United States Department of Agriculture

BEH Rangeland Allotments (33836)

Environmental Impact Statement

Forest Service | Stanislaus National Forest | R5-MB-289 | February 2016

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Environmental Impact Statement

Stanislaus National Forest

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Abstract: This Environmental Impact Statement (EIS) describes a proposal by the Stanislaus National Forest which would reauthorize livestock grazing on the Bell Meadow (B), Eagle Meadow (E) and Herring Creek (H) Allotments on the Summit Ranger District. The area affected by this proposal includes about 57,250 acres located in the Sierra Nevada within Tuolumne County, California. The EIS discloses the direct, indirect and cumulative environmental impacts that would result from the proposed action, a no action alternative and two additional action alternatives developed in response to issues raised by the public. Of the alternatives under consideration at this stage, Alternative 1 (Proposed Action) is preferred by the Responsible Official.

Cover Photo: View of Eagle Meadow in the fall.

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Table of Contents

Summary vii

1. Purpose of and Need for Action 1

1.01 Document Structure 1
1.02 Background 1
1.03 Purpose And Need 3
1.04 Proposed Action 8
Updates to the Proposed Action 9
1.05 Principle Laws And Regulations 9
1.06 Decision Framework 10
1.07 Public Involvement 10
Initial Public Scoping on the Proposed Action 10
Continued Scoping after the Comment Period 11
DEIS Comment Period 11
1.08 ISSUES 11
Significant Issues 12

2. The Alternatives 13

2.01 How the Alternatives Were Developed 13
2.02 Alternatives Considered In Detail 14
Alternative 1 (Proposed Action) 14
Alternative 2 (No Action) 18
Alternative 3 (Current Management) 18
Alternative 4 (Resource Protection) 21
2.03 Mitigation And Other Requirements 25
2.04 Alternatives Considered But Eliminated From Detailed Study 30
2.05 Comparison Of The Alternatives 32

3. Affected Environment and Environmental Consequences 39

3.01 Introduction 39
Analysis Process 39
Resource Reports 39
Cumulative Effects 40
Affected Environment Overview 41
Information on Other Resource Issues 42
Air Quality 42
Climate Change 42
Fire 43
Geology 43
Private Property 43
Analysis Framework 43
National Forest Management Act 44
1995 Rescissions Act 44
Forest Plan Direction 44
3.02 Aquatic Species 45
Analysis Framework: Statute, Regulation, Forest Plan and Other Direction 45
Effects Analysis Methodology 45
Assumptions Specific to Aquatic Species 45
Data Sources 46
Aquatic Species Indicators 47
Aquatic Species Methodology by Action 47
Affected Environment 47
Yosemite toad 48
Sierra Nevada Yellow-Legged Frog 54
Environmental Consequences 57
Alternative 1 (Proposed Action) 57
Alternative 2 (No Action) 66
Alternative 3 (Current Management) 67
Alternative 4 (Resource Protection) 67

Summary of Effects Analysis across All Alternatives....68
Compliance with the Forest Plan and Other Direction....69
3.03 BOTANY....71
Analysis Framework: Statute, Regulation, Forest Plan and Other Direction....71
Effects Analysis Methodology....71
Assumptions Specific to Botany....71
Data Sources....72
Botany Indicators....72
Botany Methodology....72
Affected Environment....73
Sensitive Plant Review....73
Surveys....74
Species Account and Habitat Status....75
Environmental Consequences....79
Alternative 1 (Proposed Action)....79
Alternative 2 (No Action)....82
Alternative 3 (Current Management)....83
Alternative 4 (Resource Protection)....84
Summary of Effects Analysis across All Alternatives....85
Compliance with the Forest Plan and Other Direction....85
3.04 CULTURAL RESOURCES....87
Analysis Framework: Statute, Regulation, Forest Plan and Other Direction....87
Effects Analysis Methodology....88
Assumptions Specific to Cultural Resources....88
Data Sources....89
Cultural Resources Indicators....89
Cultural Resources Methodology by Action....89
Affected Environment....89
Existing Conditions....89
Environmental Consequences....92
Alternative 1 (Proposed Action)....92
Alternative 2 (No Action)....93
Alternative 3 (Current Management)....93
Alternative 4 (Resource Protection)....93
Summary of Effects Analysis across All Alternatives....93
Compliance with the Forest Plan and Other Direction....93
3.05 INVASIVE SPECIES....95
Analysis Framework: Statute, Regulation, Forest Plan and Other Direction....95
Effects Analysis Methodology....95
Assumptions Specific to Invasive Species....95
Data Sources....95
Invasive Species Indicators....95
Invasive Species Methodology....95
Affected Environment....96
Known Noxious Weeds and Invasive Plants....96
Habitat Vulnerability....96
Vectors....97
Environmental Consequences....97
Habitat Alteration Expected as a result of Project....97
Increased Vectors as a result of Project implementation....97
Analysis/Synthesis....98
Summary of Effects Analysis across All Alternatives....98
Compliance with the Forest Plan and Other Direction....98
3.06 RANGE....99
Analysis Framework: Statute, Regulation, Forest Plan and Other Direction....99
Effects Analysis Methodology....104
Assumptions Specific to Range....104
Data Sources....104
Range Indicators....104
Range Methodology....105
Affected Environment....105
Rangeland Capability and Suitability....105

Rangeland Vegetation *106*
Historic and Current Allotment Management *106*
Monitoring *107*
Sensitive Resources *110*
Environmental Consequences *112*
Alternative 1 (Proposed Action) *112*
Alternative 2 (No Action) *115*
Alternative 3 (Current Management) *116*
Alternative 4 (Resource Protection) *118*
Summary of Effects Analysis across All Alternatives *119*
Compliance with the Forest Plan and Other Direction *119*
3.07 RECREATION 121
Analysis Framework: Statute, Regulation, Forest Plan and Other Direction *121*
Effects Analysis Methodology *121*
Assumptions Specific to Recreation *121*
Data Sources *121*
Recreation Indicators *121*
Recreation Methodology *121*
Affected Environment *121*
Environmental Consequences *122*
Alternative 1 (Proposed Action) *123*
Alternative 2 (No Action) *125*
Alternative 3 (Current Management) *126*
Alternative 4 (Resource Protection) *126*
Summary of Effects Analysis across All Alternatives *126*
Compliance with the Forest Plan and Other Direction *127*
3.08 SOCIETY, CULTURE AND ECONOMY 129
Analysis Framework: Statute, Regulation, Forest Plan and Other Direction *129*
Effects Analysis Methodology *129*
Assumptions Specific to Society, Culture and Economy *129*
Data Sources *129*
Society, Culture and Economy Indicators *129*
Society, Culture and Economy Methodology *129*
Affected Environment *129*
Environmental Consequences *131*
Alternative 1 (Proposed Action) *131*
Alternative 2 (No Action) *132*
Alternative 3 (Current Management) *133*
Alternative 4 (Resource Protection) *133*
Summary of Effects Analysis across All Alternatives *134*
Compliance with the Forest Plan and Other Direction *134*
3.09 SOILS 135
Analysis Framework: Statute, Regulation, Forest Plan and Other Direction *135*
Effects Analysis Methodology *135*
Assumptions Specific to Soils *135*
Data Sources *135*
Soils Indicators *135*
Soils Methodology by Action *136*
Affected Environment *136*
Soil Existing Condition *136*
Legacy Effects *137*
Special Aquatic Features *137*
Environmental Consequences *138*
Alternative 1 (Proposed Action) *140*
Alternative 2 (No Action) *141*
Alternative 3 (Current Management) *141*
Alternative 4 (Resource Protection) *142*
Summary of Effects Analysis across All Alternatives *143*
Compliance with the Forest Plan and Other Direction *143*
3.10 SPECIAL AREAS 145
Analysis Framework: Statute, Regulation, Forest Plan and Other Direction *145*
Effects Analysis Methodology *145*

Assumptions Specific to Special Areas....145
Data Sources....145
Special Areas Indicators....145
Special Areas Methodology....146
Affected Environment....146
Inventoried Roadless Areas....146
Research Natural Areas....147
Special Interest Areas....148
Wild and Scenic Rivers and Proposed Wild and Scenic Rivers....148
Environmental Consequences....149
Alternative 1 (Proposed Action)....149
Alternative 2 (No Action)....150
Alternative 3 (Current Management)....150
Alternative 4 (Resource Protection)....151
Summary of Effects Analysis across All Alternatives....151
Compliance with the Forest Plan and Other Direction....151
3.11 WATERSHED....153
Analysis Framework: Statute, Regulation, Forest Plan and Other Direction....153
Effects Analysis Methodology....154
Assumptions Specific to Watershed....154
Data Sources....154
Watershed Indicators....154
Watershed Methodology....155
Affected Environment....158
Environmental Consequences....173
Alternative 1 (Proposed Action)....173
Alternative 2 (No Action)....178
Alternative 3 (Current Management)....180
Alternative 4 (Resource Protection)....183
Summary of Effects Analysis across All Alternatives....185
Compliance with the Forest Plan and Other Direction....187
3.12 WILDERNESS....189
Analysis Framework: Statute, Regulation, Forest Plan and Other Direction....189
Effects Analysis Methodology....189
Assumptions Specific to Wilderness....189
Data Sources....189
Wilderness Indicators....189
Wilderness Methodology by Action....190
Affected Environment....190
Environmental Consequences....190
Alternative 1 (Proposed Action)....192
Alternative 2 (No Action)....193
Alternative 3 (Current Management)....194
Alternative 4 (Resource Protection)....195
Summary of Effects Analysis across All Alternatives....196
Compliance with the Forest Plan and Other Direction....196
Wilderness Act....196
Agency Policy....197
Forest Plan Direction....197
3.13 WILDLIFE....199
Analysis Framework: Statute, Regulation, Forest Plan and Other Direction....199
Effects Analysis Methodology....200
Assumptions Specific to Wildlife....200
Data Sources....200
Wildlife Indicators....200
Wildlife Methodology....201
Affected Environment....201
Sierra Nevada red fox....201
Great Gray Owl....202
Willow Flycatcher....204
Mule Deer....205
Environmental Consequences....206

Sierra Nevada red fox.....206
Great Gray Owl.....208
Willow Flycatcher.....211
Mule deer.....212
Summary of Effects Analysis across All Alternatives.....214
Compliance with the Forest Plan and Other Direction.....214
3.14 Short-Term Uses And Long-Term Productivity.....217
3.15 Unavoidable Adverse Effects.....217
3.16 Irreversible And Irretrievable Commitments.....217
3.17 Other Required Disclosures.....217

4. Consultation and Coordination.....221
4.01 Preparers and Contributors.....221
4.02 Distribution Of The EIS.....225

Index.....227

References.....229

A. Abbreviations and Acronyms.....241

B. Cumulative Effects Analysis.....243

C. Forest Plan Direction.....247

D. Glossary.....263

E. Response to Comments.....271

F. Rangeland Capability and Suitability Analysis.....287

G. Monitoring Plan.....291

H. Bell Meadow Allotment Management Plan.....301

I. Eagle Meadow Allotment Management Plan.....317

J. Herring Creek Allotment Management Plan.....335

List of Tables

Table S.01-1 Comparison of Alternatives: Authorization Parameters and Design Criteria.....x
Table S.01-2 Comparison of Alternatives: Summary of Effects.....xi
Table 1.03-1 Existing conditions and identified need for change in the project area.....5
Table 2.02-1 Alternative 1 (Proposed Action): Permitted Livestock Numbers.....16
Table 2.02-2 Alternative 3 (Current Management): Permitted Livestock Numbers.....19
Table 2.02-3 Alternative 4 (Resource Protection): Permitted Livestock Numbers.....23
Table 2.05-1 Comparison of Alternatives: Parameters and Requirements.....32
Table 2.05-2 Comparison of Alternatives: Summary of Effects.....33
Table 3.03-1 Sensitive Plant species of the Stanislaus National Forest.....75
Table 3.03-2 Habitat types and sensitive plant species that occupy each habitat type.....79
Table 3.03-3 Summary of effects across all alternatives.....85
Table 3.06-1 Maximum Forage Use Levels.....103
Table 3.06-2 Summary of Actual Use (Livestock Number in cow/calf pairs).....108
Table 3.06-3 Summary of Annual Utilization Monitoring within Key Areas.....108
Table 3.06-4 Summary of 2005-2011 R5 Long-Term Condition and Trend Monitoring.....109
Table 3.06-5 Rapid Assessment of Ecological Condition.....110
Table 3.06-6 Range Condition based on field observation.....110
Table 3.06-7 Summary of effects to meadow condition.....119
Table 3.08-1 Tuolumne County Population, Personal Income, and Employment (BEA 2012).....130
Table 3.08-2 Tuolumne County Farm and Farms with cattle production (USDA 2012).....130
Table 3.08-3 Ethnic Distribution and Poverty Level for Tuolumne County, CA (US Census 2012).....131
Table 3.08-4 Alternative Summary Comparison.....131

Table 3.09-1 Soils Effects Analysis for BEH Meadows 139
Table 3.10-1 Special Areas 146
Table 3.10-2 Summary of Effects across All Alternatives: Special Areas 152
Table 3.11-1 Allotment Assessment Watersheds by Alternative 159
Table 3.11-2 Meadow Hydrologic Function, Bell Meadow Allotment 160
Table 3.11-3 Special Aquatic Features, Bell Meadow Allotment 161
Table 3.11-4 Meadow Hydrologic Function, Eagle Meadow Allotment 164
Table 3.11-5 Special Aquatic Features, Eagle Meadow Allotment 165
Table 3.11-6 Meadow Hydrologic Function, Herring Creek Allotment 169
Table 3.11-7 Special Aquatic Features, Herring Creek Allotment 170
Table 3.12-1 Effects of Alternatives on Wilderness Character 196
Table 3.13-1 Estimated suitable habitat for Sierra Nevada Red Fox 202
Table 3.13-2 Estimated suitable meadow habitat and potential territory for Great Gray Owl 204
Table 3.13-3 Great Gray Owl prey abundance 204
Table 3.13-4 Suitable Sierra Nevada Red Fox potentially affected by Alternatives 1, 3 and 4 207
Table 3.13-5 Suitable Sierra Nevada Red Fox habitat potentially affected by proposed additions 207
Table 3.13-6 Suitable meadow habitat and potential territory estimate for Great Gray Owl 209
Table 3.13-7 PAC meadow habitat acres maintained at a height optimal for *Microtus* spp 209
Table 3.13-8 Potentially suitable meadow habitat potentially affected by action alternative (accounting for exclusions that maintain meadow vegetation at a height optimal for *Microtus* spp) 210
Table 3.13-9 Potential reproductive territories affected by action alternative (accounting for exclusions that maintain meadow vegetation at a height optimal for *Microtus* spp) 210
Table 3.13-10 Number of cow/calf pairs potentially displacing mule deer 213
Table 3.13-11 Deer range acres subject to deer-cattle interactions 213
Table 3.13-12 Acres preferred deer habitat (meadow, riparian and aspen) quality potentially reduced 213
Table C.01-1 Forestwide S&Gs applicable to the BEH Rangeland Allotments project 247
Table C.01-2 Management Area Direction applicable to the BEH Rangeland Allotments project 254
Table C.01-3 Land Allocation Direction applicable to the BEH Rangeland Allotments project 257
Table E.01-1 List of Respondents 286
Table F.01-1 Estimated capable and suitable acres by Allotment 290
Table F.01-2 Estimated capable and suitable acres for additions proposed in Alternative 1 290
Table G.01-1 Implementation Monitoring 292
Table G.01-2 Range Readiness Indicators 293
Table G.01-3 Effectiveness monitoring plan for BEH Rangeland Allotments 295
Table G.01-4 R5 condition and trend plots and monitoring schedule within the BEH project 295
Table G.01-5 Monitoring locations and methods 297
Table H.01-1 Existing Improvements on the Bell Meadow Allotment 310
Table H.01-2 Monitoring locations and methods for Bell Meadow Allotment 312
Table H.01-3 Range Readiness Indicators for Bell Meadow Allotment 312
Table I.01-1 Existing Improvements on the Eagle Meadow Allotment 326
Table I.01-2 Monitoring locations and methods for Eagle Meadow Allotment 329
Table I.01-3 Range Readiness Indicators for Eagle Meadow Allotment 329
Table J.01-1 Existing Improvements on the Herring Creek Allotment 344
Table J.01-2 Monitoring locations and methods for Herring Creek Allotment 346
Table J.01-3 Range Readiness Indicators for Herring Creek Allotment 347

List of Maps and Figures

Figure 1.02-1 BEH Rangeland Allotments Project Area Map 2
Figure H.01-1 Bell Meadow Allotment Map 316
Figure I.01-1 Eagle Meadow Allotment Map 333
Figure J.01-1 Herring Creek Allotment Map 351
Alternative 1 Map ....**map package**
Alternative 3 Map ....**map package**
Alternative 4 Map ....**map package**

Summary

The Forest Service prepared this Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This EIS discloses the direct, indirect and cumulative environmental impacts that would result from the proposed action, a no action alternative and 2 additional action alternatives developed in response to issues raised by the public. Of the alternatives under consideration at this stage, Alternative 1 (Proposed Action) is preferred by the responsible official.

Purpose and Need

1. Authorize continued livestock grazing in the project area

P.L. 104-19 Section 504 of the 1995 Rescissions Act, as amended, require each National Forest to establish and adhere to a schedule for completing NEPA analysis and updating Allotment Management Plans for all rangeland Allotments on National Forest System lands.

2. Implement an adaptive management strategy

Adaptive management uses monitoring to determine if actions prescribed were followed, and adjusts management if changes are needed. An adaptive strategy is particularly suited for dealing with management issues involving high levels of uncertainty, limited knowledge, and unpredictability. This approach lends itself to learning and continual improvement while allowing for flexibility. An adaptive management approach facilitates a process of ongoing monitoring and adjustment in order to move resource conditions toward desired conditions.

3. Ensure compliance with regulations and agency policy

- Congressional intent allows grazing on suitable lands where it is consistent with other multiple use goals and objectives as authorized through several Congressional Acts (Organic Administration Act of 1897, Multiple Use Sustained Yield Act of 1960, Wilderness Act of 1964, Forest and Rangeland Renewable Resources Planning Act of 1974, Federal Land Policy and Management Act of 1976, National Forest Management Act of 1976, and the Public Rangelands Improvement Act of 1978);
- Code of Federal Regulations (CFR) directs the Forest Service to meet multiple-use objectives, including managing for livestock grazing on forage-producing National Forest System lands (36 CFR 222.2 (c));
- It is Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing consistent with land management plans (Forest Service Manual (FSM) 2203.1); and,
- It is Forest Service policy to continue contributions to the economic and social well-being of people by providing opportunities for economic diversity and by promoting stability for communities that depend on range resources for their livelihood (FSM 2202.1).

4. Meet demand for livestock grazing on public lands

There is public demand from qualified livestock operators for continued livestock grazing on these Allotments. Livestock grazing on Forest Service land is an important source of meat and fiber production, encourages the retention of private lands (ranches) as open space, contributes to the economic stability of rural populations, and provides Forest visitors with opportunities to experience a traditional and culturally important use of public lands.

5. Move resource conditions towards desired conditions

Recent assessments indicate that, while desired conditions are being met throughout a large portion of the project area, specific locations within the project area may not be meeting or moving toward desired conditions in a manner that is timely and consistent with Forest Plan objectives, standards and guidelines. Gaps between existing resource conditions and desired conditions indicate a need to change grazing management by updating AMPs. Table 1.03-1 displays desired and existing conditions and identified need for change in the project area. A need for change was identified wherever existing conditions do not meet desired conditions as specified in the Forest Plan Direction (USDA 2010).

Proposed Action

The Stanislaus National Forest proposes to: update Allotment Management Plans, change Allotment boundaries, and implement design criteria, including a resource conservation measures and an adaptive management strategy that would move existing resource conditions toward desired conditions. These actions are needed in order to fulfill P.L. 104-19 Section 504 of the 1995 Rescissions Act, which requires each National Forest to establish and adhere to a schedule for completing NEPA analysis and updating Allotment Management Plans for all rangeland Allotments on National Forest System lands. In addition, Code of Federal Regulations (CFR) directs the Forest Service to meet multiple-use objectives, including managing for livestock grazing on forage-producing National Forest System lands (36 CFR 222.2 (c)).

Significant Issues

An issue is a matter of public concern regarding the proposed action and its environmental impacts. Scoping identified issues which are a point of discussion, dispute, or debate with the Proposed Action. An issue is an effect on a physical, biological, social, or economic resource. An issue is not an activity; instead, the predicted effects of the activity create the issue. The Forest Service separated the issues into two groups: significant and non-significant. Significant issues are defined as those directly or indirectly caused by implementing the proposed action. Issues are significant because of the extent of their geographic distribution, the duration of their effects, or the intensity of interest or resource conflicts. Based on public comments, the Forest Service developed two significant issues to formulate and compare alternatives, prescribe mitigation measures, or analyze and compare the environmental effects of each alternative: 1) Habitat and Species Protection; and, 2) Water Quality.

1. ***Habitat and Species Protection****: The Draft Environmental Impact Statement should address a reasonable range of alternatives. Specifically, the Forest Service should develop alternatives that address habitat and species protection and/or a reduced grazing alternative.*
   - Increased protection of sensitive species while continuing to authorize grazing may result in reduced numbers of livestock or AUMs.
   - Immediate implementation of livestock exclusions could impact flexibility in management where adaptive, less expensive alternatives such as herding or timing are not explored first.
2. ***Water Quality****: The Forest Service should describe the potential impacts to water quality caused by livestock and if necessary consider feasible alternatives to reduce the risk. Livestock presence in wet meadows and proximity to streams or other bodies of water may affect water quality.*
   - Identifying areas with the highest risk would allow for adaptive management changes that would improve conditions where needed.
   - There is conflicting scientific information on the subject of water quality and the degree to which livestock actually influence the water quality in a rangeland setting.

Alternatives Considered in Detail

The action alternatives (Alternatives 1, 3 and 4) and the no action alternative (Alternative 2) are considered in detail (map package and project record contain more detailed maps of each alternative). The no action alternative represents no grazing on the Bell Meadow-Bear Lake, Eagle Meadow-Long Valley, and Herring Creek Allotments. Alternative 2, required by the implementing regulations of the National Environmental Policy Act (NEPA), serves as a baseline for comparison among the alternatives (73 Federal Register 143, July 24, 2008; p. 43084-43099). Table S.01-1 shows a side-by-side comparison of the features of each alternative.

Alternative 1 (Proposed Action)

This is the Proposed Action, as described in the Notice of Intent (76 Federal Register 150, August 4, 2011; p. 47140 - 47141) (Chapter 1). The Proposed Action would move existing conditions toward desired conditions while continuing to allow livestock grazing on these Allotments with the following management actions: 1)Authorize continued grazing on the Bell Meadow-Bear Lake (will be referred to as Bell Meadow), Eagle Meadow-Long Valley (will be referred to as Eagle Meadow), and Herring Creek Allotments in a manner that provides for healthy ecosystems and is consistent with Forest Plan direction; 2) Modify Allotment boundaries, create units, and update Allotment Management Plans to incorporate resource conservation measures and adaptive management options (Chapter 2); 3) Implement design criteria (Chapter 2) in order to better achieve desired conditions through systematic monitoring and adjustment of grazing activities, while allowing for flexibility in management decisions. Alternative 1 is the preferred alternative because it best meets the purpose and need to provide opportunities for continued grazing *and* move existing resource conditions toward desired conditions.

Alternative 2 (No Action)

The No Action alternative for NEPA decisions on grazing authorizations has been defined by the Forest Service as no grazing (FSH 2209.13, Section 92.31). This means that livestock grazing would not be authorized in the project area. Under the No Action alternative, continued grazing would not be authorized. Notifications would be given to affected permittees and permitted livestock grazing would be discontinued after 2 years. No adaptive management strategy would be implemented, structural improvements would be either removed (especially in wilderness) or left in place but not maintained, and no grazing would be allowed on these Allotments. No Forest Plan amendments would be required to implement this alternative. Selection of this alternative would be consistent with the Forest Plan, as amended (36 CFR 219.10(c)). However, this alternative does not meet the purpose and need to provide opportunities for livestock grazing.

