernate in the CCSM Project site between August and mid-late March each year and are not available as potential prey, only those eagle flight paths recorded between April 1 and September 30 were compared to colony locations to identify potential use (Figure 5). The lack of association between eagle flight paths and colony locations demonstrates that the ephemeral and very small WTPD colonies on Upper Miller Hill do not provide consistent or adequate resources for foraging by eagles. As a result, no important eagle use areas have been identified on Upper Miller Hill, which is included in Phase I of the CCSM Project.

[1] Upper Middle Hill is part of the Sierra Madre WDA.

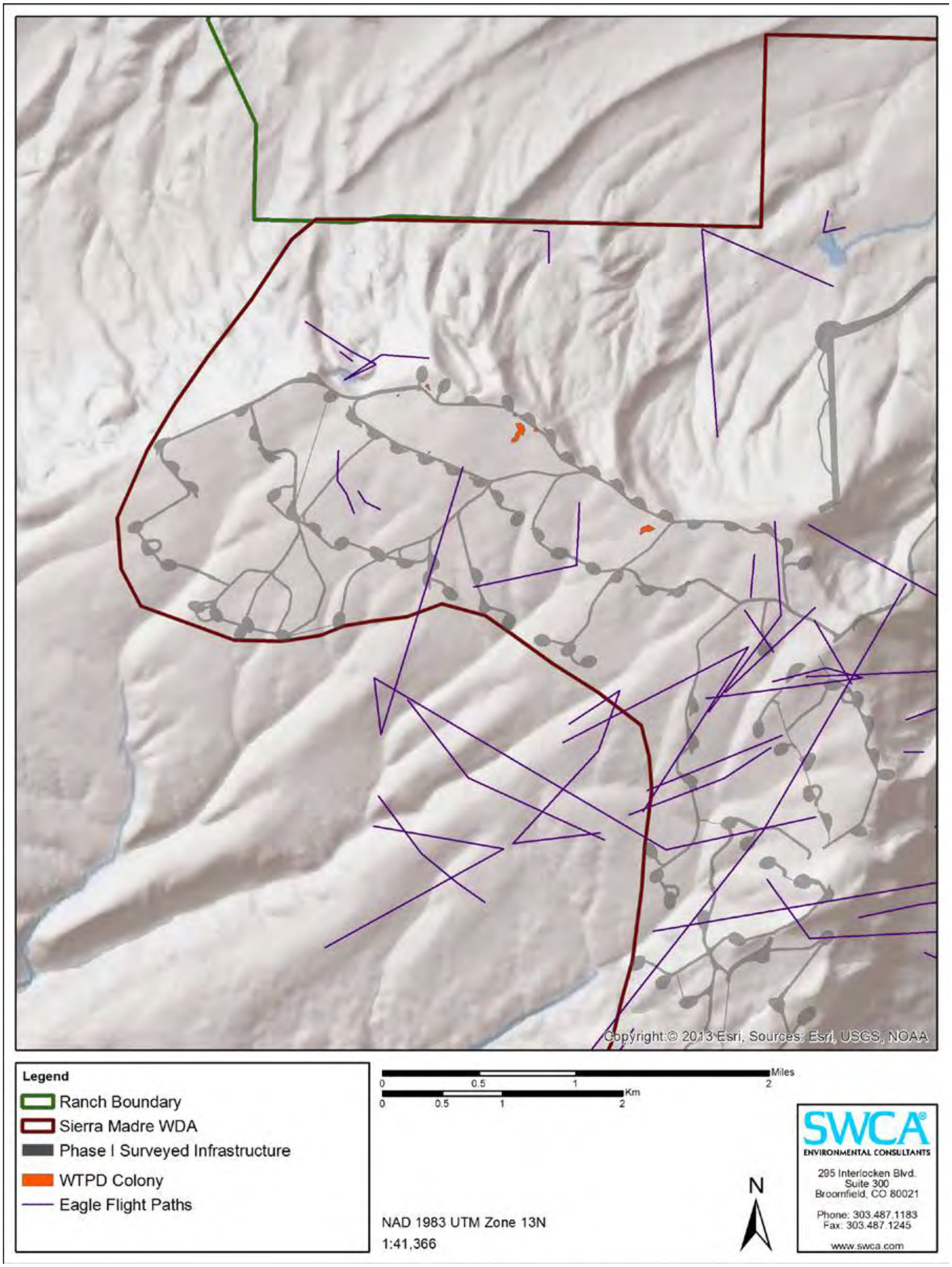

Figure 5. Eagle flight pathways in relation to white-tailed prairie dog colonies identified during surveys of Upper Miller Hill