Alternative 3 (Current Management)

Alternative 3 authorizes the continued use of the Bell Meadow, Eagle Meadow, and Herring Creek Allotments with the following minor changes to current management: 1) Update Allotment Management Plans for all three Allotments; 2) Adjustments to Allotment boundaries to correct mapping errors and more accurately reflect the actual area open to grazing; 3) Rename the Bell Meadow-Bear Lake and the Eagle Meadow-Long Valley Allotments (would be renamed Bell Meadow and Eagle Meadow, respectively). Existing Forest Plan standards and guidelines would guide management. Resource conservation measures and an adaptive management strategy (as described for Alternatives 1 and 4) would not be implemented for Alternative 3.

Alternative 4 (Resource Protection)

Alternative 4 was developed in response to scoping comments. Alternative 4 would implement resource protection measures immediately where a need for change in management was identified during project analysis. Livestock grazing would be minimized or excluded in areas where certain

resource concerns were identified. Permitted livestock numbers for the Bell Meadow, Eagle Meadow, and Herring Creek Allotments would be reduced by an amount proportionate to the reduction in suitable foraging area caused by exclusion of those areas with resource concerns. Management actions are similar to those described under Alternative 1, including resource conservation measures and adaptive management options, however the amount of foraging area and number of livestock would be reduced and no Allotment area additions are proposed.

Comparison of Alternatives

Table S.01-1 Comparison of Alternatives: Authorization Parameters and Design Criteria

Parameter	**Alternative 1** (Proposed Action)	**Alternative 2** (No Action)	**Alternative 3** (Current Management)	**Alternative 4** (Resource Protection)
Authorize Continued Grazing	Yes	No	Yes	Yes
Update Allotment Management Plans	Yes	No	Yes	Yes
Adjust Permitted Grazing Area	Additions	No grazing	Minor adjustment	Reduced area
Acres Authorized for Grazing	56,500	0	48,200	43,500
New Infrastructure Proposed	Yes	No	No	Yes
Estimated Miles of New Fence	9.4	0	0	>4.2
New Corrals	Yes	No	No	Yes
Permitted Livestock Numbers	No change from current numbers	0	No change from current numbers	Reduced livestock numbers
Season of Use	No change	None	No change	No change
Utilization Standards	Change standards on Eagle Meadow	Not applicable	No change	Change standards on Eagle Meadow
Change Grazing System	Yes	Not applicable	No	Yes
Exclusion of Sensitive Resources	If necessary	Total exclusion	No	Yes
Implement Forest Plan Standards and Guidelines	Yes	Not applicable	Yes	Yes
Resource Conservation Measures	Yes	Not applicable	No	Yes
Adaptive Management Strategy	Yes	Not applicable	No	Yes
Additional Implementation Monitoring/Monitoring Plan	Yes	Not applicable	No	Yes
Adaptive Management Options	Yes	Not applicable	Limited to terms of grazing permit	Yes
Other Requirements	Yes	Not applicable	Yes	Yes

Summary of Environmental Consequences

Table S.01-2 Comparison of Alternatives: Summary of Effects

Resource		Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Aquatic Species	Yosemite toad	Grazing of breeding habitat deferred until post-metamorphosis.	No grazing. No grazing-related impacts to Yosemite toad.	Grazing of breeding habitat deferred until post-metamorphosis.	Proposed fencing to exclude livestock from all known Yosemite toad habitat.
	Sierra Nevada yellow-legged frog	Implements Forest Plan standard and guidelines for 20% annual disturbance along streambanks and shorelines.	No grazing. No grazing-related impacts to Sierra Nevada yellow-legged frog.	Implements Forest Plan standard and guidelines for 20% annual disturbance along streambanks and shorelines.	Streambank disturbance standard of 10% in Sierra Nevada yellow-legged frog habitat.
Botanical Resources	Stream Channel Habitats	No direct, indirect, or cumulative effects to sensitive plants that occupy stream channel habitats.	No direct, indirect, or cumulative effects as no grazing would occur.	No direct, indirect, or cumulative effects to sensitive plants that occupy stream channel habitats.	No direct, indirect, or cumulative effects to sensitive plants that occupy stream channel habitats.
	Seeps, Stringer Meadows, and Meadow Edges	Sensitive plants in seeps, stringer meadows, and meadow edges could be impacted by cattle trailing and grazing. Sensitive plants in the addition areas, if any, would be vulnerable. Sensitive plant protection measures would be used to protect sensitive plants from grazing impacts.	No direct, indirect, or cumulative effects as no grazing would occur.	Sensitive plants in seeps, stringer meadows, and meadow edges could be impacted by cattle trailing and grazing. Alternative 3 has less potential for effects because no additions are proposed.	Sensitive plants could be impacted by cattle trailing and grazing, but Alternative 4 would involve surveys for sensitive plants and includes protection measures if sensitive plants are found. Sensitive plant protection measures would be used to protect sensitive plants from grazing impacts.
	Fens and Wet Areas Within Meadows	No known occurrences of sensitive plants that occupy this habitat type in the project area. Effects, if any, are assumed to be minor. If found, sensitive plants would be protected.	No direct, indirect, or cumulative effects as no grazing would occur.	No known occurrences of sensitive plants that occupy this habitat type in the project area. No additional surveys or resource conservation measures would occur with this alternative, so it is possible that suitable habitat may decline in quality.	No known occurrences of sensitive plants that occupy this habitat type in the project area. Effects, if any, are assumed to be minor. If found, sensitive plants would be protected. This alternative would have the fewest negative impacts of all the action alternatives.
	Lodgepole Forest	No known occurrences of sensitive plants of this habitat type in the project area. If found, sensitive plants would be protected.	No direct, indirect, or cumulative effects as no grazing would occur.	No known occurrences of sensitive plants that occupy this habitat type in the project area. Effects, if any, are assumed to be minor but would be greater than described for Alternative 1 because no additions are proposed.	No known occurrences of sensitive plants of this habitat type in the project area. If found, sensitive plants would be protected.

Resource		Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Cultural Resources	Cultural Resources	The addition of proposed infrastructure may have effects to cultural resources. Once need and location of infrastructure has been determined the placement will be reviewed by the District Archaeologist prior to implementation. Grazing would continue with no direct effect, minimal indirect effects and no cumulative effects to cultural resources.	No anticipated direct, indirect or cumulative effects to historic or prehistoric properties under this alternative, as no project activities (grazing) would occur.	No effects on cultural resources without ground disturbance from infrastructure. Grazing would continue with no direct effects, minimal indirect effects and no cumulative effects to cultural resources.	The addition of proposed infrastructure may have effects to cultural resources. Once need and location of infrastructure has been determined the placement will be reviewed by the District Archaeologist prior to implementation. Grazing would continue with no direct effect, minimal indirect effects and no cumulative effects to cultural resources.
Invasive Species	Habitat Alteration	There is a moderate risk for habitat alteration associated with this project.	No habitat alteration related to grazing.	There is a moderate risk for habitat alteration associated with this project.	There is a moderate risk for habitat alteration associated with this project.
	Vectors	Since the project represents an ongoing activity, the vectors remain the same. There is a moderate to high risk of increased vectors as a result of project implementation.	No risk for increased vectors related to grazing.	Since the project represents an ongoing activity, the vectors remain the same. There is a moderate to high risk of increased vectors as a result of project implementation.	Since the project represents an ongoing activity, the vectors remain the same. There is a moderate to high risk of increased vectors as a result of project implementation.
	Number of Acres Affected	Greatest number of acres potentially affected by grazing.	No acres affected by grazing.	No change in number of acres currently affected by grazing.	Least number of acres potentially affected by grazing.
Range	Meadow Condition	Key areas that are stable or trending toward desired condition would remain the same or continue to improve.	Meadows rated as high would maintain desired condition. Meadows in moderate condition would continue to recover and would likely move towards desired condition. Meadows rated in low condition would improve overtime by natural recovery.	Key areas that are stable or trending toward desired condition would remain the same or continue to improve, but recovery rates would not increase.	Key areas that are stable or trending toward desired condition would remain the same or continue to improve.
Recreation	Impacts to Forest Visitors	Dispersed user and hikers may be affected by grazing. No anticipated negative impacts to users within developed campgrounds and/or recreation residence tracts. Overall visitation is not anticipated to decrease, but visitors may adjust use patterns to avoid evidence of grazing.	No impacts to forest visitors from project activities, as no grazing would occur.	Dispersed user and hikers may be affected by grazing. No anticipated negative impacts to users within developed campgrounds and/or recreation residence tracts. Overall visitation is not anticipated to decrease, but visitors may adjust use patterns to avoid evidence of grazing.	Dispersed user and hikers may be affected by grazing. No anticipated negative impacts to users within developed campgrounds and/or recreation residence tracts. Overall visitation is not anticipated to decrease, but visitors may adjust use patterns to avoid evidence of grazing.

Resource		**Alternative 1** (Proposed Action)	**Alternative 2** (No Action)	**Alternative 3** (Current Management)	**Alternative 4** (Resource Protection)
Society, Culture and Economy	Impacts to Permittees	Additional conservation measures and monitoring may force permittees to alter their current grazing practices, but would most likely not affect the amount of grazing.	Discontinued grazing on federal lands in the BEH Allotments would negatively affect permittee operations and possibly ranch viability.	No changes are expected with Alternative 3	Reduced acres available for grazing and reduced permitted livestock numbers could affect individual ranch viability. Increased attention to sensitive resources would result in additional expense to permittee operations.
	Impacts to Local Communities	May result in temporary increase in employment	The economic impacts of this alternative would be greatest for the local economy. This alternative would result in a loss of jobs in the county. The loss of jobs would occur in farm employment, which is already in decline.	Alternative 3 would not greatly affect the local area economically. Additional employment would not likely be generated.	Alternative 4 may result in temporary increase in employment. However, if this alternative dramatically affects ranch viability this would negatively affect the local economy in the long term.
Soils	Soil Organic Matter	Soil OM status similar to Alternative 3 but upward trend more likely for class 2 meadows	Soil OM improves in all rested meadows as herbaceous root biomass increases.	Soil OM likely to remain high in class 3 meadows, fair but stable in class 2 meadows, and poor but stable in class 1 meadows.	Soil OM status similar to Alternative 3 for grazed meadows and similar to Alternative 2 for rested meadows.
	Soil Hydrologic Function	Similar to Alternative 3. Also see Meadow Hydrologic function below.	Passive improvement will occur in rested meadows. The degree and rate of change is uncertain but will be site specific for each meadow and class of meadow. Some meadows will not reach desired condition without active restoration.	The water table and soil moisture conditions will likely continue in good condition for class 3 meadows. Class 2 meadows will stay class 2 (somewhat reduced status but stable). Class 1 meadows in poor condition and with a loss of water table are unlikely to improve relative to the actual meadow soil. Deep rooted species can no longer reach the water table.	Soil hydrologic function similar to Alternative 3 for grazed meadows and similar to Alternative 2 for rested meadows.

Resource		Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Watershed	Meadow Hydrologic Function	The meadows in good or desired condition will continue to maintain their status. The meadows in fair condition will either maintain their condition or slightly improve. The meadows in poor or very poor condition may see minor channel improvements in the long run but will not likely reach desired condition without active restoration.	The no grazing alternative may help streambanks stabilize at a faster rate, may promote herbaceous vegetation recovery along the stream channels, and could help move channel form towards rejuvenation. However, these small improvements in condition may take years to achieve.	The meadows in good or desired condition will maintain their status. The meadows in fair condition will continue to maintain their condition or move toward desired condition unless some unforeseen disturbances or management problems occur. With two notable exceptions (Hammill Canyon Meadow #1 and Upper Willow Meadow), the meadows in poor or very poor condition will see channel improvements in the long run but will not likely reach desired condition without active restoration.	The hydrologic function of grazed meadows would be similar to that seen under Alternative 1. The hydrologic function of excluded meadows would be similar to that seen under Alternative 2.
	Special Aquatic Features	Addition areas should relieve grazing pressure in Eagle Meadow and Herring Creek Allotments, which could assist in maintaining PFC at special aquatic features that are currently at PFC and could help move sites which are FAR towards PFC. On the Bell Meadow Allotment, improvements may be seen in the Round subunit but no change is anticipated in the other units. Resource conservation measures would exclude sites with downward trend or that become non-functional.	No grazing-related impacts to special aquatic features. For at-risk special aquatic features, Alternative 2 would likely result in an upward trend. Sites already at PFC would likely maintain that condition.	With few exceptions, sites which are Functional At-Risk are in this condition due to the effects of current grazing practices. Sites that are currently at PFC would likely maintain this condition under current management. Forest Plan Standards and Guidelines would exclude or otherwise modify sites with downward trend or that become non-functional.	The reduction in grazing pressure as a result of decreasing numbers is anticipated to help maintain PFC at sites which are currently at PFC and could help move Functional at-risk sites towards PFC. Resource conservation measures would exclude sites with downward trend or that become non-functional.

Resource		**Alternative 1** (Proposed Action)	**Alternative 2** (No Action)	**Alternative 3** (Current Management)	**Alternative 4** (Resource Protection)
Watershed	Water Quality	Sediment deposition and accumulation in meadow streams, indicator bacteria and pathogen concentrations, and nutrient concentrations are expected to be less than under current management. No change in water temperature or taste and odor are anticipated. Beneficial uses of water should be maintained.	No livestock caused impacts to water quality. Water quality may still be impacted by other activities in the project area.	Sediment deposition and accumulation in meadow streams is expected to remain low. Indicator bacteria and pathogen concentrations should remain below the recommended maximum concentration. Overall, nutrient concentrations are expected to be well below EPA levels of concern. No change in water temperature or taste and odor are anticipated. Beneficial uses of water should be maintained.	Sediment deposition and accumulation, indicator bacteria concentrations, and nutrient concentrations are expected to be less than under current management. Ungrazed (excluded) areas would likely have lower concentrations of sediment, bacteria and pathogens, and nutrients. Beneficial uses of water should be maintained.
Wilderness	Wilderness Character	Alternative 1 is likely to have negative effects on the natural and outstanding opportunities for solitude qualities of wilderness character. The untrammeled and undeveloped qualities will probably not be further impacted.	Alternative 2 would improve the undeveloped, natural, and outstanding opportunities elements of wilderness character.	Alternative 3 is likely to have negative effects on the natural and outstanding opportunities for solitude qualities of wilderness character. The untrammeled and undeveloped qualities will probably not be further impacted.	Emphasizing resource protection through the reduction of the number of cows on the Allotments would improve the natural and outstanding opportunities for solitude qualities of wilderness character.
Wildlife	Great Gray Owl	1116 acres of potentially suitable meadow habitat potentially affected by Alternative 1.	No livestock-related effects to potentially suitable meadow habitat, as no grazing would occur.	1116 acres of potentially suitable meadow habitat potentially affected by Alternative 3.	893 acres of potentially suitable meadow habitat potentially affected by Alternative 4. Reduced livestock numbers would likely improve habitat for prey species.
	Sierra Nevada Red Fox	Alternative 1 has the greatest potential for Sierra Nevada Red Fox prey habitat changes.	No livestock-related effects to Sierra Nevada Red Fox prey habitat, as no grazing would occur.	The amount of suitable habitat potentially affected by Alternative 3 is less than Alternative 1 but more than Alternative 4.	Under Alternative 4, the least amount of suitable Sierra Nevada Red Fox habitat is potentially affected by grazing.
	Willow Flycatcher	Habitat objectives are being met for this species. This alternative complies with SNFPA and conservation assessment standards, so habitat should remain suitable.	No livestock-related effects to Willow Flycatcher habitat, as no grazing would occur.	Habitat objectives are being met for this species. This alternative complies with SNFPA and conservation assessment standards, so habitat should remain suitable.	Habitat objectives are being met for this species. This alternative complies with SNFPA and conservation assessment standards, so habitat should remain suitable.

1. Purpose of and Need for Action

The Forest Service prepared this Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Impact Statement discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives.

1.01 DOCUMENT STRUCTURE

The document is organized into the following chapters and sections:

- **Chapter 1** (Purpose of and Need for Action): includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. It also details how the Forest Service informed the public of the proposal and how the public responded.
- **Chapter 2** (The Alternatives): provides a detailed description of the agency's proposed action as well as alternative actions developed in response to comments submitted during scoping. It includes summary tables comparing the proposed action and alternatives with respect to their environmental effects.
- **Chapter 3** (Affected Environment and Environmental Consequences): describes the environmental effects of implementing the alternatives. It affected environment and environmental consequences sections organized by resource area.
- **Chapter 4** (Consultation and Coordination): provides a list of preparers and agencies consulted during the development of the EIS.
- **Index**: provides page numbers by document topic.
- **References**: provides a list of references and literature cited in the EIS.
- **Appendices**: provide more detailed information to support the analyses presented in the EIS.
- **Map Package**: the separate map package includes maps for Alternatives 1, 3 and 4 (Chapter 2).

Additional documentation, including more detailed analyses of project area resources, may be found in the project planning record located at:

Stanislaus National Forest
Forest Headquarters
19777 Greenley Road
Sonora, CA 95370

1.02 BACKGROUND

The BEH Rangeland Allotments proposed action would reauthorize livestock grazing on the Bell Meadow (B), Eagle Meadow (E) and Herring Creek (H) Allotments on the Stanislaus National Forest. This EIS discloses the direct, indirect and cumulative environmental impacts of implementing the proposed action and alternatives to that action. The EIS focuses on livestock grazing on National Forest System (NFS) lands administered by the Summit Ranger District. It does not evaluate livestock grazing activities on other Allotments, other ranger districts, or other national forests.

PROJECT LOCATION

The project area consists of three active cattle grazing Allotments that have been grazed by livestock for over 100 years (Figure 1.02-1). The Bell Meadow, Eagle Meadow and Herring Creek Allotments encompass about 51,182 acres of NFS lands in eastern Tuolumne County.

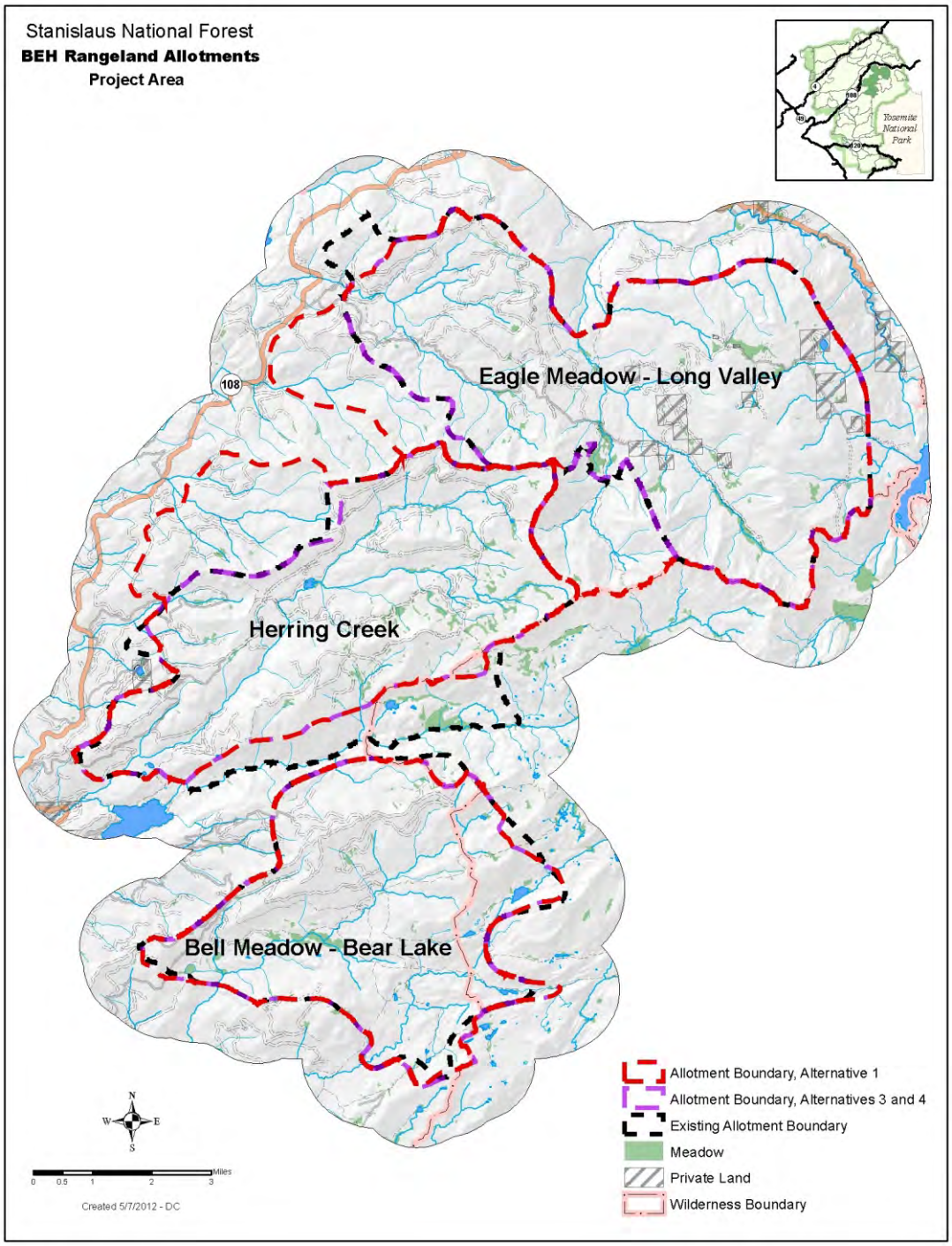

Figure 1.02-1 BEH Rangeland Allotments Project Area Map

The Summit Ranger District headquartered in Pinecrest, California administers the area in and surrounding these Allotments. Livestock grazing is just one of many activities that occur on the Summit Ranger District. Grazing on each Allotment is conducted in accordance with the term grazing permits, the Allotment-specific Allotment Management Plan (AMP), and the Annual Operating Instructions (AOI). The grazing permit is the instrument that authorizes the permit holder (permittee) to graze livestock on certain NFS lands or other lands under Forest Service jurisdiction. The AMP is the implementation document by which the Forest Service communicates to the permittees and others the management objectives and direction set-forth in the project-level NEPA decision. The AMPs for Allotments in the analysis area were developed more than 20 years ago and are in need of revision. The AOI identifies annual grazing management requirements, standards, and necessary monitoring.

The new project-level NEPA analysis and decision and the updated AMPs will guide permitted livestock grazing management and associated activities within the project area until the need is identified to revisit the NEPA process.. Actions required to implement the selected alternative (such as updating AMPs, issuing permits, and implementing mitigations) will not be subject to further NEPA documentation.

OTHER RELATED EFFORTS

Rangeland Allotments Phase 1 (2006): The Forest Service first listed the Rangeland Allotments Phase 1 (Phase 1) project in the April 1, 2006 issue of the Stanislaus National Forest Schedule of Proposed Actions (SOPA). The Forest issued an Environmental Assessment (EA) in December 2006 to re-authorize grazing on four rangeland Allotments: Bell Meadow-Bear Lake, Long Valley-Eagle Meadow, Herring Creek, and Stanislaus Meadow. The July 16, 2007 Decision Notice and Finding of No Significant Impact (FONSI) authorized grazing on the four Allotments under the proposed action. Three administrative appeals were filed under 36 CFR 215. The Regional Forester reviewed the project record and reversed the decision on October 15, 2007.

Rangeland Allotments Phase 1 (2008): Following the 2007 appeal decision, the Forest Supervisor determined a need to prepare a new EA in order to make a new decision. The Forest Service first listed the Rangeland Allotment Phase 1 (2008) in the April 2008 issue of the Stanislaus National Forest Schedule of Proposed Actions (SOPA). A revised EA was made available for public comment on June 19, 2009. After reviewing the comments received from the public and considering new information, the Forest Supervisor decided to collect more data and prepare an EIS in order to completely analyze and disclose the environmental impacts related to grazing on these Allotments.

1.03 PURPOSE AND NEED

The purpose and need can be summarized with five key objectives:

1. Authorize continued livestock grazing in the project area

P.L. 104-19 Section 504 of the 1995 Rescissions Act, as amended, require each National Forest to establish and adhere to a schedule for completing NEPA analysis and updating Allotment Management Plans for all rangeland Allotments on National Forest System lands.

2. Implement an adaptive management strategy

Adaptive management uses monitoring to determine if actions prescribed were followed, and adjusts management if changes are needed. An adaptive strategy is particularly suited for dealing with management issues involving high levels of uncertainty, limited knowledge, and unpredictability. This approach lends itself to learning and continual improvement while allowing for flexibility. An adaptive management approach facilitates a process of ongoing monitoring and adjustment in order to move resource conditions toward desired conditions.

3. Ensure compliance with regulations and agency policy

- Congressional intent allows grazing on suitable lands where it is consistent with other multiple use goals and objectives as authorized through several Congressional Acts (Organic Administration Act of 1897, Multiple Use Sustained Yield Act of 1960, Wilderness Act of 1964, Forest and Rangeland Renewable Resources Planning Act of 1974, Federal Land Policy and Management Act of 1976, National Forest Management Act of 1976, and the Public Rangelands Improvement Act of 1978);
- Code of Federal Regulations (CFR) directs the Forest Service to meet multiple-use objectives, including managing for livestock grazing on forage-producing National Forest System lands (36 CFR 222.2 (c));
- It is Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing consistent with land management plans (Forest Service Manual (FSM) 2203.1); and,
- It is Forest Service policy to continue contributions to the economic and social well-being of people by providing opportunities for economic diversity and by promoting stability for communities that depend on range resources for their livelihood (FSM 2202.1).

4. Meet demand for livestock grazing on public lands

There is public demand from qualified livestock operators for continued livestock grazing on these Allotments. Livestock grazing on Forest Service land is an important source of meat and fiber production, encourages the retention of private lands (ranches) as open space, contributes to the economic stability of rural populations, and provides Forest visitors with opportunities to experience a traditional and culturally important use of public lands.

5. Move resource conditions towards desired conditions

Recent assessments indicate that, while desired conditions are being met throughout a large portion of the project area, specific locations within the project area may not be meeting or moving toward desired conditions in a manner that is timely and consistent with Forest Plan objectives, standards and guidelines. Gaps between existing resource conditions and desired conditions indicate a need to change grazing management by updating AMPs. Table 1.03-1 displays desired and existing conditions and identified need for change in the project area. A need for change was identified wherever existing conditions do not meet desired conditions as specified in the Forest Plan Direction (USDA 2010).

Table 1.03-1 Existing conditions and identified need for change in the project area

Resource	Locations	Desired Conditions	Existing Conditions	Need for Change
Aspen Regeneration	Bell Meadow: Crab Meadow, Kerrick Corral, Bell Meadow, and Round and Lower Round Meadows Eagle Meadow: Barn Meadow, Eagle Meadow, and Niagara Creek Herring Creek: Bull Run, Fiddler's Green, Hammill Canyon and Punch Bowl	A diversity of age classes of hardwood shrubs is present and regeneration is occurring.	Aspen browse by livestock and wildlife exceeds Forest Plan standards and guidelines in certain locations	Protect aspen regeneration by ensuring Forest Plan standards and guidelines are met. Additional monitoring of aspen populations will facilitate better understanding of timing and patterns of livestock/wildlife aspen browse.
Meadow Hydrologic Function	Bell Meadow: Crab Meadow, Mud Lake Meadow, Round Meadow, Lower Round Meadow, and Upper Bell Meadow Eagle Meadow: East Eagle Meadow, Long Valley, Lower Eagle Meadow and Red Rock Meadow Herring Creek: Castle Meadow, Herring Creek Reservoir, Hammill Canyon Meadows #1-6, Upper Three Meadows and Upper Willow Meadow	Meadows are hydrologically functional: streams have floodplain connectivity to dissipate high flow energy, stream morphology is suitable for optimizing ground water retention, and the water table supports desired plant species composition and structural diversity.	Hydrologic function of listed meadows is not at desired condition. In many cases this is due to lowered water tables as a result of historic forest use activities.	Where already impaired, meadow hydrologic function is not likely to show significant improvement by changing livestock management alone. Meadow restoration is planned for Crab and Round Meadow as part of the Gooseberry project.
Meadow Hydrologic Function	Bell Meadow: Lily Lake Eagle Meadow: Shell Meadow Herring Creek: Bloomer Lake Meadow, Bluff Meadow, Burt Reed Meadow, Groundhog Meadow, Coyote Meadow and Hammill Canyon Meadow #7	Meadows are hydrologically functional: streams have floodplain connectivity to dissipate high flow energy, stream morphology is suitable for optimizing ground water retention, and the water table supports desired plant species composition and structural diversity.	Hydrologic function of listed meadows is at desired condition. However, headcuts, knick points and/or small gullies have been observed at these locations. If these increase in scale then meadow hydrologic function may become impaired.	Headcuts and gullies are not likely to show significant improvement as a result of changes in livestock management alone. Priority is to ensure that grazing is not causing new headcuts, causing accelerated advancement of headcuts and/or contributing to bank instability or channel incision. Monitor identified headcuts, knick points and small gullies. Ensure standards for streambank disturbance are not exceeded. Restoration projects are planned or

Resource	Locations	Desired Conditions	Existing Conditions	Need for Change
				already complete for all locations.
Yosemite toad Populations	Bell Meadow: no known habitat Eagle Meadow: Shell Meadow, and other small meadows in the vicinity of Shell Meadow Herring Creek: Bluff Meadow, Castle Meadow, Bloomer Lake, Groundhog Meadow, and Wire Corral	Provide habitat for diverse and viable populations of all native and desired non-native species.	Yosemite toad habitat exists in the project area. Habitat suitability is tied to meadow hydrology and is diminished where water table is lowered Long-term livestock impacts to Yosemite toad habitat and populations are uncertain.	Sierra Nevada Forest Plan Amendment (SNFPA) implements Standards and Guidelines for the protection of Yosemite toad and its habitat. There is a need to ensure consistency with this management direction by updating AMPs to include site-specific measures for conservation of Yosemite toad.
Great Gray Owl	Lower Eagle Meadow	Meadow vegetation in great grey owl PACs supports a sufficiently large meadow vole population to provide a food source for GGO through the reproductive period	Livestock excluded from 2 acres within Lower Eagle Meadow GGO PAC by temporary fence. There is uncertainty regarding what vegetative height is commensurate with site capability and habitat needs of prey species.	Construct permanent exclosure to replace temporary fence. Use best available information as interim regional guidance. Continue management study to determine habitat requirements of prey species and update regional guidance as necessary.
Ecological Status of Meadows	Bell Meadow: Crab Meadow and Round Meadow Eagle Meadow: Red Rock Meadow Herring Creek: Hammill Canyon Meadow #1	Species composition and structural diversity of plant and animal communities in riparian areas, wetlands, and meadows provide desired habitat conditions and ecological functions.	In these specific locations ecological status of meadow vegetation is low and/or in a downward trend. This is more likely a result of historic, rather than current, grazing practices.	Increase abundance of late-seral species in these meadows. Forest Plan standards and guidelines are designed to maintain meadows in satisfactory condition and improve condition of meadows where unsatisfactory.
Special Aquatic Features	Springs, seeps, and fens in various locations on all three Allotments	Maintain and restore the distribution and health of biotic communities in special aquatic habitats (springs, seeps, vernal pools, fens, bogs, and marshes) to perpetuate their unique functions and biological diversity	Many special aquatic features are functioning at risk. Livestock use may be causing trailing and trampling in special aquatic features, which in some cases has resulted in hydrologic alteration, bare soil/peat and/or loss of wetland vegetation.	Reduce impacts of livestock to special aquatic features by improving livestock distribution and minimizing time spent near special aquatic features. Update AMPs to incorporate and implement an adaptive strategy to improve the condition of special aquatic features that are Functioning At-Risk

Resource	Locations	Desired Conditions	Existing Conditions	Need for Change
Water Quality	All streams, lakes and rivers, including both Recreation Contact and Recreation Non-Contact Waters	Water quality meets the goals of the Clean Water Act and Safe Drinking Water Act; it is fishable, swimmable, and suitable for drinking after normal treatment	No known cases of pathogen related illness from forest users. Initial results of water quality study seem to indicate low risk of exceeding bacterial and pathogenic water quality standards at most locations on these Allotments.	Uncertain. Currently implement grazing BMPs to protect water quality. Educate the public about water quality and livestock grazing on public lands. Encourage forest users to drink only water that has been filtered or treated. Continue research on relationship between grazing and water quality, where possible. Implement adaptive management actions if necessary to protect water quality.
Developed and Dispersed Recreation	Bell Meadow: Crabtree Trailhead Eagle Meadow: dispersed camping areas near Barn Meadow Herring Creek: Developed Campgrounds near Herring Creek Reservoir	Minimize conflicts between recreational users and grazing operations.	Potential for livestock drift at Crabtree Trailhead. Occasional livestock drift into Herring Creek campground. Minimal complaints from recreational users but potential for conflict exist.	Potential for conflict between forest users and livestock operations in developed recreation areas and high-use dispersed camping areas is minimized by herding away from these areas. Use adaptive management actions (fencing) if needed to prevent livestock drift into developed recreation areas.
Wilderness Character	Bell Meadow: High use destinations in Emigrant Wilderness - Camp Lake, Bear Lake, Grouse Lake	Minimize conflicts between recreational users and grazing operations	Some visitor complaints received about livestock in the wilderness. Complaints related to noise (cowbells), cows in camp areas, and manure. Livestock drift outside Allotment – extent unknown	Drift: Adjust Northeastern boundary of Bell Meadow Allotment so that it is easily recognizable and wilderness technicians can better identify drift outside Allotment. Noise: Have explored ways to reduce use of cowbells in cooperation with Bell Meadow permittee.
Sensitive and Watchlist Plants	Bell Meadow: Camp Lake Herring Creek: Middle Three Meadows	Provide for protection and habitat needs of sensitive plants and watchlist species, so that Forest activities will not jeopardize their continued existence	Sundew (*Drosera rotundifolia*) occurrence located in small pond above Camp Lake. Yuba Pass Willowherb (*Epilobium howellii*) occurrences in middle three meadows and in small meadow above Leland restoration site.	None. Currently monitoring known populations of sensitive plants and watchlist plants as necessary to protect populations and prevent listing as threatened or endangered.
Invasive Weeds	Bell Meadow: Aspen Pack Station Eagle Meadow: Gathering pasture	Manage weeds using an integrated weed management approach.	Invasive weeds are present in localized areas and may spread. Potential exists for further introduction of invasive weeds.	None. Currently encourage use of weed-free hay and feed for horses and other pack stock and cleaning of equipment prior to use on forest.

1.04 PROPOSED ACTION

This is the Proposed Action, as described in the Notice of Intent (76 Federal Register 150, August 4, 2011; p. 47140-47141), with minor changes identified by the Forest Service and the public (refer to Updates to the Proposed Action). The Proposed Action is summarized below. Chapter 2, Alternative 1 (Proposed Action) provides a more detailed description.

In response to the purpose and need, the Forest Service proposes to continue to authorize livestock grazing in the Bell Meadow-Bear Lake, Eagle Meadow-Long Valley, and Herring Creek Allotments, making forage available to qualified livestock operators in a manner that is sustainable and consistent with management direction[1]. The Proposed Action would adjust livestock management, update Allotment Management Plans and implement an adaptive management strategy that would provide for healthy ecosystems in a manner that is consistent with the Forest Plan. The Proposed Action would move existing conditions toward desired conditions while continuing to allow livestock grazing on these Allotments with the following management actions.

1. Authorize continued grazing on the Bell Meadow-Bear Lake, Eagle Meadow-Long Valley, and Herring Creek Allotments in a manner that provides for healthy ecosystems and is consistent with Forest Plan direction.
2. Modify Allotment boundaries, create units, and update Allotment Management Plans to incorporate resource conservation measures and adaptive management options (described below).
3. Implement design criteria (described below) in order to better achieve desired conditions through systematic monitoring and adjustment of grazing activities, while allowing for flexibility in management decisions.

The Proposed Action includes the following changes from current management.

- Would allow an update to Allotment Management Plans for each of the three Allotments identifying desired conditions on the ground and outlining short and long term grazing management.
- Rename the Bell Meadow-Bear Lake and the Eagle Meadow-Long Valley Allotments. These Allotments will be referred to as the Bell Meadow and Eagle Meadow Allotments, respectively, for convenience and consistency.
- Adjust grazing strategy on the Bell Meadow Allotment by dividing the Allotment into units and implement a deferred grazing system that would improve distribution and timing of forage utilization and facilitate protection of sensitive resources. Construct new handling facilities for livestock shipping/receiving on the Bell Meadow Allotment at a new location. Modify the Bell Meadow Allotment boundary along the northeastern edge of the Allotment to align with natural barriers and decrease livestock entry into unauthorized areas.
- Modify the Herring Creek Allotment by adding an area to the northwest of the Allotment (Cascade Creek addition) and by removing a portion of the Allotment to the Southeast (Waterhouse Lake area). This would result in a net gain of about 850 acres to the Herring Creek Allotment, which would reduce overall utilization across the Allotment and facilitate deferred grazing on Yosemite toad habitat.
- Implement a deferred rotational grazing strategy for the Herring Creek Allotment by creating units within the Allotment in order to improve livestock distribution, reduce utilization in areas that receive concentrated use and defer grazing in Yosemite toad habitat.
- Add two additional areas to the Eagle Meadow Allotment. The Niagara Creek addition, to the west of the current Allotment boundary, would result in a gain of about 2,400 acres to the Eagle Meadow Allotment. The McCormick Pocket addition, to the south of Eagle Meadow, would

[1] The Proposed Action follows Forest Plan Direction (USDA 2010) and guidance from the Forest Service Handbook 2209.13, Chapter 90 (Grazing Permit Administration; Rangeland Management Decision-making).

include about 2,400 acres. These additions would improve livestock distribution and reduce overall utilization on the Allotment and improve the deferred rotation grazing system.

- Change utilization standards for the intensive grazing system on the Eagle Meadow Allotment to reflect site specific conditions. Maximum utilization would be set at 40% for all units that are grazed every year. If the permittee chooses to provide a year of rest in between years of grazing in certain units, the maximum allowable utilization would be raised to 50% as long as resource conditions continue to move towards or are in desired condition.
- Change grazing utilization standards at Lower Eagle Meadow to a maximum vegetative cover height to better measure and assess habitat cover for great gray owl prey species. Replace temporary exclosure fencing with a permanent fence around the established exclosure area.
- Replace temporary exclosure fencing at Shell Meadow with permanent fence.

Updates to the Proposed Action

The Forest updated the proposed action based on minor changes identified by the Forest Service and the public. The updated proposed action differs from the DEIS due to changes to proposed infrastructure and management requirements and updates to capture recent changes that have occurred to the lists of Threatened, Endangered, and Sensitive species by the Forest Service and the United States Fish and Wildlife Service (USFWS). Additional infrastructure needs were identified after the DEIS, and consist of replacing one small abandoned fence and one existing temporary fence with new barbed wire fences to ensure effective livestock control (EIS, p. 17). Updates to management requirements involve removal of one management requirement and addition of a new management requirement. The management requirement for protection of *Epilobium howelii* was removed because this species is no longer included on the Regional Foresters List of Sensitive plants and no longer requires this protection measure. A new management requirement better captures the Forest's intent to ensure compliance with the Endangered Species Act (ESA) (EIS, p. 28).

1.05 PRINCIPLE LAWS AND REGULATIONS

The National Environmental Policy Act of 1969 (NEPA) requires that all major federal actions significantly affecting the human environment be analyzed to determine the magnitude and intensity of those impacts and that the results be shared with the public and the public given opportunity to comment. The regulations implementing NEPA further require that to the fullest extent possible, agencies shall prepare environmental impact statements concurrently with and integrated with environmental analyses and related surveys and studies required by the Endangered Species Act of 1973, the National Historic Preservation Act of 1966, and other environmental review laws and executive orders. Principle among these are the Multiple Use and Sustained Yield Act of 1960, the National Forest Management Act of 1976 as expressed through the Forest Plan, the Clean Air Act of 1955, the Clean Water Act of 1948 and the Forest and Rangeland Renewable Resources Planning Act of 1974.

1995 Rescissions Act (104-19 Section 504): this BEH Rangeland Allotments EIS is designed specifically to implement the requirements of the 1995 Rescissions Act, which requires each National Forest to establish and adhere to a schedule for completing NEPA analysis and updating Allotment Management Plans for all rangeland Allotments on National Forest System lands.

1.06 DECISION FRAMEWORK

As the Responsible Official, the Forest Supervisor may decide to: (1) select the proposed action; (2) select one of the alternatives; (3) select one of the alternatives after modifying the alternative with additional mitigating measures or combination of activities from other alternatives; or, (4) select the no action alternative, choosing not to authorize continued grazing on the BEH rangeland Allotments.

1.07 PUBLIC INVOLVEMENT

Due to the controversy surrounding livestock grazing on National Forests, the Forest Service relied on public and permittee involvement to ensure that the EIS would consider a reasonable range of alternatives. The Forest Service sought input from individuals, non-profit groups, industry representatives, local governments, public agencies and Native American tribes. As a result, interested parties submitted a fair number of comments. This public input not only informed me of people's opinions, but also contributed to the project design process. Ultimately, my decision to select Alternative 1 is the direct result of the public input that I received throughout this process.

Of particular value during the public involvement process were public comments representing a wide range of values and opinions. Commenters included a wide variety of local stakeholders including grazing permittees, environmental groups, government agencies, private landowners and others. These comments helped the Forest Service to understand the views of important segments of the public and to seek solutions that would strike the right balance between the range of values that were represented. Public involvement directly contributed to the scope and content of the DEIS. However, as a review of the public comment on the DEIS makes clear, there was no consensus on how to best manage grazing on these allotments.

Many of the key points of disagreement that were evident in the comments on the DEIS were held by key stakeholders: members of the ranching industry and environmental groups. Ultimately, I could not incorporate all of our stakeholder's recommendations, since doing so would be either impractical or would negatively impact the economic viability of the allotments, creating the potential to effectively render them inoperable. In the end, I believe that Alternative 1 strikes a reasonable balance that will achieve project objectives and will be feasible to implement. And, it was only through public input that I could reach this point.

Initial Public Scoping on the Proposed Action

The Forest Service first listed the BEH project in the October 2010 issue of the Stanislaus National Forest Schedule of Proposed Actions (SOPA). The Forest distributes the SOPA to about 160 parties and it is available on the internet [http://www.fs.fed.us/sopa/forest-level.php?110516].

The Forest Service relied on public and permittee involvement to ensure that a range of alternatives would be analyzed in this EIS. District and Forest personnel met with the affected permittees on the BEH allotments several times between 2006 and 2012 to gather their input and incorporate their suggestions into the planning process.

After developing the Proposed Action, the Forest Service began its scoping process according to the Council on Environmental Quality (CEQ) regulations (40 CFR 1501.7). In addition to other public involvement, scoping initiates an early and open process for determining the scope of issues to be addressed in the EIS and for identifying the significant issues related to a proposed action. This scoping process allows the Forest Service not only to identify significant environmental issues deserving of study, but also to deemphasize insignificant issues, narrowing the scope of the EIS process accordingly (40 CFR 1500.4(g)).

On August 3, 2011 the Forest sent a scoping letter to 100 individuals, permittees, organizations, agencies, and Tribes interested in this project. The letter requested comments on the Proposed Action and referred to additional information (scoping package, maps, etc.) available on the internet. On August 4, 2011, the Forest Service published a Notice of Intent (NOI) that asked for public comment on the proposal (76 Federal Register 150, August 4, 2011; p. 47140-47141); the 45-day scoping period ended on September 19, 2011. During scoping, letters were received from 12 individuals and organizations. Individuals included grazing permittees and private landowners. Organizations included Western Watersheds, Tuolumne County, Central Sierra Environmental Resource Council, and the California Farm Bureau. The Forest Service developed the issues (EIS Chapter 1.08) based on public comments submitted during the scoping period.

Continued Scoping after the Comment Period

After the initial 30-day scoping period, the Forest continued scoping with interested parties. Forest Service representatives communicate regularly with interested parties, primarily permittees, forest visitors and local environmental groups. Information received from regular communications was considered and used to further develop the alternatives.

DEIS Comment Period

The initial Notice of Availability (NOA) for the DEIS appeared in the Federal Register on January 31, 2014 (79 Federal Register 21, January 31, 2014; p. 5400). The Forest Supervisor sent a DEIS notification letter to the 12 interested parties who submitted unique comments during scoping along with other individuals, permittees, organizations, agencies, and Tribes interested in this project on January 24, 2014 requesting specific written comments by the filing deadline of March 17, 2014. The Forest Service also published the DEIS on the internet [http://www.fs.fed.us/nepa/nepa_project_exp.php?project=33836].

Interested parties submitted 18 total comment letters on the DEIS. The Response to Comments (EIS Appendix E) identifies specific comments submitted during the comment period and the Forest Service responses. During the final stages of preparing the EIS and Draft ROD, Forest personnel met with key stakeholders to discuss alternatives and the importance of implementing key components of the selected alternative, including Standards and Guidelines, Resource Conservation Measures, and Adaptive Management.

1.08 ISSUES

The Forest Service reviewed scoping comments from the public, other agencies, and permittees to formulate issues concerning the proposed action (Scoping Comment Analysis, project record). An issue is a matter of public concern regarding the proposed action and its environmental impacts. Scoping identified issues which are a point of discussion, dispute, or debate with the Proposed Action. An issue is an effect on a physical, biological, social, or economic resource. An issue is not an activity; instead, the predicted effects of the activity create the issue. The Forest Service separated the issues into two groups: significant and non-significant. Significant issues are defined as those directly or indirectly caused by implementing the proposed action.

Significant Issues are used to formulate alternatives, prescribe mitigation measures, or analyze environmental effects. Issues are significant because of the extent of their geographic distribution, the duration of their effects, or the intensity of interest or resource conflicts. Non-Significant Issues were identified as those that were: 1) outside of the scope of the proposed action; 2) already determined through law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; 4) conjectural and not supported by scientific fact; 5) a comment, opinion, or position statement; or, 6) a question for clarification or information. Although non-significant issues are not

used to formulate alternatives or prescribe mitigation measures, the DEIS will disclose all significant environmental effects including any related to non-significant issues.

The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)..." A list of non-significant issues and reasons why they were found non-significant may be found in the project record.

Significant Issues

As described above, issues are significant because of the extent of their geographic distribution, the duration of their effects, or the intensity of interest or resource conflicts. Based on public comments, the Forest Service developed two significant issues to formulate and compare alternatives, prescribe mitigation measures, or analyze and compare the environmental effects of each alternative: 1) Habitat and Species Protection; and, 2) Water Quality.

SIGNIFICANT ISSUE STATEMENTS

The significant issue statements identify elements (individual or groups of significant issue topics) along with a cause and effect based on public comments.

1. ***Habitat and Species Protection****: The Draft Environmental Impact Statement should address a reasonable range of alternatives. Specifically, the Forest Service should develop alternatives that address habitat and species protection and/or a reduced grazing alternative.*
   - Increased protection of sensitive species while continuing to authorize grazing may result in reduced numbers of livestock or AUMs.
   - Immediate implementation of livestock exclusions could impact flexibility in management where adaptive, less expensive alternatives such as herding or timing are not explored first.
2. ***Water Quality****: The Forest Service should describe the potential impacts to water quality caused by livestock and if necessary consider feasible alternatives to reduce the risk. Livestock presence in wet meadows and proximity to streams or other bodies of water may affect water quality.*
   - Identifying areas with the highest risk would allow for adaptive management changes that would improve conditions where needed.
   - There is conflicting scientific information on the subject of water quality and the degree to which livestock actually influence the water quality in a rangeland setting.