3.3 LOWER MILLER HILL

The Lower Miller Hill[2] portion of the 2013 survey area includes Lower Miller Hill (Phase I) and the western portion of Sage Creek Basin (Phase II) (Figure 2). SWCA identified 127 WTPD colonies in the Lower Miller Hill portion of the 2013 survey area (Figure 6).

Of the 127 colonies identified, twenty-eight colonies were determined to be inactive. The remaining 99 colonies had at least one prairie dog present or a burrow with sign of recent activity. Of the 99 active colonies, 43 colonies were less than 5 acres in size and were located in scattered or loosely associated groups and 14 were identified as having burrow densities of less than five burrows per acre with very few individuals. These 57 colonies were removed from consideration as important eagle use areas due to their small population and ephemeral nature, both of which indicate they are not suitable for consistent foraging that would be essential for continued viability of the site for eagle foraging (50 CFR 22.3).

The remaining 42 colonies in Lower Miller Hill were active, more than five acres in size, and had burrow densities of more than five burrows per acre. These locations were compared to observed eagle flight paths and behaviors to identify potential important eagle use areas associated with prairie dog colonies having combinations of suitable prey density and eagle use (Figure 7). Because WTPD hibernate in the Project site between August and mid-late March each year and are not available as potential prey, only those eagle flight paths recorded between April 1 and September 30 were compared to colony locations to identify potential use.

Overlaying eagle flight paths collected between 2011 and 2013 and active WTPD colonies having suitable prey density, only two areas provide potentially suitable foraging opportunities and have documented patterns of use by eagles (Figure 8). One area is located north of Rasmussen Reservoir in an area included in Phase II of the CCSM Project and the second is located in Phase I of the CCSM Project immediately south of Lone Tree Creek.

To evaluate the potential of these locations as important eagle use areas (50 CFR 22.3), the frequency and duration of use and individual behavior of observed eagles was analyzed based on eagle use data collected from 2011 to 2013. For the location north of Rasmussen Reservoir, use was observed during only two survey events for a total of 7 minutes. When compared to the 7,640 survey minutes completed between April 1 and October 30 at the two sites from which observations were made (RM15 and RM16), eagle use over this WTPD colony occurs only 0.09% of the time. This demonstrates that this location does not meet the definition of important eagle use area (50 CFR 22.3) because it does not provide the frequent and consistent use that would be essential for continued viability of the site for eagle foraging.

[2] Lower Middle Hill is part of the Sierra Madre WDA.

For the location south of Lone Tree Creek, use was observed during four survey events for a total of 11 minutes. When compared to the 7,169 survey minutes completed between April 1 and October 30 at the two sites from which observations were made (RM15 and RM16), eagle use in the vicinity of this WTPD colony occurs only 0.15% of the time. Of the observations made over this location, more than 50% were recorded as having circle soaring and soaring behavior more than 150 meters above the ground surface. No observations were made of foraging behavior during surveys. This demonstrates that this location does not meet the definition of important eagle use area (50 CFR 22.3) because it does not provide the frequent and consistent use with foraging behavior that would be essential for continued viability of the site for eagle foraging.