2. The Alternatives

This chapter describes and compares the alternatives under consideration for the Stanislaus National Forest BEH Rangeland Allotments EIS. It describes both alternatives considered in detail and those considered but eliminated from detailed study. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative and some of the information is based upon the environmental, social and economic effects of implementing each alternative.

Based on the issues identified through public comment on the proposed action, the Forest Service developed other action alternatives that achieve the purpose and need differently than the proposed action. In addition, the Forest Service is required to analyze a No Action alternative. The proposed action, no action and the other action alternatives are described in detail.

The chapter is divided into the following sections:

- Chapter 2.01 describes how the alternatives were developed.
- Chapter 2.02 presents the alternatives considered in detail.
- Chapter 2.03 shows the mitigation and other requirements common to all action alternatives.
- Chapter 2.04 presents the alternatives that were considered, but eliminated from detailed analysis, including the rationale for eliminating them.
- Chapter 2.05 compares the alternatives based on their environmental, social and economic consequences including a comparative display of the projected effects of the alternatives.

Map Package

The following detailed maps are available online at: http://www.fs.usda.gov/project/?project=33836.

Alternative 1 Map
Plotter size (36 inch by 48 inch) map showing all of the actions proposed under Alternative 1.

Alternative 3 Map
Plotter size (36 inch by 48 inch) map showing all of the actions proposed under Alternative 3.

Alternative 4 Map
Plotter size (36 inch by 48 inch) map showing all of the actions proposed under Alternative 4.

2.01 How the Alternatives Were Developed

The action alternatives represent a wide range of perspectives designed to meet the purpose and need and to address the issues identified through scoping (Chapter 1).

Refining Alternatives Submitted by the Public during Scoping

During the 45-day public scoping process comments and suggested alternatives were submitted for consideration. The Forest Service reviewed and considered each proposal. The alternatives considered in detail incorporate portions of those proposals. Specifically, Alternative 4 was developed in response to Alternatives submitted for consideration by the public. The alternatives considered but eliminated from detailed study address the remaining portions of those proposals. Also important in this process, the Forest Service gathered information in consultation and discussions with grazing permittees, tribal representatives, local counties and Forest Service employees.

2.02 ALTERNATIVES CONSIDERED IN DETAIL

The action alternatives (Alternatives 1, 3 and 4) and the no action alternative (Alternative 2) are considered in detail. The no action alternative represents the No Grazing alternative (FSH 2209.13, Section 92.31). Alternative 2, required by the implementing regulations of the National Environmental Policy Act (NEPA), serves as a baseline for comparison among the alternatives (73 Federal Register 143, July 24, 2008; p. 43084-43099).

The following sections describe each of the alternatives considered in detail (map package and project record contain more detailed maps of each alternative).

Alternative 1 (Proposed Action)

This is the Proposed Action, as described in the Notice of Intent (76 Federal Register 150, August 4, 2011; p. 47140-47141), with minor changes identified by the Forest Service and the public (Chapter 1.04). In response to the purpose and need, the Forest Service proposes to continue to authorize livestock grazing in the Bell Meadow-Bear Lake, Eagle Meadow-Long Valley, and Herring Creek Allotments, making forage available to qualified livestock operators in a manner that is sustainable and consistent with management direction[2]. The Proposed Action would adjust livestock management, update Allotment Management Plans and implement an adaptive management strategy that would provide for healthy ecosystems in a manner that is consistent with the Forest Plan. The Proposed Action would move existing conditions toward desired conditions while continuing to allow livestock grazing on these Allotments with the following management actions.

- Authorize continued grazing on the Bell Meadow-Bear Lake, Eagle Meadow-Long Valley, and Herring Creek Allotments in a manner that provides for healthy ecosystems and is consistent with Forest Plan direction.
- Modify Allotment boundaries, create units, and update Allotment Management Plans to incorporate resource conservation measures and adaptive management options (described below).
- Implement design criteria (described below) in order to better achieve desired conditions through systematic monitoring and adjustment of grazing activities, while allowing for flexibility in management decisions.

The Proposed Action includes the following changes from current management.

- Would allow an update to Allotment Management Plans for each of the three Allotments identifying desired conditions on the ground and outlining short and long term grazing management.
- Rename the Bell Meadow-Bear Lake and the Eagle Meadow-Long Valley Allotments. These Allotments will be referred to as the Bell Meadow and Eagle Meadow Allotments, respectively, for convenience and consistency.
- Adjust grazing strategy on the Bell Meadow Allotment by dividing the Allotment into units and implement a deferred grazing system that would improve distribution and timing of forage utilization and facilitate protection of sensitive resources. Construct new handling facilities for livestock shipping/receiving on the Bell Meadow Allotment at a new location. Modify the Bell Meadow Allotment boundary along the Northeastern edge of the Allotment to align with natural barriers and decrease livestock entry into unauthorized areas.
- Modify the Herring Creek Allotment by adding an area to the Northwest of the Allotment (Cascade Creek addition) and by removing a portion of the Allotment to the Southeast (Waterhouse Lake area). This would result in a net gain of about 850 acres to the Herring Creek

[2] The Proposed Action follows Forest Plan Direction (USDA 2010) and guidance from the Forest Service Handbook 2209.13, Chapter 90 (Grazing Permit Administration; Rangeland Management Decision-making).

Allotment, which would reduce overall utilization across the Allotment and facilitate deferred grazing on Yosemite toad habitat.

- Implement a deferred rotational grazing strategy for the Herring Creek Allotment by creating units within the Allotment in order to improve livestock distribution, reduce utilization in areas that receive concentrated use and defer grazing in Yosemite toad habitat.
- Add two additional areas to the Eagle Meadow Allotment. The Niagara Creek addition, to the west of the current Allotment boundary, would result in a gain of about 2,400 acres to the Eagle Meadow Allotment. The McCormick Pocket addition, to the south of Eagle Meadow, would include about 2,400 acres. These additions would improve livestock distribution and reduce overall utilization on the Allotment and improve the deferred rotation grazing system.
- Change utilization standards on the Eagle Meadow Allotment to reflect site specific conditions. Maximum utilization would be set at 40% for all units that are grazed every year. If the permittee chooses to provide a year of rest in between years of grazing in certain units, the maximum allowable utilization would be raised to 50% as long as resource conditions continue to move towards or are in desired condition.
- Change grazing utilization standards at Lower Eagle Meadow to a maximum vegetative cover height to better measure and assess habitat cover for great gray owl prey species. Replace temporary exclosure fencing with a permanent fence around the established exclosure area.
- Replace electric fence exclosure at Shell Meadow with standard barbed wire fence. Livestock may be permitted in Shell Meadow after the site has recovered from restoration with annual approval, after Yosemite toad metamorphosis.

The Proposed Action consists of two components: Authorization and Mitigation and Other Requirements.

AUTHORIZATION

Authorization addresses six components: permitted grazing area; infrastructure; permitted livestock numbers; season of use; utilization standards; and, management (grazing system).

Permitted Grazing Area

The permitted grazing area would include a majority of the current area open to grazing as well as three proposed additions. The Bell Meadow Allotment would remain much the same, with the exception of minor boundary adjustments to reflect the actual location of Allotment boundary fences and natural boundaries. Allotment boundaries for the Eagle Meadow and Herring Creek Allotment would also have minor boundary adjustments to line up with Allotment fences and natural barriers. In the Eagle Meadow Allotment, the Niagara Creek addition would incorporate about 2,400 acres of Forest Service land to the western edge of the Allotment and nearly 450 acres are removed from this unit reflecting the actual location of the western boundary fence. The McCormick Pocket addition would add about 2,400 acres directly to the south of Eagle Meadow. An area in the southern portion of the Herring Creek Allotment, called the Waterhouse Lake area, would be removed from the Allotment and an area to the northwest of the Allotment, called the Cascade Creek addition, would be added into the Allotment for a net gain of about 850 acres.

Infrastructure

Additional infrastructure would be required to support livestock grazing in the areas described below.

Bell Meadow Allotment

- Corral and handling facility at Forest Service Road 4N25.
- Construct allotment boundary fence on the Southeast corner of the Bell Meadow allotment. Fence would be approximately .25 mile with a gate and backpacker cattleguard on trail 19E95.
- Additional fencing may be needed if the proposed grazing system (rotation and distribution) cannot be achieved after three years of intensive herding alone.

Eagle Meadow Allotment

- Fence the western edge of the Niagara Creek addition to keep livestock away from Highway 108 and developed recreation facilities (about 1.0 miles).
- Replace temporary exclosure fencing at Lower Eagle Meadow with permanent fence.
- Replace temporary exclosure fencing at Shell Meadow with permanent fence. Rebuild existing abandoned fences in McCormick pocket as needed.
- Install cattle guard on Forest Service Road 5N01 at Niagara Creek addition.
- Install a water trough in Lower Eagle unit near Indian Rock.
- Construct new corral at the junction of 5N13Y and 5N01 (Eagle Meadow Road).

Herring Creek Allotment

- Fence the western edge of the Cascade Creek addition to keep livestock away from Highway 108 and developed recreation facilities (about 1.2 miles).
- Cattle guards on Forest Service Roads 5N21 and 5N30 at Cascade Creek addition
- Small drift fence between the Hammill Canyon and Willow Creek units, along Herring Creek at the top of Hammill Canyon and to the west of Bloomer Lake (about 400 feet).
- Additional fencing may be needed to divide the Hammill Canyon and Willow Creek units if deferred rotation cannot be achieved after three years of intensive herding alone.

Permitted Livestock Numbers

Permitted livestock numbers for the Bell Meadow, Eagle Meadow, and Herring Creek Allotments would remain at the current permitted numbers (Table 2.02-1). Adjustments to annual authorized livestock numbers may occur before each grazing season, based on conditions, range inspections and/or monitoring results. Permitted livestock numbers will not be exceeded unless an adjustment in season occurs and overall AUMs (as calculated by the permitted numbers and season) are not exceeded. Up to 5 head of horses (18 AUMs) would also be authorized on each Allotment to be used for Allotment administration.

Table 2.02-1 Alternative 1 (Proposed Action): Permitted Livestock Numbers

Allotment	Season of Use	Permitted Numbers	AUMs
Bell Meadow	July 1 – September 15	80 cow/calf	268
Eagle Meadow	July 1 – September 30	150 cow/calf	599
Herring Creek	July 1 – September 30	156 cow/calf	623

Season of Use

The permitted season of use would be from July 1 to September 15 on the Bell Meadow Allotment and from July 1 to September 30 on the Eagle Meadow and Herring Creek Allotments. The season of use may be administratively adjusted by allowing livestock to enter the Allotments as much as two weeks early and/or remain on the Allotment as much as two weeks past the permitted date, as long as the standards and guidelines, particularly utilization and streambank disturbance standards, are not exceeded and resource conservation measures are implemented. An extended season of use would only be authorized if it has been determined through field inspections that soil, water, vegetative and other resource conditions are suitable.

Utilization Standards

Utilization (forage use) standards described in the Forest Plan and as amended in the Sierra Nevada Forest Plan Amendment would be employed to maintain or improve rangeland vegetation, watershed connectivity and long-term soil productivity. Utilization standards are included as part of the design criteria described below.

Management (Grazing System)

Livestock grazing would continue to be authorized on the Bell Meadow, Eagle Meadow and Herring Creek Allotments using the project design criteria. The implementation of improved grazing systems on each Allotment and use of adaptive management to respond to changes, should allow the Forest Service and the permittee the most flexibility in continuing to move towards desired conditions. Livestock management may be adjusted each year in terms of timing and actual livestock numbers. The overall objectives should be met by staying within the sideboards outlined in the design criteria.

The following information describes how the units would be divided and how livestock grazing would typically be managed on the Allotments each year. Annual Operating Instructions (AOI) would reflect the planned management for each year including authorized livestock numbers, season of use and allowable use standards based on the grazing authorization and Allotment Management Plan.

Bell Meadow

Bell Meadow Allotment would be divided into units to implement a deferred grazing system. The Allotment would be divided into three units that would be used to improve distribution of forage utilization while livestock are moved through the Allotment. The units will be referred to as the Round unit (Western unit), Crab unit (Northeastern unit), and Mud unit (Southeastern). Initially, a deferred grazing system will be achieved through intensive herding and dispersal. If herding is unsuccessful after three years then additional fencing or other infrastructure would be required. The cattle would be trucked to and unloaded at a corral near Kerrick Horse Camp on July 1, depending on range readiness. The herd would spend a day or two in the Round unit, where they will rest and “mother-up” before being pushed into the other units. From there the cattle will be separated into two cow/calf herds, about 40 pair each. One herd will be driven to the Mud unit and the other herd will be moved to the Crab unit. Cattle will stay in the Mud and Crab units for about 6 weeks or until forage utilization approaches allowable use standards. Around mid-August, the cattle will be allowed to drift back into the Round unit. Livestock will remain in the Round unit for about 2 weeks, when they will be gathered into the Bell Meadow gathering pasture. On September 15, livestock are gathered and moved in small groups back to the corral near Kerrick Horse Camp and trucked off the Allotment.

Eagle Meadow

Eagle Meadow Allotment would use a deferred rotation grazing system with the option of using some of the units under a rest-rotation system. The cattle would enter the Allotment around July 1 at the Niagara unit, depending on range readiness. The Niagara Creek addition would become part of the Niagara unit and will be used to improve distribution and facilitate deferred grazing in the higher elevation units. From the Niagara unit, cattle would be distributed through the Lower Eagle unit and remain there until allowable utilization standards are being approached and there is reduced risk of Larkspur poisoning in the other units. Cattle are then moved into the Sardine or Long Valley unit depending on the operating plan for the year. The Haypress unit is used in conjunction with the Sardine unit to improve livestock distribution on the east side of the Allotment. In years the Long Valley unit is grazed last, prior to gathering, the McCormick Pocket unit would be authorized for partial numbers in order to improve livestock distribution and to facilitate gathering into the Eagle Meadow unit. At the end of the season the cattle are gathered into the Eagle Meadow unit (gathering pasture) for up to two weeks and then trucked off the Allotment.

Herring Creek

The Herring Creek Allotment would be divided into 4 units to allow for a deferred rotation grazing system. Besides the short fence proposed near Bloomer Lake, this would be achieved through intensive herding and dispersal, but may require additional fencing or other infrastructure, if herding is unsuccessful after three years. Livestock would enter the Allotment at Burt Reed meadow on or about July 1, depending on range readiness, and from there are dispersed evenly throughout the Bull Run unit. The Cascade Creek addition area would be included in the Allotment as a new unit, called

the Cascade unit, and would provide additional forage which would facilitate deferred grazing in the upper units. Livestock would be moved to the Hammill Canyon unit when allowable use in the Bull Run and Cascade units is approached. To reduce grazing pressure on the meadows in Hammill Canyon the permittee is encouraged to herd cattle toward the permanent uphill watering troughs and supplement in approved locations with a salt or protein block to hold and increase distribution of cattle in the upland vegetation until allowable use is reached. Livestock are then removed from the Hammill Canyon unit and placed in the Willow unit. Cattle will be managed in meadows occupied by Yosemite toad according to Forest Plan Standards and Guidelines listed below. At the end of the season cattle will be gathered near and into Bluff Meadow for a period of about one to two weeks, and from there they are shipped off the Allotment.

MITIGATION AND OTHER REQUIREMENTS

Mitigation proposed for Alternative 1 (Proposed Action) includes Standards and Guidelines, Resource Conservation Measures, and an Adaptive Management Strategy. These are described in Chapter 2.03, Mitigation and Other Requirements.

Alternative 2 (No Action)

The No Action alternative for NEPA decisions on grazing authorizations has been defined by the Forest Service as no grazing (FSH 2209.13, Section 92.31). This means that livestock grazing would not be authorized in the project area. Under the No Action alternative, continued grazing would not be authorized. Notifications would be given to affected permittees and permitted livestock grazing would be discontinued after 2 years. No adaptive management strategy would be implemented, structural improvements would be either removed (especially in wilderness) or left in place but not maintained, and no grazing under permit would be allowed on these Allotments. The Allotments would become vacant; no Forest Plan amendments would be required to implement this alternative. Selection of this alternative would be consistent with the Forest Plan, as amended (36 CFR 219.10(c)).

Alternative 3 (Current Management)

Alternative 3 (Current Management) authorizes the continued use of the Bell Meadow-Bear Lake, Eagle Meadow-Long Valley, and Herring Creek Allotments for cattle grazing through the issuance of term grazing permits.

This alternative represents a continuation of current management with the following modifications:

- Update Allotment Management Plans for each of the three Allotments identifying desired conditions on the ground and outlining short and long term grazing management.
- Adjustments to Allotment boundaries. Recent evaluation of Allotment boundary fences and landform barriers suggests that the actual Allotment area is slightly different than indicated on current maps of the Allotment. Improved technology such as Global Positioning Systems (GPS) has allowed for more precise mapping. The boundary adjustments will correct the mapping errors and more accurately reflect the actual area open to grazing.
- Rename the Bell Meadow-Bear Lake and the Eagle Meadow-Long Valley Allotments. These Allotments will be referred to as the Bell Meadow and Eagle Meadow Allotments, respectively, for convenience and consistency.
- Modify the Herring Creek Allotment by removing a portion of the Allotment to the Southeast that is currently not used by cattle (Waterhouse Lake area).

All other existing applicable Forest Plan standards would continue to apply through issuance of the Term Grazing Permit.

Alternative 3 consists of two components: Authorization and Mitigation and Other Requirements. For this alternative, Mitigation and Other Requirements is limited to Forest Plan Standards and

Guidelines. Resource conservation measures and an adaptive management strategy would not be implemented as described in Chapter 2.03, as this alternative represents a continuation of current management.

AUTHORIZATION

Authorization addresses six components: permitted grazing area; infrastructure; permitted livestock numbers; season of use; utilization standards; and, management (grazing system).

Permitted Grazing Area

The permitted grazing area would be very similar to the current area open to grazing. Allotment boundaries for the Bell Meadow, Eagle Meadow and Herring Creek Allotment would have minor boundary adjustments to line up with existing Allotment fences and natural barriers. An area in the southern portion of the Herring Creek Allotment, called the Waterhouse Lake area, would be removed from the Allotment because it is inaccessible to livestock.

Infrastructure

No additional infrastructure would be required for Alternative 3.

Permitted Livestock Numbers

Permitted livestock numbers for the Bell Meadow, Eagle Meadow, and Herring Creek Allotments would remain at the current permitted numbers (Table 2.02-2). Adjustments to annual authorized livestock numbers may occur before each grazing season, based on conditions, range inspections and/or monitoring results. Permitted livestock numbers will not be exceeded unless an adjustment in season occurs and overall AUMs (as calculated by the permitted numbers and season) are not exceeded. Up to 5 head of horses (18 AUMs) would also be authorized on each Allotment to be used for Allotment administration.

Table 2.02-2 Alternative 3 (Current Management): Permitted Livestock Numbers

Allotment	Season of Use	Permitted Numbers	AUMs
Bell Meadow	July 1 – September 15	80 cow/calf	268
Eagle Meadow	July 1 – September 30	150 cow/calf	599
Herring Creek	July 1 – September 30	156 cow/calf	623

Season of Use

The permitted season of use would be from July 1 to September 15 on the Bell Meadow Allotment and from July 1 to September 30 on the Eagle Meadow and Herring Creek Allotments. The season of use may be administratively adjusted by allowing livestock to enter the Allotments as much as two weeks early and/or remain on the Allotment as much as two weeks past the permitted date, as long as the standards and guidelines, particularly utilization and streambank disturbance standards, are not exceeded and resource conservation measures are implemented. An extended season of use would only be authorized if it has been determined through field inspections that soil, water, vegetative and other resource conditions are suitable.

Utilization Standards

Utilization (forage use) standards described in the Forest Plan and as amended in the Sierra Nevada Forest Plan Amendment would be employed to maintain or improve rangeland vegetation, watershed connectivity and long-term soil productivity. Utilization in key areas of the Bell Meadow and Herring Creek Allotments would be set at a maximum of 40% (or minimum 4-inch stubble height). For the Eagle Meadow Allotment, utilization would remain at 60% utilization for all locations because the Allotment is managed under an intensive grazing system (rest rotation).

Management (Grazing System)

Current management of each Allotment is summarized below:

Bell Meadow Allotment

Bell Meadow Allotment allows 80 cow/calf pairs to run from July 1 to September 15 and allows grazing in all units for the entire season (season-long management). The cattle are trucked to a temporary corral above Aspen Meadow Pack Station and unloaded at the corral. The cattle are herded onto the Allotment July 1, depending on range readiness. The cattle are generally separated into two 40 cow/calf herds. This Allotment is managed through intensive herding and dispersal management system. On September 15, livestock are gathered into small groups and moved back to the corral above Aspen Pack Station and trucked off the Allotment. All livestock are removed from the Allotment by September 15, unless authorized by Forest Service Officer.

Eagle Meadow Allotment

Eagle Meadow Allotment allows 150 cow/calf pairs to run from July 1 to September 30. Management of this Allotment is by a deferred grazing and rest-rotation system. The cattle enter the Allotment at the Niagara Unit on or about July 1, depending on range readiness, and are held there for two to three weeks, or until the allowed utilization level is being approached. The cattle are then herded into the Lower Eagle Unit and when utilization is approached they are moved to other units of the Allotment. Cattle movements to the Sardine and Haypress Units are delayed when possible to avoid Larkspur poisoning. Rest-rotation units (Sardine, Haypress, and Long Valley Units) are used only every other year. Sufficient riding is done throughout the grazing season to keep forage use and riparian shrub browse within allowable levels and ensure an even distribution of cattle. About September 22, the cattle are gathered into the Eagle Meadow gathering pasture where they remain until the end of the grazing season.

Herring Creek Allotment

Herring Creek Allotment allows 156 cow/calf pairs to run from July 1 to September 30 and allows grazing for the entire season (season-long management). Four horses are also permitted to graze on this Allotment. Livestock enter the Allotment at the Bert Reed pasture on or about July 1, depending on range readiness, and then are released into Bull Run Unit. Cattle are evenly distributed throughout the Bull Run, Punchbowl, and the Strawberry fuelbreak areas, where they graze for about two weeks. By July 16, the cattle are moved into both the Hammill Canyon and Willow Creek units. After one week, 40 pair are moved to the Pinecrest Peak area. The Permittee makes an effort to keep cattle evenly distributed, and prevent them from congregating in the riparian areas. Herding towards the uphill water trough(s) and use of salt or protein blocks may be used to aid with livestock distribution. During the last few weeks of the grazing season, the cattle are herded towards Bluff Meadow which is used for gathering in the last week. They are shipped off the Allotment from the upper log corrals prior to September 30. It is typical for the permittee to have gathered and removed all of the livestock prior to the opening of Deer (rifle) hunting season, the third Saturday of September. This Allotment is managed through intensive herding and dispersal management system. A cow camp on the Allotment, including temporary horse corrals, is used to facilitate appropriate herding of livestock and to limit livestock from Yosemite toad sites.

MITIGATION AND OTHER REQUIREMENTS

Mitigation proposed for Alternative 3 (Current Management) is limited to Standards and Guidelines. Resource Conservation Measures and an Adaptive Management Strategy would not be implemented as described in Chapter 2.03 if this alternative is selected by the deciding official. Applicable Standards and Guidelines are listed in Chapter 2.03, Mitigation and Other Requirements.

Alternative 4 (Resource Protection)

Alternative 4 (Resource Protection) addresses the significant issues developed in response to scoping comments (Chapter 1). This Alternative would implement resource conservation measures immediately where a need for change in management was identified during project analysis. Livestock grazing would be minimized or excluded in areas where certain resource concerns were identified. Permitted livestock numbers for the Bell Meadow, Eagle Meadow, and Herring Creek Allotments would be reduced by an amount proportionate to the reduction in suitable foraging area caused by exclusion of those areas with resource concerns. Similar to Alternative 1 (Proposed Action), this Alternative would move existing conditions toward desired conditions while continuing to allow livestock grazing on these Allotments with the following management actions:

- Update Allotment Management Plans for each of the three Allotments identifying desired conditions on the ground and outlining short and long term grazing management.
- Rename the Bell Meadow-Bear Lake and the Eagle Meadow-Long Valley Allotments. These Allotments will be referred to as the Bell Meadow and Eagle Meadow Allotments, respectively, for convenience and consistency.
- Adjust grazing strategy on the Bell Meadow Allotment by dividing the Allotment into units and implement a deferred grazing system that would improve distribution and timing of forage utilization and facilitate protection of sensitive resources. Construct new handling facilities for livestock shipping/receiving on the Bell Meadow Allotment at a new location. Modify the Bell Meadow Allotment boundary along the Northeastern edge of the Allotment to align with natural barriers and decrease livestock entry into unauthorized areas.
- Modify the Herring Creek Allotment by removing a portion of the Allotment to the Southeast that is currently not used by cattle (Waterhouse Lake area).
- Minimize or exclude livestock grazing from the following areas: meadows where ecological status of the meadow was determined to be low; special aquatic features that are determined to be non-functioning or most at-risk; and all habitat for threatened, endangered, and sensitive species. This will be accomplished through intensive herding or barriers, if necessary.
- Create four units within the Herring Creek Allotment and implement a deferred rotational grazing strategy. Units would be similar to those proposed for the Proposed Action, but the Willow Unit would be further subdivided to create an additional unit in the area near Pinecrest Peak. Grazing would be allowed in the Pinecrest Peak Unit but excluded from the Willow Unit. Construct exclosure around Wire Corral to effectively exclude livestock from all known Yosemite toad habitat in the Herring Creek Allotment.
- Change utilization standards for the intensive grazing system on the Eagle Meadow Allotment to reflect site specific conditions. Maximum utilization would be set at 40% for all units that are grazed every year. If the permittee chooses to provide a year of rest in between years of grazing in certain units, the maximum allowable utilization would be raised to 50%, as long as resource conditions continue to move towards or are in desired condition.
- Implement a 10% streambank trampling standard in stream reaches occupied by Sierra Nevada yellow-legged frog (Reaches on Bell Creek and Willow Creek).
- Construct permanent fence and expand exclosure area at Lower Eagle Meadow. Construct a fence around small meadow to the southeast of Shell Meadow (Unnamed Meadow at T6N, R19E, Section 35). Replace electric fence at Shell Meadow with a permanent barbed wire fence.
- Adjust permitted livestock numbers (AUMs) as appropriate to reflect reductions in permitted grazing area and generally reduce livestock impacts to sensitive resources.

The Resource Protection Alternative consists of two components: Authorization and Mitigation and Other Requirements.

AUTHORIZATION

Authorization addresses six components: permitted grazing area; infrastructure; permitted livestock numbers; season of use; utilization standards; and, management (grazing system).

Permitted Grazing Area

The Resource Protection Alternative would reduce the permitted grazing area for all three Allotments due to exclusion of sensitive areas. Additional infrastructure (fencing or other barriers) may be required to protect sensitive resources if exclusion cannot be accomplished within three years through herding alone. This alternative excludes areas with sensitive resources (meadows with low ecological status, special aquatic features, and habitat for threatened, endangered or sensitive species) from the permitted grazing area. Sensitive resources were identified at the following locations:

Bell Meadow Allotment

Intensive herding or barriers, if necessary, to minimize or exclude livestock grazing at Crab Meadow, Round Meadow, Sierra Nevada yellow-legged frog habitat, and the most at-risk Special Aquatic features (Chapter 3.11 and Watershed Report for a list of the most at-risk special aquatic features).

Eagle Meadow Allotment

Intensive herding or barriers, if necessary, to minimize or exclude livestock grazing at Red Rock Meadow, Lower Eagle Meadow, an unnamed Meadow at T6N, R19E, Section 35 and the most at-risk Special Aquatic Features. Livestock are currently excluded from Shell Meadow by a temporary fence. Under this alternative, this temporary fence would be replaced by a permanent fence.

Herring Creek Allotment

Intensive herding or barriers, if necessary, to minimize duration of or exclude livestock grazing in Hammill Canyon, Sierra Nevada yellow-legged frog habitat, Sensitive Plant Habitat, and the most at-risk Special Aquatic Features. Exclusion of livestock from Wire Corral Meadow and Willow unit to eliminate potential for livestock impacts to Yosemite toad.

Infrastructure

Additional infrastructure (fences or other barriers) would be required in order to exclude livestock from sensitive resources in the locations described below.

Bell Meadow Allotment

- Fences will be constructed around Round Meadow and Crab Meadow during implementation of the Gooseberry Project. Under this alternative, these fences would remain in place following implementation of the Gooseberry Ecological Restoration project until meadow condition (ecological status) is moderate or is in an upward trend.
- Corral and handling facility at Forest Service Road 4N25.
- Construct allotment boundary fence on the Southeast corner of the Bell Meadow allotment. Fence would be approximately .25 mile with a gate and backpacker cattleguard on trail 19E95.

Eagle Meadow Allotment

- Construct fence around Lower Eagle Meadow to exclude livestock from Great Gray Owl foraging habitat.
- Water trough in Lower Eagle Unit near Indian Rock, not required to implement decision.
- Construct corral at 5N13Y and 5N01 (Eagle Meadow Road).
- Construct fence around unnamed meadow at T6N, R19E, Section 35 (Yosemite toad habitat)
- Replace electric fence at Shell Meadow with standard barbed wire fence.

Herring Creek Allotment

- Unit division fence and drift fence to exclude livestock from Willow Unit. Exclusion of livestock from the Willow Unit would effectively exclude livestock from a majority of known or potential Yosemite toad and Sierra Nevada yellow-legged frog habitat in the Herring Creek Allotment.
- Exclosure fence at Wire Corral to exclude livestock from Yosemite toad habitat in the Pinecrest Peak unit.
- Barrier at small unnamed meadow above Leland Restoration Site to reduce trailing in habitat for Yuba Pass Willowherb (*Epilobium howelii*), a sensitive plant.

Permitted Livestock Numbers

Permitted livestock numbers for the Bell Meadow, Eagle Meadow, and Herring Creek Allotments would be adjusted to reflect exclusion of areas with sensitive or at-risk resources (Table 2.02-3). Livestock numbers would be reduced by 20% in the Bell Meadow and Eagle Meadow Allotments. Livestock numbers would be reduced by 50% in the Herring Creek Allotment. Permitted livestock numbers will not be exceeded unless an adjustment in season occurs and overall AUMs are not exceeded. Up to 5 head of horses (18 AUMs) would also be authorized on each Allotment to be used for Allotment administration.

Table 2.02-3 Alternative 4 (Resource Protection): Permitted Livestock Numbers

Allotment	Season of Use	Permitted Numbers	AUMs
Bell Meadow	July 1 – September 15	64 cow/calf	214
Eagle Meadow	July 1 – September 30	120 cow/calf	478
Herring Creek	July 1 – September 30	78 cow/calf	310

Season of Use

The permitted season of use would be from July 1 to September 15 on the Bell Meadow Allotment and from July 1 to September 30 on the Eagle Meadow and Herring Creek Allotments. The season of use may be administratively adjusted by allowing livestock to enter the Allotments as much as two weeks early and/or remain on the Allotment as much as two weeks past the permitted date, as long as the standards and guidelines are not exceeded. An extended season of use would only be authorized if it has been determined through field inspections that soil, water, vegetative and other resource conditions are suitable.

Utilization Standards

Utilization (forage use) standards described in the Forest Plan and as amended in the Sierra Nevada Forest Plan Amendment would be employed to maintain or improve rangeland vegetation, watershed connectivity and long-term soil productivity. Utilization standards for all action alternatives would be the same as those described for the Proposed Action.

Management (Grazing System)

Livestock grazing would continue to be authorized on the Bell Meadow, Eagle Meadow and Herring Creek Allotments using the project design criteria. The implementation of deferred grazing systems on each Allotment and use of adaptive management to respond to changes, should allow the Forest Service and the permittee the most flexibility in continuing to move towards desired conditions. Livestock management may have adjustments each year in terms of timing and actual livestock numbers. The overall objectives should be met by staying within the sideboards outlined in authorization parameters.

The following information describes how the units would be divided and how livestock grazing would typically be managed on the Allotments each year. Annual Operating Instructions (AOI) would

reflect the planned management for each year including authorized livestock numbers, season of use and allowable use standards based on the grazing authorization and Allotment Management Plan.

Bell Meadow

Bell Meadow Allotment would be divided into units to implement a deferred grazing system. The Allotment would be divided into three units that would be used to improve distribution of forage utilization while livestock are moved through the Allotment. The units will be referred to as the Round unit (Western unit), Crab unit (Northeastern unit), and Mud unit (Southeastern). Initially, a deferred grazing system will be achieved through intensive herding and dispersal, although additional fencing or other infrastructure may be needed in future if herding is unsuccessful after three years. The cattle would be trucked to and unloaded at a corral near Kerrick Horse Camp on July 1, depending on range readiness. The herd would spend a day or two in the Round unit, where they will rest and "mother-up" before being pushed into the other units. From there the cattle will be driven to the Mud unit and the Crab unit. Cattle will stay in the Mud and Crab units for about 6 weeks or until forage utilization approaches allowable use standards. Around mid-August, the cattle will be allowed to drift back into the Round unit. Livestock will remain in the Round unit for about 2 weeks, when they will be gathered into the Bell Meadow gathering pasture. On September 15, livestock are gathered and moved in small groups back to the corral near Kerrick Horse Camp and trucked off the Allotment.

Eagle Meadow

Eagle Meadow Allotment would use a deferred rotation grazing system with the option of using some of the units under a rest-rotation system. The cattle would enter the Allotment around July 1 at the Niagara unit, depending on range readiness. From the Niagara unit, cattle would be distributed through the Lower Eagle unit and remain there until allowable utilization standards are being approached and there is reduced risk of Larkspur poisoning in the other units. Cattle are then moved into the Sardine or Long Valley unit depending on the operating plan for the year. The Haypress unit is used in conjunction with the Sardine unit to improve livestock distribution on the east side of the Allotment. At the end of the season the cattle are gathered into the Eagle Meadow Unit (gathering pasture) for up to two weeks and then trucked off the Allotment.

Herring Creek

Under Alternative 4, the Herring Creek Allotment would be divided into 4 units by splitting the Willow unit into two units; the new western unit would be referred to as the Pinecrest Peak unit. A deferred grazing system would be achieved through intensive herding and dispersal, but may require additional fencing or other infrastructure if herding is unsuccessful after three years. Livestock would enter the Allotment at Burt Reed meadow on or about July 1, depending on range readiness, and from there are dispersed evenly throughout the Bull Run unit. Livestock would be moved to the Hammill Canyon and Pinecrest Peak units when allowable use in the Bull Run unit is approached. To reduce grazing pressure on the meadows in Hammill Canyon the permittee is encouraged to herd cattle toward the permanent uphill watering troughs and supplement in approved locations with a salt or protein block to hold and increase distribution of cattle in the upland vegetation until allowable use is reached. At the end of the season cattle will be gathered and shipped off the Allotment.

MITIGATION AND OTHER REQUIREMENTS

Mitigation proposed for Alternative 4 (Resource Protection) includes Standards and Guidelines, Resource Conservation Measures, and an Adaptive Management Strategy. These are described in Chapter 2.03, Mitigation and Other Requirements.

2.03 MITIGATION AND OTHER REQUIREMENTS

Based on their site specific review of the anticipated environmental effects of each alternative, resource specialists identified mitigation measures and other requirements to reduce some of the potential impacts caused by implementation of the alternatives.

MITIGATION MEASURES

Mitigation measures can be separated into three components: Standards and Guidelines; Resource Conservation Measures; and, Adaptive Management Strategy. Standards and guidelines would apply to all action alternatives (Alternatives 1, 3, and 4), while Resource Conservation Measures and Adaptive Management Strategy would apply only to Alternative 1 (Proposed Action) and Alternative 4 (Resource Protection).

Standards and Guidelines

The Forest Service developed the following standards to be used as part of all of the action alternatives. This direction was developed with the goal of achieving desired conditions, and is applied through the following standards applicable to grazing management within the project area:

- To protect hardwood regeneration in grazing Allotments, allow livestock browse on no more than 20% of annual growth of hardwood seedlings and advanced regeneration. Modify grazing plans if hardwood regeneration and recruitment needs are not being met (USDA 2010, p. 51).
- Prevent disturbance to streambanks and natural lake and pond shorelines caused by resource activities (for example, livestock, off-highway vehicles, and dispersed recreation) from exceeding 20% of stream reach or 20% of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots (USDA 2010, p. 193).
- Assess the hydrologic function of meadow habitats and other special aquatic features during range management analysis. Ensure that characteristics of special features are, at a minimum, at Proper Functioning Condition, as defined in the appropriate Technical Reports (or their successor publications): (1) “Process for Assessing PFC” TR 1737-9 (1993), “PFC for Lotic Areas” USDI TR 1737-15 (1998) or (2) “PFC for Lentic Riparian-Wetland Areas” USDI TR 1737-11 (1994) (USDA 2010, p. 195).
- Under season-long grazing, for meadows in early seral status: limit livestock utilization of grass and grass-like plants to 30% (or minimum 6-inch stubble height). For meadows in late-seral status: limit livestock utilization of grass and grass-like plants to a maximum of 40% (or minimum 4-inch stubble height). Under intensive grazing systems (such as rest-rotation and deferred rotation) where meadows are receiving a period of rest, utilization levels can be higher than the levels described above if the meadow is maintained in late seral status and meadow associated species are not being impacted. Degraded meadows (such as those in early seral status with greater than 10% of the meadow area in bare soil and active erosion) require total rest from grazing until they have recovered and have moved to mid or late seral status (USDA 2010, p. 195).
- Limit browsing to no more than 20% of the annual leader growth of mature riparian shrubs and no more than 20% of individual seedlings. Remove livestock from any area of an Allotment when browsing indicates a change in livestock preference from grazing herbaceous vegetation to browsing woody riparian vegetation (USDA 2010, p. 195).
- Implement the following Pacific Southwest Region BMPs and National BMPs applicable to grazing:
    - Regional BMP 8-1, National BMP Range-1: Rangeland Management Planning. Use the Allotment management planning process to develop measures to avoid, minimize, mitigate and/or restore adverse impacts to water and aquatic and riparian resources during rangeland management activities.

- Regional BMP 8-2, National BMP Range-2: Rangeland Permit Administration. Manage rangeland vegetation and grazing to protect water and aquatic and riparian resources through administration and monitoring of grazing permits and annual operating instructions.
- Regional BMP 8-3, National BMP Range-3: Rangeland Improvements. Implement range improvements to protect, maintain or improve water and aquatic and riparian resources and associated beneficial uses.

▪ Exclude livestock from standing water and saturated soils in wet meadows and associated streams and springs occupied by Yosemite toads or identified as "essential habitat" in the conservation assessment for the Yosemite toad during the breeding and rearing season (through metamorphosis). Wet meadow habitat for Yosemite toad is defined as relatively open meadows with low to moderate amounts of woody vegetation that have standing water on June 1 or for more than 2 weeks following snow melt. Specific breeding and rearing season dates will be determined locally. If physical exclusion of livestock is impractical, then exclude grazing from the entire meadow. Exclusions in this standard and guideline may be waived if an interdisciplinary team has developed a site-specific management plan to minimize impacts to Yosemite toad and its habitat by managing the movement of stock around wet areas. Such plans are to include a requirement for systematically monitoring a sample of occupied Yosemite toad sites within the meadow to: (1) assess habitat conditions and (2) assess Yosemite toad occupancy and population dynamics. Every 3 years from the date of the plan, evaluate monitoring data. Modify or suspend grazing if Yosemite toad conservation is not being accomplished. Plans must be approved by the authorized officer and incorporated into all Allotment plans and/or special use permits governing use within the occupied habitat (USDA 2010, p. 42).
▪ Complete one survey cycle in suitable habitat for the Yosemite toad within this species' historic range to determine presence of Yosemite toads (USDA 2010, p. 42).
▪ In meadow areas of great gray owl Protected Activity Centers (PAC), maintain herbaceous vegetation at a height commensurate with site capability and habitat needs of prey species (USDA 2010, p. 187).
▪ Encourage use of certified weed free hay and straw. Cooperate with other agencies and the public in developing a certification program for weed free hay and straw. Phase in the program as certified weed free hay and straw becomes available. This standard and guideline applies to pack and saddle stock used by the public, livestock permittees, outfitter guide permittees, and local, State, and Federal agencies (USDA 2010, p. 52).
▪ Locate new facilities for gathering livestock and pack stock outside of meadows and riparian conservation areas. During project-level planning, evaluate and consider relocating existing livestock facilities outside of meadows and riparian areas. Prior to re-issuing grazing permits, assess the compatibility of livestock management facilities located in riparian conservation areas with riparian conservation objectives (USDA 2010, p. 195).
▪ In meadows with occupied willow flycatcher sites, allow only late-season grazing (after August 15) in the entire meadow. This standard and guideline may be waived if an interdisciplinary team has developed a site-specific meadow management strategy. This strategy is to be developed and implemented in partnership with the affected grazing permittee. The strategy objectives must focus on protecting the nest site and associated habitat during the breeding season and the long-term sustainability of suitable habitat at breeding sites. It may use a mix of management tools, including grazing systems, structural improvements, and other exclusion by management techniques to protect willow flycatcher habitat (USDA 2010, p. 41).
▪ In willow flycatcher sites receiving late-season grazing, monitor utilization annually using regional range analysis and planning guide. Monitor willow flycatcher habitat every 3 years using the following criteria: rooting depth cores for meadow condition, point intercepts for shrub foliar density, and strip transects for shrub recruitment and cover. Meadow condition assessments will be included in a GIS meadow coverage. If habitat conditions are not supporting the willow flycatcher or trend downward, modify or suspend grazing (USDA 2010, p. 41).

- Ensure project consistency with the ESA and compliance with applicable Biological Opinions issued for listed species in the project area.

Resource Conservation Measures

Special Aquatic Features

Protect identified special aquatic features (springs, seeps, and fens). Proper Functioning Condition (PFC) methodology (USDI 2003, USDI 1998) will be used to evaluate the condition of all identified special aquatic features. Addition areas will be surveyed for special aquatic features and PFC methodology will be used to establish baseline conditions of special aquatic features prior to livestock being allowed in those areas. Livestock grazing will be managed at special aquatic features as follows:

- If rating is PFC, continue grazing at the level specified in the permit.
- If rating is Functional-at-Risk with an upward trend or with no apparent trend, continue grazing and monitor the condition of the special aquatic feature every 3 to 5 years. If the special aquatic feature has not reached PFC within 5 years and grazing is having a negative effect, exclude grazing as described below.
- If rating is Functional-at-Risk with a downward trend or Non-Functional, exclude the site (including its full natural potential size) from grazing within one year of evaluation and maintain the exclusion at least until the site naturally recovers or is restored to PFC. Monitor grazed special aquatic features in the vicinity of excluded ones to determine if there is an increase in use that requires re-evaluation of management at the grazed locations.

Hardwood Regeneration

Identified aspen stands will be monitored at defined intervals using specified aspen browse protocol(s). Livestock grazing will be managed at each identified aspen stand as follows:

- If stand is healthy and regeneration is occurring, continue grazing as specified in the permit.
- If regeneration is not occurring and livestock activity is not contributing to the condition, continue grazing as specified in AMP.
- If regeneration is not occurring and it is determined that recruitment is significantly suppressed by livestock browse, exclude the stand (including its full natural potential size) from grazing within one year of evaluation and maintain the exclusion at least until aspen saplings have reached a height sufficient to prevent livestock browse of terminal leader growth. Monitor grazed aspen stands in the vicinity of excluded ones to determine if there is an increase in use that requires re-evaluation of management at the grazed stand(s).
- Where exclusion of aspen stand(s) is determined to be necessary, fencing of aspen stands would be accomplished using temporary electric fencing. Temporary exclosures would be removed when aspen regeneration is above browse height. The effects of temporary fencing around aspen stands were considered as part of Alternatives 1 and 4 during project analysis. Placement of temporary fencing shall occur in a timely manner, may vary from year to year, and will not require additional analysis or clearances.

Meadow Hydrologic Function

- Identified headcuts, knick points and/or small gullies in hydrologically functional meadows will be monitored by a qualified hydrologist to ensure that meadow hydrologic function is not compromised as a result of grazing. If a headcut, knick point or gully is stable and no excessive erosion is occurring, continue monitoring.
- If a headcut, knick point or gully is unstable, excessive aggradation or degradation is occurring, and/or meadow hydrologic function is in danger of becoming impaired, and livestock utilization or trampling is contributing to the condition, reduce or exclude livestock disturbance through herding or fencing as necessary.

- Restoration projects are needed in most of the meadows where hydrologic function is not at desired condition in order to raise the water table and restore hydrologic function. Monitoring will be conducted to ensure that conditions do not worsen as a result of livestock grazing prior to implementation of restoration projects. Monitoring will focus on bank stability, herbaceous vegetation, or deep rooted vegetation, depending on what is most appropriate for that particular site. If monitoring indicates that livestock utilization or trampling is worsening the condition of the meadow, reduce or exclude livestock disturbance through herding or fencing as necessary.

Sensitive Plant Protection

- Protect known occurrences of sensitive and watchlist plants from cattle traffic as needed, by falling a tree or some other measure to shift the cattle trail(s) to another location.
- Survey McCormick Pocket area for sensitive plants prior to allowing grazing in the area.
- If any sensitive plants are found in these Allotments at some time in the future, they will be protected as much as is reasonably possible through adaptive options. Sensitive plants will be monitored to ensure that protection measures are adequate.

Adaptive Management Strategy

Adaptive management refers to the concept of allowing decisions, which are focused on desired outcomes, to be made with the best information available and to be adjusted during implementation to achieve desired conditions. This management strategy is most appropriate to dynamic situations, providing flexibility where changing conditions are the norm. Flexibility is essential because 1) all inventory and assessments are imperfect and subject to improvement with expanded knowledge or measured attention when and if warranted and; 2) unpredictable management situations are caused by weather fluctuations (i.e. drought), livestock behavior, or acts of nature such as wildfires. Having flexibility in the management strategy recognizes opportunities to improve resources, resource management, and grazing management through adaptation to improved knowledge, techniques, and changing conditions. An approach that both acknowledges and accommodates adaptation and flexibility will optimize the speed of progression toward Desired Conditions.

Monitoring is a component of any adaptive management strategy, providing means to assess whether management actions are effective in meeting goals and objectives. Development of monitoring plans is included as part of the adaptive management strategy of the Proposed Action, this process is outlined in the section titled “Monitoring Plan”, below. If monitoring indicates that desired conditions are not being achieved in a timely manner, management would be modified. Potential adaptive management actions would be constrained by Forest Plan direction, NEPA decisions, regulations, policy and grazing permit terms and conditions. These are described in the section titled “Potential Adaptive Management Actions”, below.

Monitoring Plan

As a step toward implementing the Proposed Action a monitoring plan will be developed for the project area and made a part of the respective Allotment Management Plans. The monitoring plan would provide targets and objectives for short- and long-term monitoring that will be needed to determine if resources are moving toward desired conditions. Annual monitoring implementation will be specified every year in the Annual Operating Instructions and will reflect current monitoring priorities and realistic targets. Monitoring may include a combination of the following resources: annual utilization, ecological status of meadow vegetation, fen disturbance (% bare peat), proper functioning condition (PFC), meadow hydrologic function, streambank disturbance, BMP effectiveness evaluation, aspen browse, water quality, stability of hydrologic features (headcuts, knick points, incisions), sensitive and watchlist plants and/or monitoring for threatened and endangered wildlife species. Additional monitoring may be done if necessary to provide information that will be used to determine if management is moving resources toward desired conditions. Review of monitoring methodologies and results will be done using the best available science. If monitoring

indicates that desired conditions are not being achieved in a timely manner, management would be modified in cooperation with the permittee. The following section describes possible changes to management using an Adaptive Management Strategy.