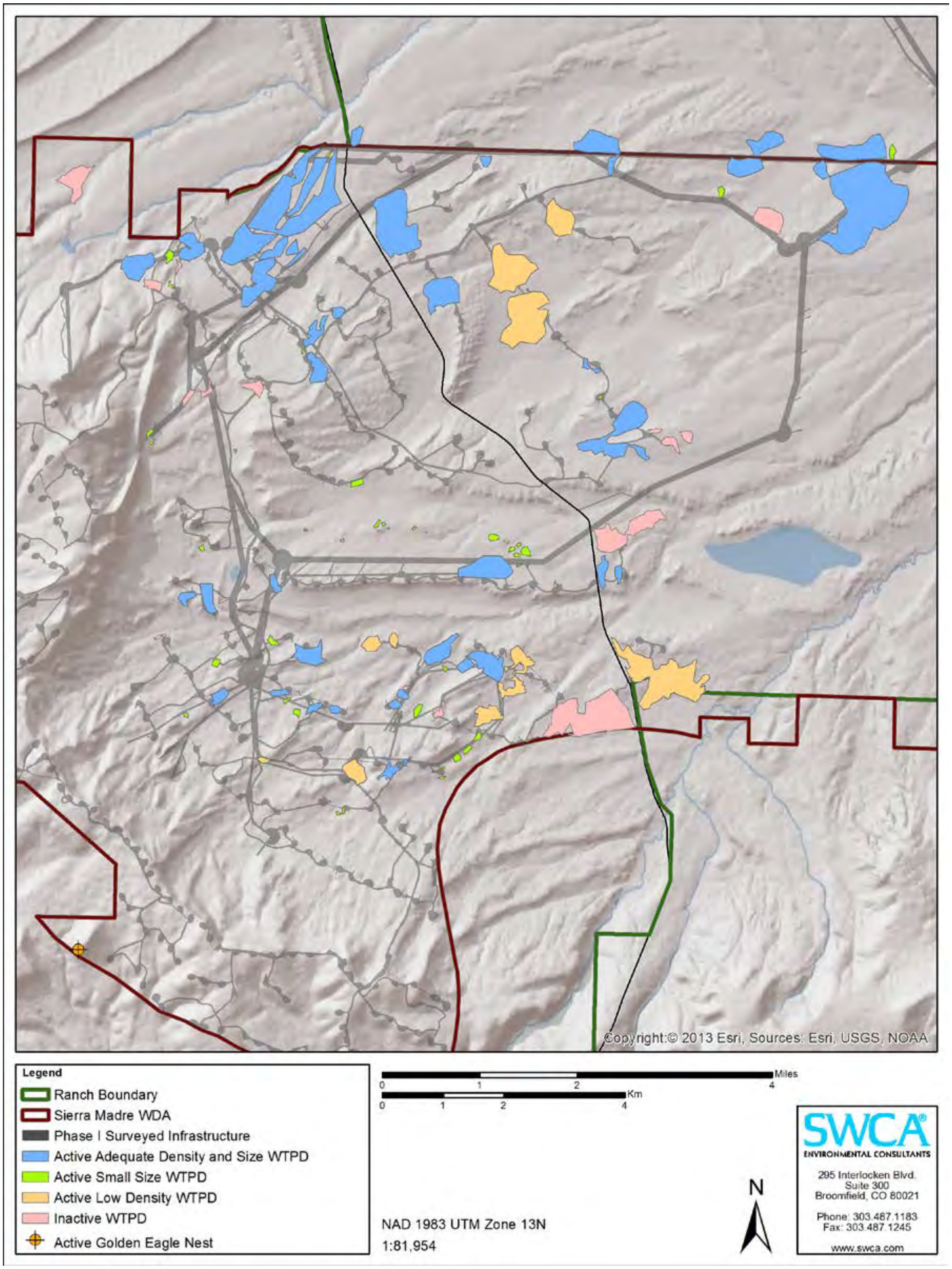

Figure 6. Location of WTPD colonies within the Lower Miller Hill portion of the 2013 survey area

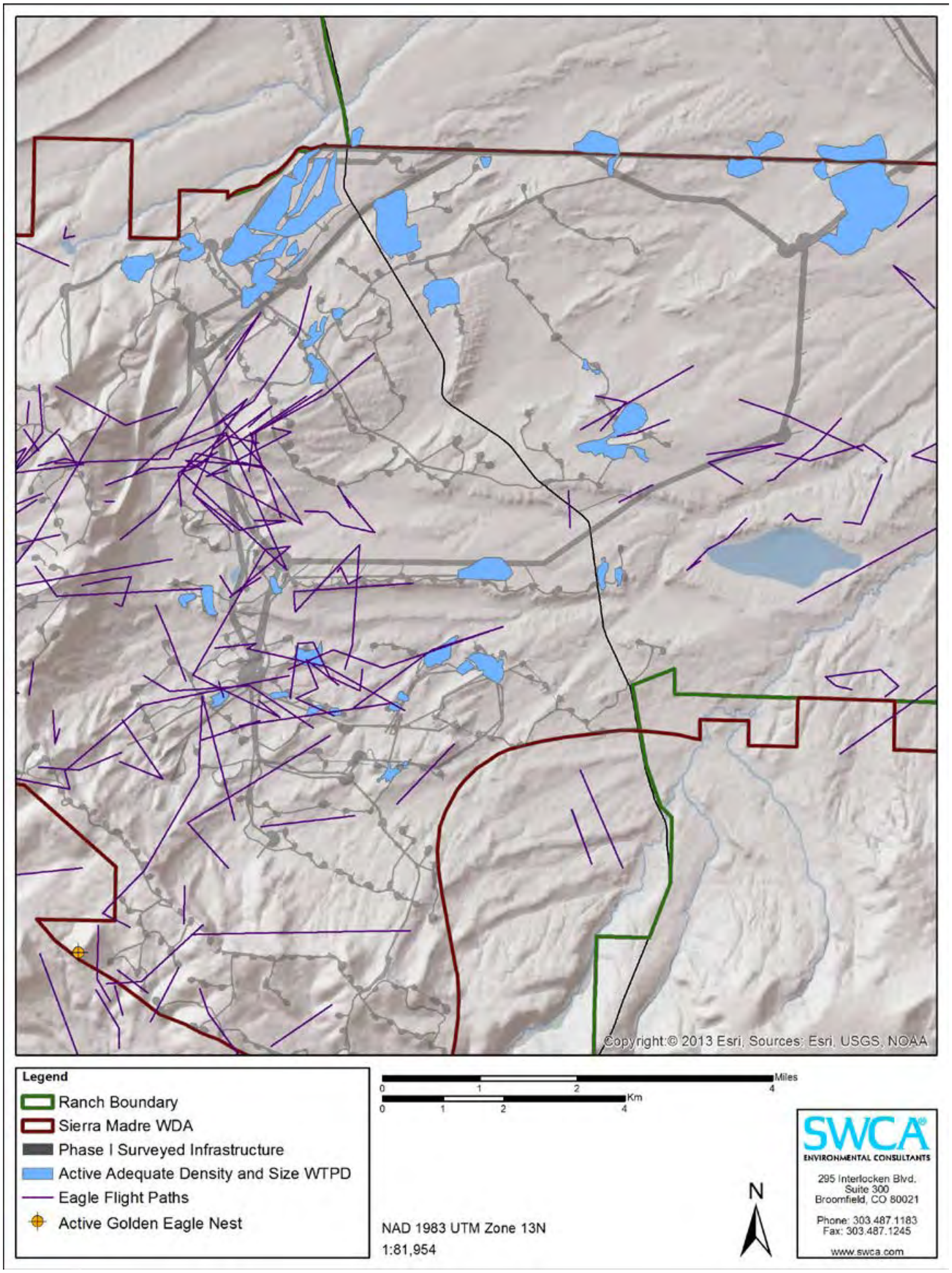

Figure 7. Eagle flight pathways and active eagle nest locations (2008, 2011, 2012, and 2013) in relation to WTPD colonies having adequate size and density in the Lower Miller Hill portion of the 2013 survey area.