Potential Adaptive Management Actions

The Proposed Action implements an Adaptive Management Strategy to achieve defined desired conditions through design criteria, monitoring and constrained flexibility. By monitoring effects and evaluating results, managers can assess resource trends and modify management practices by adjusting the AMP or AOI. Potential Adaptive Management Actions are grazing management actions that can be used to achieve the goals and objectives of the Forest Plan. For example, depending on the results of site-specific monitoring and any required additional site-specific NEPA analysis[3], potential adaptive management actions may include items such as:

- Adjust stocking rate to light, moderate or heavy grazing intensity.
- Implement alternative riparian grazing dates based upon specific conditions (topography, range rider, upland water sources, and livestock use patterns).
- Use salt or supplement to draw livestock toward or away from specific areas.
- Change season of use, animal numbers; do not exceed permitted AUMs.
- Rest from livestock grazing for one or more seasons.
- Construct fence to exclude livestock from areas of concern (riparian, streams, springs, wetlands, mesic meadows, etc.).
- Reconstruct fence to ensure effective exclusion of livestock from exclusion areas.
- Control livestock distribution patterns by constructing cross fences (electric, standard, permanent or temporary).
- Manage livestock trailing locations using barriers to deter cattle traffic (logs and other natural barriers).
- Construct livestock water development (pipeline, tanks, well, submersible pumps, solar).
- Implement restoration practices, where appropriate, if current grazing is causing or contributing to observed degradation (excessive compaction, lowered water tables, or active down cutting).
- Treat invasive plant infestations by pulling, digging, solarization (covering with a tarp), flaming, and other mechanical means.
- Additional fencing may be needed if the proposed grazing system (rotation and distribution) cannot be achieved after three years of intensive herding alone.

OTHER REQUIREMENTS

Surveys and Monitoring

- Prior to the construction of corrals and/or handling facilities, historic and prehistoric sites will be “flagged and avoided” for protection per the Regional PA (project record).
- Once need and location of additional fencing has been determined, the placement will be reviewed by the District Archaeologist prior to implementation.
- Assess proper functioning condition of special aquatic features in the addition areas prior to allowing livestock to use those areas.
- Addition areas will be surveyed for special aquatic features and PFC methodology will be used to establish baseline conditions of special aquatic features prior to livestock being allowed in those areas.
- Monitor the condition of special aquatic features that are rated as Functional At-Risk every 3 to 5 years to determine trend.
- Monitor forage utilization and meadow condition in key meadows in addition areas. If resource concerns are identified, use adaptive management options to make adjustments.

[3] Additional NEPA may be required for adaptive management fencing not analyzed in the EIS.

Invasive Plants

- Encourage permittees to clean vehicles that bring cattle and horses onto the allotment and to minimize vegetative matter that comes along with the animals.

Permit Administration

If an alternative is selected that authorizes continued grazing on the Bell Meadow, Eagle Meadow, and Herring Creek Allotments, a Term Grazing Permit will be issued to authorize the use of National Forest System lands for commercial livestock production purposes. These Term Grazing Permits will be issued and administered according to the following directives:

- Forest Service Manual 2200, Chapter 2230 – Grazing and Livestock Use Permit System (USDA 2005)
- Forest Service Handbook 2209.13 – Grazing Permit Administration Handbook (USDA 2009)
- 36 CFR, Part 222, Subpart A – Grazing and Livestock Use on the National Forest System (USDA 2007)

2.04 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

NEPA requires that federal agencies rigorously explore and objectively evaluate all reasonable alternatives and briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments suggested the alternatives briefly described below along with a brief response discussing the reasons for eliminating them from detailed study. EIS Chapter 2.04 provides a detailed description these alternatives considered but eliminated from detailed study along with the reasons why each was eliminated.

a. Water Quality Emphasis

This alternative would minimize livestock grazing along small tributary streams, limit the duration of livestock presence in wet meadows and meadows with streams, exclude livestock from fens and important wetland features, and exclude or limit livestock grazing along stream reaches where substantial recreation activities occur. However, it was eliminated from detailed study for the following reasons:

- This alternative would curtail livestock grazing on all three grazing allotments, and would significantly diminish the economic viability of all three allotments by reducing livestock numbers while dramatically increasing management workload and expense (herding and fencing).
- It is similar to Alternative 2 (No Action) which would eliminate grazing on these allotments and stop all livestock impacts to water quality in the project area. However, even if all cattle were removed from the project area, there would still be contamination sources associated with timber, mining, wildlife, mineral deposits, and recreational use. Even if all cattle were removed from the Forest, the direct consumption of untreated surface waters is never a safe or recommended practice.
- It is similar to Alternative 4 (Resource Protection) which addresses concerns about livestock-related impacts to water quality by reducing the number of livestock on each allotment. Alternative 4 reduces livestock by 20% on the Bell Meadow and Eagle Meadow allotments and by 50% on the Herring Creek allotment. Reduction of livestock numbers would abate impacts to water quality in the project area.
- All action alternatives would implement standards and guidelines and best management practices (BMPs) to minimize livestock impacts to water quality. In addition, all action alternatives would update AMPs to prescribe a grazing system where cattle are dispersed around the allotments to minimize concentration of waste products in surface waters and all

would use adaptive management actions where necessary to control non-point source pollution associated with livestock grazing activities on a site-specific level.

b. Habitat and Species Protection

This alternative would provide habitat and species protection by eliminating grazing in all Yosemite toad habitats, and eliminating all herding through Yosemite toad occurrences. However, it was eliminated from detailed study for the following reasons:

- Excluding livestock from Yosemite toad habitat without reducing livestock numbers would concentrate impacts on areas not excluded.
- It is similar to Alternative 4 (Resource Protection), which addresses concerns about livestock-related impacts to sensitive species habitat by excluding grazing from all Yosemite toad habitat, but also reduces livestock numbers by amounts proportionate to the reduction in grazing area on each allotment.
- It is similar to Alternative 2 (No Action) which would eliminate grazing on these allotments and stop all livestock impacts to Yosemite toad in the project area. However, even if all cattle were removed from the project area, there would still be potential for impacts to Yosemite toad and their habitat associated with other uses of NFS lands.

c. Reduced Grazing

This alternative would reduce the amount of acreage within the Bell Meadow, Eagle Meadow, and Herring Creek allotments to: reduce conflicts with recreation; reduce costs and time demands on Forest Service range management personnel; reduce the amount of fencing needed for allotment management; and, reduce the number of cattle to the degree necessary to reduce negative impacts caused by livestock. However, it was eliminated from detailed study for the following reasons:

- This alternative would curtail livestock grazing on all three grazing allotments, and would significantly diminish the economic viability of all three allotments by reducing livestock numbers while dramatically increasing management workload and expense (herding and fencing).
- It is similar to Alternative 2 (No Action), which would eliminate grazing on these allotments.
- It is similar to Alternative 4 (Resource Protection), which reduces livestock by 20% on the Bell Meadow and Eagle Meadow allotments and by 50% on the Herring Creek allotment.
- If, during implementation of the selected alternative, it is determined that livestock numbers or permitted grazing area are not compatible with the Forest Plan or resource objectives, adaptive management actions could be used to address specific resource concerns associated with livestock grazing activities on a site-specific level. Livestock numbers may be reduced as necessary through regular permit administration.

2.05 COMPARISON OF THE ALTERNATIVES

Chapter 3 describes the environmental consequences of the alternatives. This section compares the alternatives by summarizing key differences between them and provides a summary of the effects analysis. Table 2.05-1 compares the alternatives by summarizing authorization parameters and mitigation and other requirements. Table 2.05-2 compares the alternatives by summarizing their environmental effects.

Table 2.05-1 Comparison of Alternatives: Parameters and Requirements

Parameter/Requirement	**Alternative 1** (Proposed Action)	**Alternative 2** (No Action)	**Alternative 3** (Current Management)	**Alternative 4** (Resource Protection)
Authorize Continued Grazing	Yes	No	Yes	Yes
Update Allotment Management Plans	Yes	No	Yes	Yes
Adjust Permitted Grazing Area	Additions	No grazing	Minor adjustment	Reduced area
Acres Authorized for Grazing	56,500	0	48,200	43,500
New Infrastructure Proposed	Yes	No	No	Yes
Estimated Miles of New Fence	9.4	0	0	>4.2
New Corrals	Yes	No	No	Yes
Permitted Livestock Numbers	No change from current numbers	0	No change from current numbers	Reduced livestock numbers
Season of Use	No change	None	No change	No change
Utilization Standards	Change standards on Eagle Meadow	Not applicable	No change	Change standards on Eagle Meadow
Change Grazing System	Yes	Not applicable	No	Yes
Exclusion of Sensitive Resources	If necessary	Total exclusion	No	Yes
Implement Forest Plan Standards and Guidelines	Yes	Not applicable	Yes	Yes
Resource Conservation Measures	Yes	Not applicable	No	Yes
Adaptive Management Strategy	Yes	Not applicable	No	Yes
Additional Implementation Monitoring/Monitoring Plan	Yes	Not applicable	No	Yes
Adaptive Management Options	Yes	Not applicable	Limited to terms of grazing permit	Yes
Other Requirements	Yes	Not applicable	Yes	Yes

Table 2.05-2 Comparison of Alternatives: Summary of Effects

Resource		**Alternative 1** (Proposed Action)	**Alternative 2** (No Action)	**Alternative 3** (Current Management)	**Alternative 4** (Resource Protection)
Aquatic Species	Yosemite toad	Grazing of breeding habitat deferred until post-metamorphosis.	No grazing. No grazing-related impacts to Yosemite toad.	Grazing of breeding habitat deferred until post-metamorphosis.	Proposed fencing to exclude livestock from all known Yosemite toad habitat.
	Sierra Nevada yellow-legged frog	Implements Forest Plan standard and guidelines for 20% annual disturbance along streambanks and shorelines.	No grazing. No grazing-related impacts to Sierra Nevada yellow-legged frog.	Implements Forest Plan standard and guidelines for 20% annual disturbance along streambanks and shorelines.	Streambank disturbance standard of 10% in Sierra Nevada yellow-legged frog habitat.
Botanical Resources	Stream Channel Habitats	No direct, indirect, or cumulative effects to sensitive plants that occupy stream channel habitats.	No direct, indirect, or cumulative effects as no grazing would occur.	No direct, indirect, or cumulative effects to sensitive plants that occupy stream channel habitats.	No direct, indirect, or cumulative effects to sensitive plants that occupy stream channel habitats.
	Seeps, Stringer Meadows, and Meadow Edges	Sensitive plants in seeps, stringer meadows, and meadow edges could be impacted by cattle trailing and grazing. Sensitive plants in the addition areas, if any, would be vulnerable. Sensitive plant protection measures would be used to protect sensitive plants from grazing impacts.	No direct, indirect, or cumulative effects as no grazing would occur.	Sensitive plants in seeps, stringer meadows, and meadow edges could be impacted by cattle trailing and grazing. Alternative 3 has less potential for effects because no additions are proposed.	Sensitive plants could be impacted by cattle trailing and grazing, but Alternative 4 would involve surveys for sensitive plants and includes protection measures if sensitive plants are found. Sensitive plant protection measures would be used to protect sensitive plants from grazing impacts.
	Fens and Wet Areas Within Meadows	No known occurrences of sensitive plants that occupy this habitat type in the project area. Effects, if any, are assumed to be minor. If found, sensitive plants would be protected.	No direct, indirect, or cumulative effects as no grazing would occur.	No known occurrences of sensitive plants that occupy this habitat type in the project area. No additional surveys or resource conservation measures would occur with this alternative, so it is possible that suitable habitat may decline in quality.	No known occurrences of sensitive plants that occupy this habitat type in the project area. Effects, if any, are assumed to be minor. If found, sensitive plants would be protected. This alternative would have the fewest negative impacts of all the action alternatives.
	Lodgepole Forest	No known occurrences of sensitive plants of this habitat type in the project area. If found, sensitive plants would be protected.	No direct, indirect, or cumulative effects as no grazing would occur.	No known occurrences of sensitive plants that occupy this habitat type in the project area. Effects, if any, are assumed to be minor but would be greater than described for Alternative 1 because no additions are proposed.	No known occurrences of sensitive plants of this habitat type in the project area. If found, sensitive plants would be protected.

Resource		Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Cultural Resources	Cultural Resources	The addition of proposed infrastructure may have effects to cultural resources. Once need and location of infrastructure has been determined the placement will be reviewed by the District Archaeologist prior to implementation. Grazing would continue with no direct effect, minimal indirect effects and no cumulative effects to cultural resources.	No anticipated direct, indirect or cumulative effects to historic or prehistoric properties under this alternative, as no project activities (grazing) would occur.	No effects on cultural resources without ground disturbance from infrastructure. Grazing would continue with no direct effects, minimal indirect effects and no cumulative effects to cultural resources.	The addition of proposed infrastructure may have effects to cultural resources. Once need and location of infrastructure has been determined the placement will be reviewed by the District Archaeologist prior to implementation. Grazing would continue with no direct effect, minimal indirect effects and no cumulative effects to cultural resources.
Invasive Species	Habitat Alteration	There is a moderate risk for habitat alteration associated with this project.	No habitat alteration related to grazing.	There is a moderate risk for habitat alteration associated with this project.	There is a moderate risk for habitat alteration associated with this project.
	Vectors	Since the project represents an ongoing activity, the vectors remain the same. There is a moderate to high risk of increased vectors as a result of project implementation.	No risk for increased vectors related to grazing.	Since the project represents an ongoing activity, the vectors remain the same. There is a moderate to high risk of increased vectors as a result of project implementation.	Since the project represents an ongoing activity, the vectors remain the same. There is a moderate to high risk of increased vectors as a result of project implementation.
	Number of Acres Affected	Greatest number of acres potentially affected by grazing.	No acres affected by grazing.	No change in number of acres currently affected by grazing.	Least number of acres potentially affected by grazing.
Range	Meadow Condition	Key areas that are stable or trending toward desired condition would remain the same or continue to improve.	Meadows rated as high would maintain desired condition. Meadows in moderate condition would continue to recover and would likely move towards desired condition. Meadows rated in low condition would improve overtime by natural recovery.	Key areas that are stable or trending toward desired condition would remain the same or continue to improve, but recovery rates would not increase.	Key areas that are stable or trending toward desired condition would remain the same or continue to improve.
Recreation	Impacts to Forest Visitors	Dispersed user and hikers may be affected by grazing. No anticipated negative impacts to users within developed campgrounds and/or recreation residence tracts. Overall visitation is not anticipated to decrease, but visitors may adjust use patterns to avoid evidence of grazing.	No impacts to forest visitors from project activities, as no grazing would occur.	Dispersed user and hikers may be affected by grazing. No anticipated negative impacts to users within developed campgrounds and/or recreation residence tracts. Overall visitation is not anticipated to decrease, but visitors may adjust use patterns to avoid evidence of grazing.	Dispersed user and hikers may be affected by grazing. No anticipated negative impacts to users within developed campgrounds and/or recreation residence tracts. Overall visitation is not anticipated to decrease, but visitors may adjust use patterns to avoid evidence of grazing.

Resource		Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Society, Culture and Economy	Impacts to Permittees	Additional conservation measures and monitoring may force permittees to alter their current grazing practices, but would most likely not affect the amount of grazing.	Discontinued grazing on federal lands in the BEH Allotments would negatively affect permittee operations and possibly ranch viability.	No changes are expected with Alternative 3	Reduced acres available for grazing and reduced permitted livestock numbers could affect individual ranch viability. Increased attention to sensitive resources would result in additional expense to permittee operations.
	Impacts to Local Communities	May result in temporary increase in employment	The economic impacts of this alternative would be greatest for the local economy. This alternative would result in a loss of jobs in the county. The loss of jobs would occur in farm employment, which is already in decline.	Alternative 3 would not greatly affect the local area economically. Additional employment would not likely be generated.	Alternative 4 may result in temporary increase in employment. However, if this alternative dramatically affects ranch viability this would negatively affect the local economy in the long term.
Soils	Soil Organic Matter	Soil OM status similar to Alternative 3 but upward trend more likely for class 2 meadows	Soil OM improves in all rested meadows as herbaceous root biomass increases.	Soil OM likely to remain high in class 3 meadows, fair but stable in class 2 meadows, and poor but stable in class 1 meadows.	Soil OM status similar to Alternative 3 for grazed meadows and similar to Alternative 2 for rested meadows.
	Soil Hydrologic Function	Similar to Alternative 3. Also see Meadow Hydrologic function below.	Passive improvement will occur in rested meadows. The degree and rate of change is uncertain but will be site specific for each meadow and class of meadow. Some meadows will not reach desired condition without active restoration.	The water table and soil moisture conditions will likely continue in good condition for class 3 meadows. Class 2 meadows will stay class 2 (somewhat reduced status but stable). Class 1 meadows in poor condition and with a loss of water table are unlikely to improve relative to the actual meadow soil. Deep rooted species can no longer reach the water table.	Soil hydrologic function similar to Alternative 3 for grazed meadows and similar to Alternative 2 for rested meadows.

Resource		Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Watershed	Meadow Hydrologic Function	The meadows in good or desired condition will continue to maintain their status. The meadows in fair condition will either maintain their condition or slightly improve. The meadows in poor or very poor condition may see minor channel improvements in the long run but will not likely reach desired condition without active restoration.	The no grazing alternative may help streambanks stabilize at a faster rate, may promote herbaceous vegetation recovery along the stream channels, and could help move channel form towards rejuvenation. However, these small improvements in condition may take years to achieve.	The meadows in good or desired condition will maintain their status. The meadows in fair condition will continue to maintain their condition or move toward desired condition unless some unforeseen disturbances or management problems occur. With two notable exceptions (Hammill Canyon Meadow #1 and Upper Willow Meadow), the meadows in poor or very poor condition will see channel improvements in the long run but will not likely reach desired condition without active restoration.	The hydrologic function of grazed meadows would be similar to that seen under Alternative 1. The hydrologic function of excluded meadows would be similar to that seen under Alternative 2.
	Special Aquatic Features	Addition areas should relieve grazing pressure in Eagle Meadow and Herring Creek Allotments, which could assist in maintaining PFC at special aquatic features that are currently at PFC and could help move sites which are FAR towards PFC. On the Bell Meadow Allotment, improvements may be seen in the Round subunit but no change is anticipated in the other units. Resource conservation measures would exclude sites with downward trend or that become non-functional.	No grazing-related impacts to special aquatic features. For at-risk special aquatic features, Alternative 2 would likely result in an upward trend. Sites already at PFC would likely maintain that condition.	With few exceptions, sites which are Functional At-Risk are in this condition due to the effects of current grazing practices. Sites that are currently at PFC would likely maintain this condition under current management. Forest Plan Standards and Guidelines would exclude or otherwise modify sites with downward trend or that become non-functional.	The reduction in grazing pressure as a result of decreasing numbers is anticipated to help maintain PFC at sites which are currently at PFC and could help move Functional at-risk sites towards PFC. Resource conservation measures would exclude sites with downward trend or that become non-functional.

Resource		Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Watershed	Water Quality	Sediment deposition and accumulation in meadow streams, indicator bacteria and pathogen concentrations, and nutrient concentrations are expected to be less than under current management. No change in water temperature or taste and odor are anticipated. Beneficial uses of water should be maintained.	No livestock caused impacts to water quality. Water quality may still be impacted by other activities in the project area.	Sediment deposition and accumulation in meadow streams is expected to remain low. Indicator bacteria and pathogen concentrations should remain below the recommended maximum concentration. Overall, nutrient concentrations are expected to be well below EPA levels of concern. No change in water temperature or taste and odor are anticipated. Beneficial uses of water should be maintained.	Sediment deposition and accumulation, indicator bacteria concentrations, and nutrient concentrations are expected to be less than under current management. Ungrazed (excluded) areas would likely have lower concentrations of sediment, bacteria and pathogens, and nutrients. Beneficial uses of water should be maintained.
Wilderness	Wilderness Character	Alternative 1 is likely to have negative effects on the natural and outstanding opportunities for solitude qualities of wilderness character. The untrammeled and undeveloped qualities will probably not be further impacted.	Alternative 2 would improve the undeveloped, natural, and outstanding opportunities elements of wilderness character.	Alternative 3 is likely to have negative effects on the natural and outstanding opportunities for solitude qualities of wilderness character. The untrammeled and undeveloped qualities will probably not be further impacted.	Emphasizing resource protection through the reduction of the number of cows on the Allotments would improve the natural and outstanding opportunities for solitude qualities of wilderness character.
Wildlife	Great Gray Owl	1116 acres of potentially suitable meadow habitat potentially affected by Alternative 1.	No livestock-related effects to potentially suitable meadow habitat, as no grazing would occur.	1116 acres of potentially suitable meadow habitat potentially affected by Alternative 3.	893 acres of potentially suitable meadow habitat potentially affected by Alternative 4. Reduced livestock numbers would likely improve habitat for prey species.
	Sierra Nevada Red Fox	Alternative 1 has the greatest potential for Sierra Nevada Red Fox prey habitat changes.	No livestock-related effects to Sierra Nevada Red Fox prey habitat, as no grazing would occur.	The amount of suitable habitat potentially affected by Alternative 3 is less than Alternative 1 but more than Alternative 4.	Under Alternative 4, the least amount of suitable Sierra Nevada Red Fox habitat is potentially affected by grazing.
	Willow Flycatcher	Habitat objectives are being met for this species. This alternative complies with SNFPA and conservation assessment standards, so habitat should remain suitable.	No livestock-related effects to Willow Flycatcher habitat, as no grazing would occur.	Habitat objectives are being met for this species. This alternative complies with SNFPA and conservation assessment standards, so habitat should remain suitable.	Habitat objectives are being met for this species. This alternative complies with SNFPA and conservation assessment standards, so habitat should remain suitable.

3. Affected Environment and Environmental Consequences

3.01 INTRODUCTION

This chapter summarizes the physical, biological, social, and economic environments that are affected by the proposed action and alternatives and the effects on that environment that would result from implementation of any of the alternatives. This chapter also presents the scientific and analytical basis for comparison of the alternatives presented in Chapter 2.

The "Affected Environment" section under each resource topic describes the existing condition against which environmental effects were evaluated and from which progress toward the desired condition can be measured. Environmental consequences form the scientific and analytical basis for comparison of alternatives, including the proposed action, through compliance with standards set forth in the Stanislaus National Forest Land and Resource Management Plan, as amended (Forest Plan). The environmental consequences discussion centers on direct, indirect and cumulative effects, along with applicable mitigation measures. Effects can be neutral, beneficial or adverse. The "Irreversible and Irretrievable Commitments of Resources" section is located at the end of this chapter. These terms are defined as follows:

- Direct effects are caused by the action and occur at the same place and time as the action.
- Indirect effects are caused by the action and are later in time, or further removed in distance, but are still reasonably foreseeable.
- Cumulative effects are those that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

Analysis Process

The environmental consequences presented in Chapter 3 address the impacts of the actions proposed under each alternative. This effects analysis was done at the forest scale (the scale of the proposed action as discussed in Chapter 1). However, the effects findings in this chapter are based on site-specific analyses of each alternative.

Each resource specialist assessed every alternative at a level sufficient to support their effects analysis and identify any necessary site-specific mitigation. The project record contains additional details about analysis methodology, data, and assumptions and limitations of effects analyses.

Resource Reports

Most resource sections in this chapter provide a summary of the project-specific reports, assessments, and other documents prepared by Forest Service specialists. These reports are part of the project record on file at the Forest Supervisor's Office in Sonora, California and they are available by request. The following reports, assessments and other documents are incorporated by reference:

Aquatics: Biological Evaluation – Aquatics (Aquatics BE); Biological Assessment – Aquatics (Aquatics BA); Management Indicator Species (MIS) Report (MIS Report)

Botany: Botany Report for Watchlist and other Rare Plants, Fens, Noxious Weeds, Invasive Plants and Other Botanical Resources (Botany Report); Biological Evaluation for Sensitive Plants (Sensitive Plants BE)

Cultural: Heritage Resource Report (Heritage Report); Cultural Resource Management Report (05-16-3266)

Range: Rangeland Specialist Report (Range Report)

Recreation: Recreation Report

Special Areas: Special Areas Report

Social: Social and Economic Report (Economic Report)

Soil: Soil Management Report (Soil Report)

Wilderness: Wilderness Specialist Report (Wilderness Report)

Water: Watershed Management Report (Watershed Report)

Wildlife: Biological Evaluation - Terrestrial Wildlife (Wildlife BE); Management Indicator Species Report (MIS Report)

Cumulative Effects

According to the Council on Environmental Quality (CEQ) NEPA regulations, "cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR 1508.7).

The cumulative effects analysis area is described under each resource, but in most cases includes the entire Stanislaus National Forest including private and other public lands that lie within the Forest boundary. Past activities are considered part of the existing condition and are discussed in the "Affected Environment (Existing Conditions)" and "Environmental Consequences" section under each resource.

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. Existing conditions reflect the aggregate impact of all prior human actions and natural events that affected the environment and might contribute to cumulative effects. This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis for three reasons.

First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Innumerable actions over the last century (and beyond) impacted current conditions and trying to isolate the individual actions with residual impacts would be nearly impossible.

Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because information on the environmental impacts of individual past actions is limited, and one cannot reasonably identify each and every action over the last century that contributed to current conditions. Additionally, focusing on the impacts of past human actions risks ignoring the important residual effects of past natural events which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects.

Finally, the Council on Environmental Quality (CEQ) issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions" (CEQ 2005).

The cumulative effects analysis in this EIS is also consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (73 Federal Register 143, July 24, 2008; p. 43084-43099), which state, in part:

> "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives will add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonable foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision making. (40 CFR 1508.7)"

For these reasons, the analysis of past actions in this section is based on current environmental conditions. Appendix B (Cumulative Effects Analysis) lists present and reasonably foreseeable future actions potentially contributing to cumulative effects.

Affected Environment Overview

All resources share many aspects of the affected environment. In order to avoid repeating these shared elements of the affected environment in each resource section, the following general elements of the affected environment are provided.

The project area is located near the crest of the Central Sierra Nevada in Tuolumne County, on lands administered by the Summit Ranger District. There are seven grazing Allotments either wholly or partially within the District, six of which are active Allotments. The project area consists of lands within three active grazing Allotments, as well as three areas proposed for addition to Allotments. The Bell Meadow-Bear Lake, Herring Creek, and Long Valley-Eagle Meadow Allotments currently encompass about 51,200 acres, of which about 50,300 acres is NFS lands. These Allotments are located within Township 4 to 7 North and Range 18 to 21 East. Elevation varies from 6,600 to over 9,000 feet. Annual precipitation is 40 to 65 inches, most of which occurs as snowfall in winter. The analysis area lies within portions of the Clavey River, South Fork Stanislaus River, Lower Middle Fork Stanislaus River and Upper Middle Fork Stanislaus River watersheds.

The project area contains a mosaic of vegetation distributed and controlled primarily by climate and soils. Ecosystems are primarily mixed-conifer forest interspersed with montane meadows and riparian corridors. Vegetation cover in the project area is about 75% forested: primarily mixed conifer, but with areas of Jeffrey pine, lodgepole pine, red fir, and western hemlock. The remaining 25% consists of forest openings (i.e. meadows, open ridge, rock outcroppings, and slope areas). Forested stands are generally denser and exhibit overstocking and decreased growth rates than occurred historically. Meadow-riparian vegetation occurs in riparian areas with relatively deep fertile soils and are dominated by a mix of native and non-native herbaceous vegetation. The main forage areas used by permitted livestock are located primarily in meadows and riparian areas, but also include forested areas with an understory forage component, all of which occur as patches within the forest mosaic.

Land Allocations and Management Areas within the project area include: Proposed Wild and Scenic Rivers, Critical Aquatic Refuge (CAR) Riparian Conservation Areas (RCAs), Near Natural, Research Natural Area (RNA), Scenic Corridor, Wilderness, Pinecrest Basin, Great Grey Owl Protected Activity Centers (PACs), Developed Recreation Sites and a Winter Sports Site.

Livestock grazing in the area began in the 1850s and the industry peaked around the turn of the century. Regulation of livestock grazing began with the establishment of the Stanislaus National Forest in 1905. Initially, activities such as mining, logging, and grazing were more prevalent but have been gradually curtailed over time. Livestock numbers in the project area were historically much higher than present. As late as the 1960s, the same area was occupied by 6 different Allotments that grazed over 400 head of cattle and horses and 3,000 head of sheep. Records indicate that much of the Sierra Nevada was overgrazed until the federal government began asserting control over grazing use in the Sierra in the early 20th century. Since then both the numbers of livestock and the season of use have been dramatically reduced, and the stocking rates brought into balance with forage production. Historic overgrazing has resulted in resource degradation and has lasting effects on the environment, but natural resources generally appear to be recovering as a result of improved management.

Currently, the project area has high recreational use year round. Recreation opportunities include scenic viewing, hiking, backpacking, biking, camping, fishing, horseback riding and downhill and cross country skiing. Other recreation facilities within the project area include: three popular and intensively used trailheads that access the Emigrant Wilderness, Aspen Pack Station, and two developed horse camps.

Information on Other Resource Issues

The alternatives considered in detail do not affect these resource issues or localized effects are disclosed under other resource sections. A brief summary on why they are not further discussed in Chapter 3 is provided based upon input received during scoping.

Air Quality

Actions proposed are in compliance with state air quality regulations and the Forest Plan. Air emissions are generally managed and analyzed spatially by air basins (http://www.arb.ca.gov/knowzone/basin/basin.swf) where topographic features delineate common air quality characteristics. Air quality conditions are highly controlled by short and long term meteorological and climate conditions.

Generally, the number of livestock is not expected to change in any alternatives and in two alternatives would be reduced. No exceedance of federal and state ambient air quality standards is expected to result from any of the alternatives.

Climate Change

The following elements of climate change are known with near certainty (IPCC 2007):

- Human activities are changing the composition of Earth's atmosphere. Increasing levels of greenhouse gases, like carbon dioxide (CO_2) in the atmosphere since pre-industrial times, are well-documented and understood.
- The atmospheric buildup of CO_2 and other greenhouse gases is largely the result of human activities such as the burning of fossil fuels.
- An "unequivocal" warming trend of about 1.0 degrees to 1.7 degrees Fahrenheit occurred from 1906-2005. Warming occurred in both the Northern and Southern Hemispheres and over the oceans.
- The major greenhouse gases emitted by human activities remain in the atmosphere for periods ranging from decades to centuries. It is virtually certain that atmospheric concentrations of greenhouse gases will continue to rise over the next few decades.
- Increasing greenhouse gas concentrations tend to warm the planet.

According to IPCC (2007), however, it is uncertain how much warming will occur, how fast that warming will occur, and how the warming will affect the rest of the climate system including precipitation patterns. Given what is known and what is not known about global climate change, the

following discussion outlines the cumulative effects of this project on greenhouse gas emissions and the effects of climate change on forest resources.

Carbon Dioxide (CO_2), Methane (CH_4) and Nitrous Oxide (N_20) emissions generated by project activities are expected to contribute to the global concentration of greenhouse gases that affect climate change. Projected climate change impacts include air temperature increases, sea level rise, changes in the timing, location, and quantity of precipitation, and increased frequency of extreme weather events such as heat waves, droughts, and floods. The intensity and severity of these effects are expected to vary regionally and even locally, making any discussion of potential site-specific effects of global climate change on forest resources speculative. Land managers have the ability to adjust land management activities (grazing) in the future, should adjustments be needed to respond to climate change.

Because greenhouse gases from project activities mix readily into the global pool of greenhouse gases, it is not currently possible to discern the effects of this project from the effects of all other greenhouse gas sources worldwide, nor is it expected that attempting to do so would provide a practical or meaningful analysis of project effects. Potential regional and local variability in climate change effects add to the uncertainty regarding the actual intensity of this project's effects on global climate change. Further, emissions associated with this project are extremely small in the global atmospheric CO_2 context, making it impossible to measure the incremental cumulative impact on global climate from emissions associated with this project.

In summary, the potential for cumulative effects is considered negligible for all alternatives because none of the alternatives would result in measurable direct and indirect effects on air quality or global climatic patterns. Changes that may result from climate change are difficult to predict on a site specific scale. However, the adaptive management process will allow managers to make adjustments in response to site specific changes are they identified.

Fire

None of the alternatives considered in detail would change the number of human-caused fires or affect emergency access.

Geology

Granite, the most common rock type on the Stanislaus National Forest, is especially evident at the higher elevations. Volcanic rocks once covered much of the Forest, but eroded away in many areas. The alternatives considered in detail do not affect geology.

Private Property

About 900 acres of private property exists within the BEH Rangeland Allotments project area. The alternatives considered do not affect private property because Forest Service authorizes only grazing which occurs on public (NFS) lands.

Analysis Framework

This section provides the statutes, regulations, Forest Plan and other direction that apply to this analysis. NEPA at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders." Each resource section lists the applicable laws, regulations, policies and Executive Orders relevant to that resource. Surveys, analyses and findings required by those laws are addressed in the resource reports in the project record.

National Forest Management Act

This section provides the statutes, regulations, Forest Plan and other direction that apply to this analysis. NEPA at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders." Each resource section lists the applicable laws, regulations, policies and Executive Orders relevant to that resource. Surveys, analyses and findings required by those laws are addressed in the resource reports in the project record.

1995 Rescissions Act

The Rescission Act of 1995 (Public Law 104-19). Section 504(a) requires each National Forest System unit to identify all Allotments for which NEPA analysis is needed. These Allotments must be included in a schedule that sets a due date for the completion of the requisite NEPA analysis. Section 504(a) requires adherence to these established schedules.

Forest Plan Direction

The Forest Service completed the Stanislaus National Forest Land and Resource Management Plan (Forest Plan) on October 28, 1991. The Stanislaus National Forest "Forest Plan Direction" (USDA 2010) presents the current Forest Plan management direction, based on the original Forest Plan, as amended. Appendix C (Forest Plan Direction) lists the Forest Plan Standards and Guidelines (S&Gs) that specifically apply to commercial livestock grazing on NFS lands.

3.02 AQUATIC SPECIES

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

There are several tiers of requirements for wildlife under the Forest Plan (USDA 2010), ranging from broad management goals and strategies to specific standards and guidelines. The most applicable direction is provided below.

- Species viability – Maintain and restore habitat to support viable populations of native and desired non-native plant, invertebrate and vertebrate riparian-dependent species.
- Plant and animal community diversity – Maintain and restore the species composition and structural diversity of plant and animal communities in riparian areas, wetlands, and meadows to provide desired habitats and ecological function.
- Streamflow patterns and sediment regimes – Maintain and restore in-stream flows sufficient to sustain desired conditions of riparian, aquatic, wetland, and meadow habitats and keep sediment regimes as close as possible to those with which aquatic and riparian biota evolved.
- Stream banks and shorelines – Maintain and restore the physical structure and condition of stream banks and shorelines to minimize erosion and sustain desired habitat diversity.
- Provide habitat for diverse and viable populations of all native and desired non-native wildlife and fish. Maintain and improve habitat for federally listed Threatened and endangered species and give special attention to sensitive species to see that they do not become Threatened or Endangered.
- Exclude livestock from standing water and saturated soil in wet meadows and associated streams and springs occupied by Yosemite toads or identified as “essential habitat” during the breeding and rearing season (through metamorphosis). If physical exclusion of livestock is impractical, then exclude grazing from the entire meadow.
- Complete one survey cycle in suitable habitat for the Yosemite toad within this species’ historic range to determine presence of Yosemite toads.
- Provide medium to high quality habitat for resident trout species.
- Maintain high water quality values in accordance with the Standards and Guidelines for watershed.
- Retain streamside vegetation so that at least 60% of the stream surface is shaded from 11 AM to 4 PM from June 1 to September 30 to maintain water temperatures at less than 65 degrees for those perennial streams which do not normally exceed this temperature.
- In wilderness, ecosystems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces.
- Ensure that management activities do not adversely affect water temperatures necessary for local aquatic- and riparian-dependent species assemblages.
- Prevent disturbance to streambanks and natural lake and pond shorelines caused by resource activities (for example, livestock) from exceeding 20 percent of the stream reach or 20 percent of natural lake and pond shorelines.
- Locate new facilities for gathering livestock outside of meadows and riparian conservation areas. During project-level planning, evaluate and consider relocating existing livestock facilities outside of meadows and riparian areas.
- Limit browsing to no more than 20 percent of the annual leader growth of mature riparian shrubs and no more than 20 percent of individual seedlings.

Effects Analysis Methodology

Assumptions Specific to Aquatic Species

The following assumptions are specific to aquatic species:

1. Primary use areas represent the places where livestock grazing is most frequently concentrated and the locations where direct interactions between livestock and the analysis species are most likely to occur. Direct and indirect effects to individuals and habitat are readily observable and measureable in these habitats. Primary use areas included an “aquatics only” analysis “buffer” of 100 meters (about 330 feet) from the edge of the meadow to account for livestock lounging in close proximity to the meadow.
2. Secondary use areas include areas with lower availability of forage than primary use areas, and are places livestock use on a regular, but less intensive, basis. This use includes lounging, light foraging, and principal routes of travel between primary use areas. Direct and indirect effects to individuals and habitats have lower intensity based on the reduced number and duration of livestock in these areas, and impacts may not be readily observable or measureable.
3. Implementation of the Forest Plan Direction effectively reduces the effect of livestock grazing on the species analyzed and allows for the maintenance or improvement of the aquatic/riparian habitats relied upon by those species. This would be achieved in part by remaining within allowable utilization and streambank disturbance levels. These two measures reflect the extent of livestock use in near-stream environments and the implementation of both standards are adequate to maintain or improve streambank (and meadow) condition.
4. An adequate amount of annual or semi-annual monitoring will occur with the implementation of the project to inform land and livestock management decisions relative to the species analyzed.
5. The length of time this analysis covers is the ten year duration of the permit. At the end of the ten year period, an adequate review of field conditions is required to confirm habitat condition and trend in order to inform the renewal of the permit.
6. All populations of the two species, known and unknown, are affected in essentially the same ways. Unknown populations are afforded the protections provided by implementation of the Forest Plan Direction upon their discovery.
7. Permitted livestock grazing poses an unnatural mortality risk to multiple life stages which may put some small populations at risk of localized extinction. Factors that result in reduced survivorship of multiple life stages (i.e., embryo, larval, metamorph, juvenile, and adult) can result in population declines (Biek et al. 2002). When combined with lower survivorship rates of adults, reduced survivorship rates of juveniles can result in a greater cumulative reduction of population growth which could be expected given the similar life history traits of juvenile and adult toads (Biek et al. 2002). Therefore, some of these small populations have a risk of becoming non-viable within several generations of the species if “unnatural” mortality is occurring.

Data Sources

Data sources used in the analysis for the Yosemite toad and Sierra Nevada yellow-legged frog include the following. For current distribution information (occupied habitat), the forest’s aquatic survey database (Aquasurv 2011), the California Natural Diversity Database (CNDDB), and data from the U. S. Forest Service Sierra Nevada Amphibian Monitoring Program were used. Information contained in the soil and hydrology reports (project record) prepared for this project and long term trend monitoring of key areas in each allotment (USDA 2011a) was used for describing existing condition and anticipated trend in meadow condition as related to Yosemite toad habitat. Livestock grazing and Yosemite toad interactions were supported by data from the study conducted by the University of California and U. S. Forest Service (Allen-Diaz et al. 2010, Lind et al. 2011). Stream condition assessments (SSI and SCI) provided information on fine sediment levels in streams in the Allotments and from comparable streams across the forest. Additional data specific to the two species was obtained from various sources available on the internet or the Forest Service’s library of journal subscriptions, and other informative information was obtained from these two sources as well.

Aquatic Species Indicators

Indicators used for Yosemite toad and Sierra Nevada yellow-legged frog habitat include meadow hydrologic function, streambank and lake shore trampling, fine sediment values (pool tail fines and pool bed sediments), and forage utilization standards. Occupancy of breeding habitat serves as an indicator of population size and recruitment to metamorphosis is an indicator of habitat suitability.

Aquatic Species Methodology by Action

The methodology used in the analysis for the Yosemite toad and Sierra Nevada yellow-legged frog was very similar. The analysis occurred at two spatial scales: the Sierra Nevada bioregional scale and a local scale. The bioregional analysis incorporates the viability analyses completed for the two species in the two Sierra Nevada Plan Amendments (USDA 2001, USDA 2004). At the local scale, effects analysis was conducted at a generalized level, followed by a discussion for each occupied site and predicted outcomes for each site. The generalized discussion applies to all sites and considers effects and relative risks to individuals, populations, and habitats required by the species. The main emphasis for analysis was to focus on primary use areas (meadows) because cattle use is more concentrated as related to forage availability.

Affected Environment

The Bell Meadow, Eagle Meadow, and Herring Creek Allotments lie within the geographical and elevation range and contain suitable habitat for the following aquatic species: Yosemite toad and Sierra Nevada yellow-legged frog. A detailed effects analysis for these species is included in the Aquatics BE and a summarization is incorporated below.

Several other species are briefly addressed in the BE. Detailed analysis was not completed for the following species based on the absence of suitable habitat and/or distributional information: California red-legged frog – Federally Threatened (T), Central Valley steelhead (T), delta smelt (T), Lahontan cutthroat trout (T), foothill yellow-legged frog - sensitive (S), hardhead (S), limestone salamander (S), and western pond turtle (S).

There is no designated critical habitat within any of the three Allotments for a federally-listed species; however, there is proposed critical habitat within the analysis area. There is no habitat required for the recovery of a federally-listed species because recovery plans for the Sierra Nevada Yellow-Legged Frog and the Yosemite toad have not been developed/prepared by the USFWS.

Criteria for whether a species is considered for detailed analysis include geographic and elevation range of each species and presence of suitable habitat. Considerations are classified as: 1) if the project area **is not** within the geographic **and** elevation ranges of a species, effects from the project are not evaluated further in this document; 2) if the project area **is** within the geographic range of a species **but** is outside of the elevation range of a species, or if there is no suitable habitat within primary or secondary use areas, potential effects to the species are not evaluated further in this document; or 3) if the project area is within either the geographic **or** elevation range of a species, **and** there is suitable habitat within one mile of the project area, potential effects to the species are analyzed.

Species included in 1) above include: Central Valley steelhead, delta smelt, and limestone salamander. These species are excluded from further analysis, and a determination of No Effect is made in the Aquatics BE.

Species included in 2) above include: California red-legged frog, foothill yellow-legged frog, western pond turtle, and hardhead. These species are excluded from further analysis, and a No Effect determination is made in the Aquatics BE.

Species included in 3) above include: Yosemite toad and Sierra Nevada yellow-legged frog. These species are included for analysis and a determination is made in the Aquatics BA and BE that the project may affect and is likely to adversely affect the toad and frog. Additionally, a determination is made that the project is not likely to result in the destruction or adverse modification of proposed critical habitat for the Sierra Nevada yellow-legged frog and Yosemite toad.

Lahontan cutthroat trout are not analyzed in this document because the project area is outside of the local geographic range, none of the three out of range populations are within the three Allotments. There is no critical habitat for this species on the forest. A No Effect determination is made in the Aquatics BE for this trout.

Following is a summary of what is known about the species of concern relative to the analysis area.

Yosemite toad

FOREST-WIDE SPECIES ACCOUNT

The Yosemite toad is known from 60 to 70 localities on the Forest (Aquasurv 2011, CNDDB 2011) and from over 400 sites range-wide, with over 300 known occupied meadows on the Sierra National Forest (Phil Strand, Sierra National Forest, personal communication). The Stanislaus National Forest represents the current known northern extent of the toad (the status of the toad on the Eldorado National Forest is uncertain) and there appear to be 3 to 4 clusters of localities across the Forest. Populations of the toad are concentrated in the Emigrant Wilderness Area, Herring Creek/Hammill Canyon, upper Relief Meadow/Granite Dome, and Highland Lakes areas of the Forest. Across the Forest, the remaining toad populations have an apparent spatial disconnect or separation between the next closest population. The distance between these isolated populations may be greater than the toad's maximum dispersal distance.

A full description of the habitats required by the Yosemite toad can be found in the Federal Register (2014) and are summarized as follows along with using additional literature, as cited, for reference. The Yosemite toad may make a variety of movements during the year that are related to breeding, foraging, and overwintering activities. In general, the pattern of movements begins in late spring and is as follows: 1) to breeding from overwintering habitats, 2) from breeding to foraging habitats, and then 3) from foraging to overwintering habitats.

Breeding occurs at snowmelt which, locally, is typically from late May through June (also Morton 1981). Breeding may occur as late as July or August in heavy snow years. Upon snowmelt, the males emerge from overwintering sites and reach the breeding site earlier than females in an attempt to establish territories. Males are present at the breeding site for several weeks; females remain for a few days. Females may not breed every year (Morton 1981, Liang 2010) and there is some indication females may reproduce every other to every third year (Kagarise Sherman and Morton 1993, Morton and Pereyra 2010). Breeding occurs in discrete wet features in meadows with a variety of moisture regimes ranging from wet to mesic (moist). Eggs typically hatch quickly (<12 days) and the tadpoles metamorphose in about two months. Mortality is presumably high during the period from tadpole to second year juveniles (Brown, et al. 2012). Desiccation of breeding habitat is a primary source of mortality, particularly in years with below-average precipitation or in habitats where the water table has been extensively modified (that is, stream down-cutting).

Following breeding, both sexes disperse into the meadow or to upland habitats to forage with females typically moving greater distances than males (Morton 1981, Kagarise Sherman and Morton 1984, Martin 2008, Liang 2010, Morton and Pereyra 2010). Maximum dispersal distance recorded for the toad is about 0.8 mile (Liang 2010). Foraging occurs in meadow, seep/spring, and non-meadow upland (including forested) habitats and there is a high association with rodent burrows (Martin 2008, Liang 2010). Martin (2008) observed foraging behavior at night which contrasts with previously assumed daytime activity. Morton and Pereyra (2010) reported subadult toads were evenly distributed

through four zones based on distance from the breeding area, and first year juveniles utilized upland habitat similar to that used by adults but in close proximity to the breeding site. Other work with the toad indicates that recently metamorphosed toads move away from the breeding pools (Cathy Brown, personal communication).

Adults and juveniles feed upon a variety of terrestrial insects, spiders, and the terrestrial phase of aquatic macroinvertebrates. Some of these prey items include beetles, ants, dragonfly larvae, mosquitoes, moth and butterfly larvae, flies, bees, wasps, spider mites, craneflies, springtails, owl flies, and damselflies (Federal Register citing Mullally 1953, Kagarise Sherman and Morton 1984, and Martin 1991).

Upon the onset of regularly occurring freezing temperatures at night, the adults move from foraging habitat to overwintering habitat (Martin 2008). Overwintering habitats may be relatively similar to foraging habitats and can include willow clumps in and around the meadow, talus slopes, and in burrows at the base of trees.