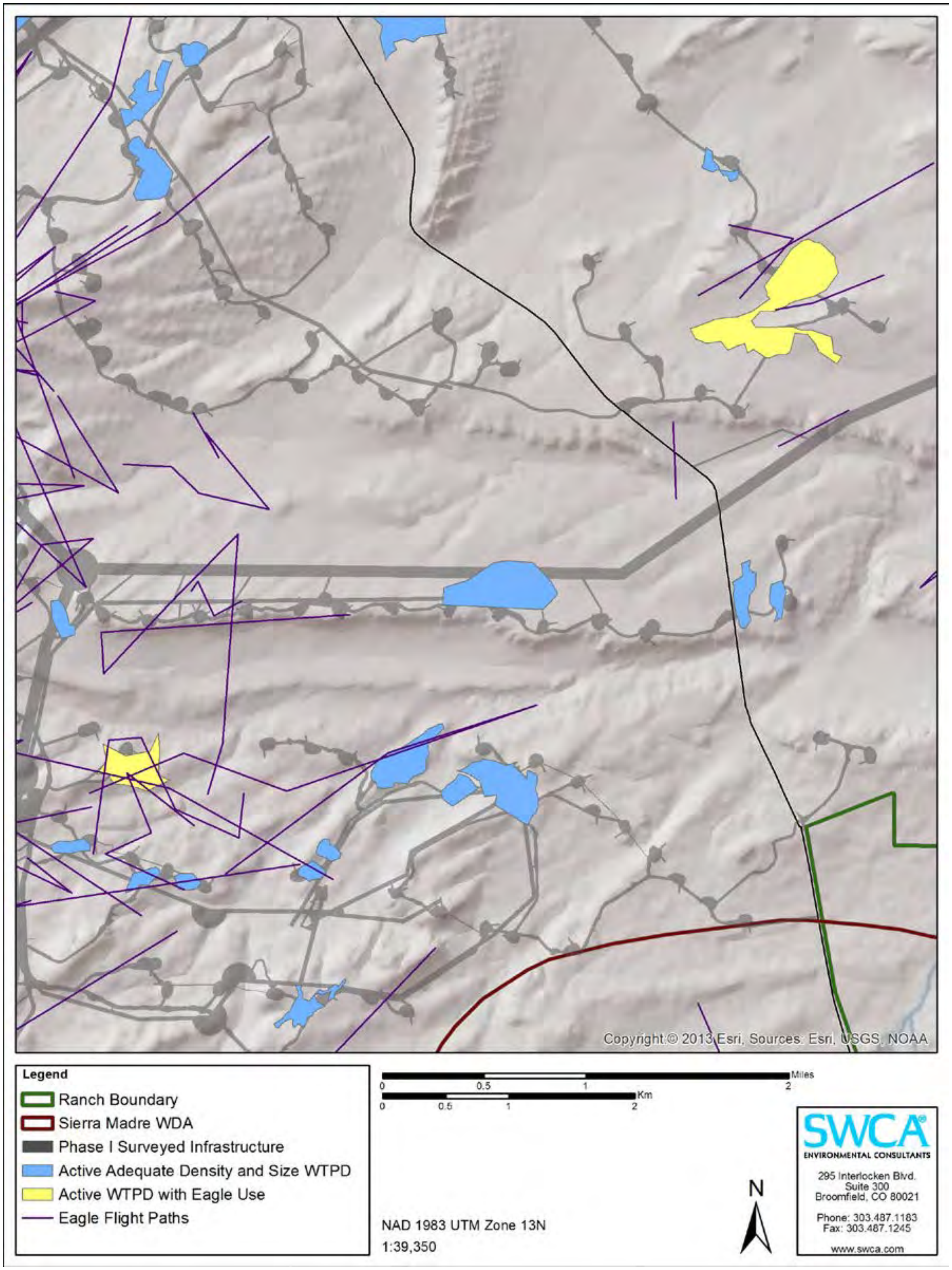

Figure 8. Eagle flight pathways in relation to the two WTPD colonies identified as having combinations of documented eagle use and sufficient WTPD colony size and burrow density.

4.0 CONCLUSIONS

Overall, active and inactive WTPD colonies are scattered throughout the 2013 survey area (covering all of Phase I of the CCSM Project and a portion of Phase II) and generally consist of small, low density colonies. Areas on Upper Miller Hill (Phase I) and within the Phase I portion of the Chokecherry WDA are generally characterized by shallow, rocky soils that provide unsuitable to marginal habitat for burrowing. The lack of sufficient numbers and sizes of WTPD colonies on Upper Miller Hill (Phase I) and in the Phase I portion of the Chokecherry WDA indicate that these locations do not provide suitable conditions for consideration as important eagle use areas associated with foraging locations. The areas within the 2013 survey area between Interstate 80 and the Hogback, outside of the Phase I and Phase II Chokecherry WDA, provide the most likely foraging locations for golden eagle nest 145 (active in 2008) and the other two active eagle nests along the northern edge of the Chokecherry WDA in Phase II (Figure 4).

The highest numbers of WTPD colonies were located in the Lower Miller Hill portion of the 2013 survey area where deeper soils provide better habitat for burrowing mammals. The Lower Miller Hill portion of the 2013 survey area includes areas of Phase I and a portion of Phase II. Within the Lower Miller Hill portion of the 2013 survey area, two locations were identified for further evaluation as potential eagle use areas, (1) a location north of Rasmussen Reservoir, and (2) a location south of Lone Tree Creek. These locations were identified due to observations of eagle use overlapping with WTPD colonies of sufficient size and population density to support foraging activities. Eagle use at the location north of Rasmussen Reservoir, outside of the Phase I portion of the Lower Miller Hill, was observed in 2011 and 2012; however, use was only observed on two days indicating opportunistic foraging and that this site is not be an important eagle use area. Eagle use was observed at the location south of Lone Tree Creek on three dates in June 2012 and one date in September 2011. Behavior data indicate that use surrounding this WTPD location consists primarily of circle soaring behavior at altitudes greater than 150 meters above the ground surface. While this behavior could be an indication of potential hunting, no foraging attempts were observed.

In sum, the field data and analysis supports that there are no important eagle use areas located within Phase I of the CCSM Project. As an initial matter, WTPD are not available as prey resources for much of the year due to hibernation. This fact combined with the scattered, ephemeral nature of WTPD locations and the results of comparisons of WTPD activity, eagle use, and eagle behavior indicate that any eagle foraging associated with WTPD locations within Phase I of the CCSM Project is likely opportunistic. It is likely that other parts of the Overland Trail Ranch (areas surrounding Kindt Reservoir, adjacent to the Bolten Road, and surrounding the Bolten Ranch pastures) represent locations that could be considered important eagle use areas associated with WTPD activity (SWCA 2012). The North Platte River corridor also likely represents a possible important eagle use area because of the overlap of suitable foraging and nesting habitats. These areas provide suitable and consistent foraging opportunities adjacent to active nesting territories between April and October. These areas are also within turbine no-build areas or are outside of the Chokecherry and Sierra Madre WDAs and will not be impacted by either Phase I or Phase II of the CCSM Project.

5.0 REFERENCES

Bureau of Land Management (BLM). 2012. Chokecherry and Sierra Madre Wind Energy Project Final Environmental Impact Statement (Volume II). Rawlins Field Office, Carbon County, Wyoming. June 2012.

Bureau of Land Management (BLM). 2012a. Record of Decision for the Chokecherry and Sierra Madre Wind Energy Project and Approved Visual Resource Management Plan Amendment on Public Lands Administered by the Bureau of Land Management Rawlins Field Office, Carbon County, Wyoming. October 2012.

Cooke, L. A., and S. R. Swiecki. 1992. Structure of a white-tailed prairie dog burrow. Great Basin Naturalist 52: 288-289.

Keinath, D.A. 2004. Species assessment for white-tailed prairie dog (*Cynomys leucurus*) in Wyoming. Prepared for U.S. Department of the Interior, Bureau of Land Management, Wyoming State Office, Cheyenne, Wyoming. Wyoming Natural Diversity Database, University of Wyoming, Laramie, Wyoming. 47p.

McDonald, L.L., T.R. Stanley, D.L. Otis, D.E. Biggins, P.D. Stevens, J.L. Koprowski, and W. Ballard,. 2011. Recommended methods for range-wide monitoring of prairie dogs in the United States: U.S. Geological Survey Scientific Investigations Report 2011–5063, 36p.

Menkens, E. George, Jr., B.J. Miller, and S.H. Anderson. 1987. White-tailed prairie dog ecology in Wyoming. Great Plains Wildlife Damage Control Workshop Proceedings. Paper 83. Available online: http://digitalcommons.unl.edu/gpwdcwp/83. Accessed July 2012.

Pauli, J.N, S.W. Buskirk, E.S. Williams, and W.H. Edwards. 2006. A plague epizootic in the black-tailed prairie dog (*Cynomys ludovicianus*). Journal of Wildlife Diseases 42: 74–80.

Seglund, A.E., A.E. Ernst, M. Grenier, B. Luce, A. Puchniak and P. Schurr. 2004. White-tailed prairie dog conservation assessment.

SWCA Environmental Consultants, Inc. (SWCA). 2012. Eagle and Raptor Prey Base Assessment. Chokecherry and Sierra Madre Wind Energy Project. Prepared for Power Company of Wyoming, LLC. Denver, CO.

U.S. Fish and Wildlife Service. 2011. Draft Eagle Conservation Plan Guidance. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.