Alterations to meadow hydrology (stream incision, lowered water table) has been associated with historic high intensity livestock grazing and is believed to have extensively degraded suitable breeding habitat for the toad (Martin 2008). There are several accounts of declining populations of Yosemite toads (Kagarise Sherman and Morton 1993, Drost and Fellers 1996, Martin 2008, Brown et al. 2012). As noted by Shaffer, et al. (2000), many declines have occurred in remote regions where habitat destruction is not a concern suggesting a larger scale phenomenon may be affecting individual populations within the range of the species. An amphibian chytrid fungus, presumably *Batrachochytrium dendrobatidis*, has been implicated in the cause of death of a Yosemite toad (Green and Kagarise-Sherman 2001) and it is possible that the disease resulting from heavy fungal infestation levels is attributable to large scale declines in the Yosemite toad.

Several other primary threats or risks have been identified that apply to the three Allotment analysis area and include disease, recreation, the Forest Service road system, climate change, and vegetation management. These risks can cumulatively impact populations and habitat and are discussed in detail in the Aquatics BE.

ALLOTMENT-SPECIFIC SPECIES ACCOUNT

Bell Meadow Allotment

In 2002 and 2003, surveys for Yosemite toad and suitable habitat were completed for the Allotment. Visual encounter survey techniques were used following the USFS Region 5 protocol. Based on these survey results, there are no known occurrences of the toad within the Allotment or within one mile of the Allotment boundary.

Eagle Meadow Allotment

There are two toad localities in this Allotment, Shell Meadow and a small meadow to the southwest (and connected by the same intermittent stream) of Shell Meadow. Both localities are located within primary range, but the Shell Meadow population is within an exclusion area. Surveys for the toad have been conducted in all suitable meadow habitats within this Allotment.

Herring Creek Allotment

The Yosemite toad is known from eleven (11) meadows concentrated in the northeast corner of this Allotment. Between 1993 and 2012, multiple survey efforts have detected toads within these meadows. Very little is known about the population status within any meadow but all are assumed to be relatively small (<20 adults) (Brown et al. 2012). Bluff, Coyote, and Lower Three Meadows presumably support the largest populations of toads within this Allotment based on the relatively high number of discrete breeding sites that are occupied annually and relative abundance of tadpoles encountered.

FOREST-WIDE HABITAT ACCOUNT

The geographic distribution of the toad extends from Ebbetts Pass (Alpine Co.) in the north to near Kaiser Pass (Fresno Co.) in the south. Elevation range of the species is from about 6,400 feet to 11,320 feet above sea level, with the majority of sites between 8,500 and 10,000 feet. The known elevation range of the toad on the forest is from 7,200 to 9,720 feet above sea level with a mean elevation of about 8,784 feet and a median elevation of 8,690 feet. The toad generally occurs in montane and alpine meadows with willows and a temporary or permanent water source.

Breeding sites are typically located in shallow water (<7.5 cm) with flow conditions ranging from gently moving to still (Lind, et al. 2011). Flooded areas of meadows, potholes, tarns, small streams, and the shoreline of ponds and streams with emergent vegetation and loose silt substrate are frequently used for breeding. Wet areas in meadows sometime provide “oasis” type habitats that are the only suitable areas for breeding within mesic (moist) or relatively dry meadows. Breeding sites in meadows with lowered water tables can result in the breeding pools drying out before the larvae can metamorphosis, which may affect long term recruitment (adding individuals) to populations. Probably the most important factor for maintaining suitable breeding habitat for the toad in the future is to maintain or improve meadow hydrology.

Recently metamorphosed individuals remain in moist areas near the breeding site; however, toads have been observed dispersing away from the breeding site (Amy Lind and Cathy Brown, personal communications). Martin (2008), Lind et al. (2011), and local observations (by author and staff) indicate habitats important for recently metamorphosed individuals can be found within 50 feet of the breeding sites in a variety of vegetation including dense, tall vegetation (*Carex nebraskensis* and *C. utriculata*); in relatively dry, open areas dominated by short sedges (the receded edge of a dry breeding pool); and in dry (no surface water, but can be damp) stream channels with undercut stream banks. Other local observations have included recent metamorphs moving into relatively dry, upland habitat dominated by high elevation conifers (lodgepole pine, red fir). Willow stands close to breeding sites provide high quality cover for the small metamorphs in the root networks and leaf litter. Also, these willows may provide some protection from winter’s snow pack.

Adults are known to inhabit drier areas of the meadow, particularly found in willow clumps adjacent to breeding sites and can frequently be found in rodent burrows (Martin 2008, Liang 2010). Recent information on adult post-breeding habitat indicates the toad can make long distance movements into upland habitat (Martin 2008, Liang 2010, Morton and Pereyra 2010).

Other threats and risks were discussed previously under Forest-wide species account, above. One additional area of discussion is considered under this section of other risks and threats: nutrient loading in aquatic habitats. Some concern has been raised that livestock grazing results in nutrient loading of suitable toad habitat, thereby affecting growth and development.

Habitat Quality

Breeding habitat quality is largely based upon water persistence. Poor quality habitat is characterized by water that does not persist until metamorphosis in most years (<10% of the years, drying before August 15). Fair quality habitat is characterized by water that persists until metamorphosis less than 50% of the time. Good quality habitat is water persisting until metamorphosis >50% of the time and/or the presence of two to four suitable breeding site in close proximity (<0.25 mile). Good habitat condition is capable of supporting all life stages of the toad. Excellent habitat is water persisting until metamorphosis 100% of the time and/or multiple (>4) suitable breeding sites within close proximity. Liang (2010) developed a model to explain toad occupancy, but the habitat associations in her study area may not fit the typical conditions of meadows in the analysis area. A detailed description of assessing habitat quality is available in the Aquatics BE.

The quality of non-breeding meadow habitat is based on the extent and proximity of willow stands and burrowing rodent activity. Poor quality sites have no willow stands in the meadow or have no rodent activity. Fair sites have some willow coverage (<10%) that is patchily distributed and low rodent activity. If willows are common (>20% of the meadow area) and within 300 feet of the breeding site, then the site is of good quality. Good quality habitat would also have high levels of rodent activity. There are no limitations to the species in excellent quality habitat.

Meadow function was incorporated into this hierarchy of habitat suitability and is based on the project hydrologist's and soil scientist's assessment of stream and meadow condition and the reader is referred to the Watershed Report and the Soil Report (project record) for a full description of the evaluation process. The information in these two reports was used in the following way: if the meadow was at proper functioning condition or desired condition for the meadow hydrologic function, the toad habitat is assumed to be stable and with good to excellent suitability at the local scale. A meadow classified either as Functional – At Risk (PFC methodology) or fair condition (meadow hydrologic function methodology) was considered to provide a habitat suitability/quality spectrum of fair to good, but habitat quality could be compromised if there is a downward trend in condition. Meadows classified as Non-Functional (PFC) or poor/very poor (meadow hydrologic function methodology) provide poor to poor-fair quality habitat for the toad because the water table is too far removed from the meadow surface to provide suitable breeding habitat in all years. This evaluation of habitat suitability based on depth to water table is also supported by Lind, et al. (2011) and Roche, et al. (2012a, 2012b) in that a correlation was observed between toad occupancy and depth to water table. Unique local factors influence the suitability of some breeding sites outside of the above description.

ALLOTMENT-SPECIFIC HABITAT STATUS

Bell Meadow Allotment

Occupied habitat

At present, the Allotment is assumed to be unoccupied. This assumption is based on the lack of detection of toads during the surveys.

Unoccupied suitable habitat

About 255 acres of wet willow meadows (22 individual meadows greater than two acres), are contained within primary use areas in this Allotment. Of the 255 acres, 204 acres are at or below 7,000 feet in elevation. Since there are no known toad populations below 7,200 feet on the forest, these 204 acres are excluded from analysis. There are about 51 acres of suitable breeding habitat in ten small meadows. Many of these meadows were not specifically evaluated for hydrologic functioning; however, overall habitat quality in these meadows is assumed to be fair or better based on the following reasoning. The majority of these small, suitable meadows either has small (<6 inches wide by <6 inches deep), palmate drainage networks or the meadows do not have a defined stream channel. Ratliff (1985) supports this in stating meadows with small drainage areas and gentle slopes (surface gradients of <2%) usually do not have stream channels in them and tend to be [hydrologically] stable. Without a stream channel, there is a very low risk that the meadow would be degraded because there could be no stream incision to lower the water table. To further inform this assumption, the condition of the key meadows and special aquatic features are used as proxies for these smaller meadows. Based on the Watershed Report, meadow hydrologic function/condition ratings for the key meadows were fair or better for over 70% of the meadows evaluated (31 of 43). Further, all 46 of the special aquatic features (fens, springs, seeps, shorelines) evaluated were either at desired condition (proper functioning condition) or were functional at risk. These categories reflect fair or better condition for these sensitive sites. Combining the information from meadow and special aquatic feature function supports the assumption that most of the smaller meadows are likely in relatively good condition and provide suitable habitat for the toad in some or all years; however, it is

possible that some are in poor or very poor condition and do not provide any suitable habitat for the toad.

Eagle Meadow Allotment

Occupied habitat

The breeding habitat at Shell Meadow is in excellent condition because the meadow hydrology is at desired condition and the breeding sites retain water through metamorphosis even in drier than average years. The non-breeding meadow habitat has good suitability, though the meadow is relatively devoid of willows. Dense corn lily patches may provide refuge habitat for post-metamorphic individuals. Non-meadow upland habitat has good to excellent suitability because it is relatively undisturbed from management, but the proximity of several forest roads slightly decreases the suitability of this type of habitat. This meadow is at desired condition or proper functioning condition.

The primary breeding area in the second occupied site provides excellent breeding habitat. The lower end of the meadow is a large flooded area and there are two or three other ponded areas that are used by breeding toads. The other breeding sites can support successful recruitment in average and wetter than average years. The non-breeding habitat in the meadow is dominated by corn lily and sedges with sparse willow cover located at the edge of the meadow. This habitat has fair suitability as based on the limited extent of willow growth. The non-meadow upland habitat is in excellent condition as it is in a near natural condition. The quality of this habitat is slightly reduced due to the presence of roads in close proximity to the meadow.

The following Forest roads are within one mile of the occupied sites: 5N04, 5N09, 5N09A, 5N09E, 5N12A, 5N12Y, 5N87, 5N87C, 5N87D, 5N99, 6N19Y and 6N38Y. 5N09 and 5N04 receive moderately heavy recreational vehicle traffic while the remaining roads generally have light use.

Unoccupied suitable habitat

There are 39 meadows providing about 480 acres of suitable habitat in the primary and secondary use areas of the Allotment. The habitat is considered to be in fair to good condition for the reasons listed above under the Bell Meadow Allotment. None of the meadows in the proposed Niagara Unit are suitable for the toad because they are below the local elevation limit.

Herring Creek Allotment

Occupied habitat

Toad populations currently occupy 142 acres of wet willow meadow habitat. Site specific descriptions follow and meadow condition is based on evaluations conducted by the hydrologist and soil scientist (project record).

Breeding habitat condition at Bloomer Lake is fair to good based on low persistence of water in below average precipitation years in the two main areas of breeding habitat. Upland non-breeding meadow habitat is good, with many areas of willow present in drier sites and rodent burrows common throughout the meadow. As noted previously and as applies to all other occupied sites in this Allotment, non-meadow upland habitat is essentially undisturbed and is of excellent quality. This meadow is at desired condition and is expected to remain so as long as small headcuts remain stable. In 2012, two monitoring stations were established in the meadow to evaluate the stability of the headcuts.

Breeding habitat condition in Bluff Meadow is good to excellent. Non-breeding meadow habitat quality and condition is good, there is a large willow area in close proximity to the breeding habitat and rodent burrows are common throughout the meadow. Non-meadow upland habitat is good to excellent in quality; however, forest road 4N12 lies within dispersal distance of the toad and it slightly lowers the overall quality of the upland habitat. Talus slopes with trees are present along

about 50% of the meadow perimeter. This meadow is at desired condition and is expected to remain so as long as small headcuts remain stable. In 2012, a monitoring station was established at this site to evaluate the stability of the headcut.

Breeding habitat condition in Castle Meadow is good because the three discrete breeding sites maintain water throughout the summer in most years. Two of the three breeding sites appear to be supported by upwelling groundwater flow as evidenced by the springs associated with the sites and the third is a deeper (> 0.8 feet) depression that holds ponded water. The ponded third site is located off of the main meadow (to the west) and is associated with a small channel that is not immediately connected to the degraded stream channel in the main meadow. Non-breeding meadow habitat quality is good to excellent. The PFC rating of this meadow is “non-functioning”. If there is further degradation of the meadow, it is unclear whether the two upwelling water (fen-like habitats) sites would be at risk of drying and if they would become unsuitable for breeding.

There is typically one breeding site within Coyote Meadow. This site is in good or better condition. Non-breeding meadow habitat is in good condition with extensive willow thickets and rodent activity. Upland non-meadow habitat is in excellent condition, with a minor exception for the proximity of the Coyote Meadows trailhead (and road 5N67) and trail that crosses through the meadow and within five feet of the breeding pool. The meadow is at desired condition. Upstream of the breeding habitat there is a small headcut between the larger lower meadow and the smaller upper meadow. In 2012, a monitoring station was established at this site to evaluate the stability of the headcut.

There is typically one breeding site used annually in Groundhog Meadow and a secondary site used occasionally for breeding. The quality of the breeding habitat is good to excellent in average and above average precipitation years. Non-breeding meadow habitat is in good to excellent condition. Non-meadow upland habitat has good suitability and is limited from being excellent due to the proximity of forest road 4N12 and multiple campsites adjacent to the meadow. There is a small, stable headcut located downstream of the breeding area that poses a risk to the toad where the habitat could become less or unsuitable if the headcut reinitiates upstream movement and dewaters the meadow. In 2012, a monitoring station was established to evaluate the stability of headcut at the lower end of the meadow. This meadow is at desired condition.

The occupied toad habitat in Lower, Middle, and Upper Three Meadows is protected from grazing impacts by fencing. As such, livestock have little or no discernible impact to the breeding and non-breeding meadow habitat. The existing fence line protects a small portion of the non-meadow upland habitat, but a majority of this habitat is accessible by livestock.

The quality of the breeding habitat in the unnamed tributary to Willow Creek Meadow #1 (between Eagle and Coyote meadows) is of good quality. Willows are common in the meadow providing good quality non-breeding meadow habitat. This site is far away from the road (4N12) and there were no other disturbances occurring around the meadow. This site was not directly evaluated using PFC or another method. However, there is no defined stream channel in this meadow and it should remain in stable condition over time.

The breeding habitat quality in the unnamed tributary to Willow Creek Meadow #2 (near Bluff Meadow and adjacent to 4N12) is fair. The breeding site is a large (>500 ft^2) depression filled by snowmelt, deep enough (>5 inches) to retain water until metamorphosis about 50% of the time. The surrounding non-breeding meadow habitat quality is fair based on the limited presence of willows; however, dense stands of corn lily are present at this site and may provide cover for recently metamorphosed toads. The non-meadow upland habitat is of good quality and is, again, limited by forest road 4N12 bisecting the meadow and campsites located on the north side of the road and in close proximity to the breeding site. This site was not directly evaluated using PFC or another method. However, field observations of the breeding site in this meadow do not indicate any risks to hydrology and it should remain in stable condition over time.

The breeding habitat quality in the unnamed tributary to Willow Creek Meadow #3 (located west of Castle Meadow) is fair to good. The non-breeding meadow habitat is good to excellent in quality because there is extensive and abundant willow growth and the meadow has good functional condition. The non-meadow upland habitat is excellent in quality as there are no disturbances in the forested stand surrounding the meadow.

Breeding habitat quality in Wire Corral Meadow is excellent. Non-breeding meadow habitat is fair based on the willow criteria, with willows being essentially absent from this site. . Non-meadow upland habitat is in good condition and is limited by several roads (5N31, 5N67, 5N55Y) in close proximity to the meadow edge. The PFC rating of this meadow is “proper functioning” and habitat conditions are expected to remain stable or improve over time.

Unoccupied suitable habitat

There are numerous wet willow meadows greater than 2 acres totaling about 264 acres that are considered to be unoccupied based on survey results. Seven of these meadows (66 acres) are more than 0.9 miles (1.5 kilometers) from the nearest occupied site. These sites have a very low probability of being repopulated by one of the existing populations because they are beyond the dispersal distance of the toad. The remaining meadows are within the dispersal distance from multiple discrete populations and have the potential for recolonization if suitable breeding habitat is available in those meadows. The habitat quality in these meadows will be considered fair or better for reasons given under the Bell Meadow Allotment. None of the meadows in the proposed Cascade Unit are above 7,000 feet and are considered to be unsuitable for the toad.

Sierra Nevada Yellow-Legged Frog

FOREST-WIDE SPECIES ACCOUNT

There are about 80 localities of the frog on the forest (Aquasurv 2011, CNDDB 2011). The majority of localities are within the Emigrant Wilderness Area, where fish-free lakes, ponds, and potholes surrounding larger fish-bearing lakes and streams are common and provide high quality habitat. Few (<10) of the known breeding populations occur in streams; however, surveys of this habitat type across the forest and within the range of the species are less complete than in pond/lake habitats. To date, there has been no large scale attempt to quantify any of the known populations on the Forest, though some have been regularly surveyed in recent years.

Within its entire range, the frog has declined in overall abundance and many localities have gone extinct (Jennings and Hayes 1994, USFWS 2002, Lannoo 2005). Vredenburg, et al. (2007) report the frog has gone extinct from over 90% of 172 historic localities. Breeding populations of the frog were only found in 4.5% and 48% of the total number of surveyed and recently occupied (known presence between 1990 and 2001) watersheds, respectively (Cathy Brown, personal communication). Recent estimates of population abundance indicate very few large populations remain (Brown, et al. 2012).

A full description of the habitats required by the Sierra Nevada yellow-legged frog can be found in the Federal Register (2014 (29 April, Volume 79, Number 82)) and is summarized as follows using additional literature for reference including Lannoo (2005), USDA (2004), Federal Register (2003), Jennings and Hayes (1994), and Zeiner, et al. (1988). Other sources of information used are specifically cited. Breeding activity begins shortly after snowmelt in shallow water areas where egg masses can be attached to stones, woody debris, vegetation, or the bank of the water. The majority of adults travel short distances (<1000 feet) between overwintering sites and breeding sites, but longer distances (1 kilometer or 0.6 mile) have been reported. Eggs hatch within one month, and tadpoles typically require two to three years to metamorphose. Tadpoles frequent shallow areas taking advantage of the warmer water found in those habitats and feeding on algae, detritus, and diatoms. Once metamorphosed, individuals may take three to four years to reach sexual maturity. From metamorphosis to adult, individuals remain close to water and typically bask on open areas like rocks

with easy access to water. Post-metamorphic individuals successfully overwinter at the bottom of ponds that do not freeze to the bottom (>5 feet deep) or in crevices of rocks near a waterbody. Site fidelity is strong with adults returning to the same overwintering and breeding sites from year to year (Matthews and Preisler 2010). Survivorship between years is high in adults, also suggesting the frog is long-lived (Matthews and Preisler 2010).

Garter snakes and native and introduced trout are the primary predators of the frog at multiple life stages. Mortality is likely in overwintering tadpoles that occur in shallow ponds or streams that freeze to the bottom. Tadpoles represent a key component to food webs in the high elevation ecosystems they occupy, especially prior to the widespread introduction of trout. Adult frogs are formidable predators, as well, and their diet likely includes smaller members of their own species.

Two factors have been identified as primary causes for the observed widespread declines, the introduction of trout to formerly fishless waters and the amphibian chytrid fungus, *Batrachochytrium dendrobatidis*, both of which have been amply described in literature. Based on this literature, the introduced trout prey primarily on the larval (tadpole) stage of the frog, and the chytrid fungus primarily affects post-metamorphic frogs. Other potential decline factors have been associated with Sierran amphibians, and include wind-borne pesticide drift, habitat destruction, ultraviolet radiation, and climate change (Davidson, et al. 2002, Fellers, et al. 2004).

ALLOTMENT-SPECIFIC SPECIES ACCOUNT

Bell Meadow Allotment

There is one known population of the Sierra Nevada yellow-legged frog within the Allotment, but does not lie within a utilized primary or secondary use area. This stream and pond dwelling population is in the headwaters of Bell Creek where streamflow becomes intermittent during the summer and fall. The downstream extent of the population coincides with the most upstream distribution of trout with a non-overlap zone of about 0.25 mile. The length of stream occupied by the frog is about 0.5 mile and includes an unnamed 2 acre ponded area of the stream. Frogs have been observed in this vicinity within the last three years. Within one mile of the Allotment, there are three known populations of the frog.

Eagle Meadow Allotment

There are no known occurrences of the Sierra Nevada yellow-legged frog within the Long Valley/Eagle Meadow Allotment. One population is known to occur within one mile of the Allotment.

Herring Creek Allotment

There are two occurrence records of the Sierra Nevada yellow-legged frog within the Herring Creek Allotment, both in Willow Meadow. A 1993 visual encounter survey detected adults, tadpoles, and one egg mass in or adjacent to Willow Creek in Willow Meadow. During a stream survey in 2003, there was an incidental observation of an adult frog on the bank of Willow Creek within Willow Meadow, coinciding with the other occurrence record. An additional observation record occurred at this location from surveyors with the Sierra Nevada Amphibian Monitoring Program (Cathy Brown, personal communication).

FOREST-WIDE HABITAT ACCOUNT

The following account is summarized from Lannoo (2005), USDA (2004), Federal Register (2003), Jennings and Hayes (1994), and Zeiner, et al. (1988). The historic range of the Sierra Nevada yellow-legged frog in the Sierra Nevada extended from northern Plumas County in the north to southern Tulare County in the south. The frog is known to have an elevation range between 4,500 and 12,000 feet above sea level; however, locally the frog occurs within a range of 5,400 and 9,720 feet and only three populations occur below 7,000 feet (Aquasurv 2011).

Reproduction in the frog is aquatic and breeding typically occurs in perennial streams, ponds, and lakes; however, breeding is known to occur locally in ponds that may not always maintain water and in streams that have intermittent flow. Eggs are deposited in clusters and are typically attached to a firm substrate such as rocks, stream banks, vegetation, and downed logs. Breeding and egg deposition occurs early in spring, coinciding with ice- and snowmelt at higher elevations. Habitat characteristics in stream breeding populations are poorly documented, but also include features similar to ponded water habitat. Shallow water bodies may not be preferred at higher elevations because they may freeze down into the substrate during winter, potentially killing the overwintering tadpoles. Tadpoles overwinter at least once and may require two to three years in the larval stage before they reach metamorphosis. There is some indication the frog makes limited migrations between water bodies (up to 0.62 miles (1 km)) during the breeding season. These movements may occur across terrestrial environments or along streams connecting lake habitats. Tadpoles presumably feed on algae and detritus.

Adult and juvenile frogs apparently have similar habitat requirements. Following the breeding season, the frog is typically found close to the water's edge when in the terrestrial environment, utilizing rocks and bedrock on the shoreline where vegetation is sparse. The frog is apparently absent from small headwater streams due to insufficient depth to provide adequate refuge and overwintering habitat. While adult and subadult frogs have been observed co-occurring with tadpoles, local observations also indicate adult and subadult frogs may disperse from the breeding ponds to smaller, shallower waters during the warmest part of the year.

Habitat Quality

Breeding habitat quality is primarily determined by pond or lake water depth at higher elevations (>7,000 feet) and by presence of trout. Poor quality habitat is defined by 1) intermittent, headwater streams (stream orders 1 and 2) having water depths less than two feet at any elevation, 2) shallow (<1 foot) ponds that dry annually, or 3) presence of trout. Poor quality habitat typically does not support successful breeding and rearing until metamorphosis.

Fair quality breeding habitat is defined by 1) water depths less than three feet at elevations greater than 7,000 feet, 2) presence of trout in a nearby waterbody that is apparently restricting the natural distribution of the frog, or 3) low number (<2) of breeding sites within a one mile radius. Fair quality habitat supports successful breeding and/or rearing until metamorphosis less than 50% of the time.

Good quality breeding habitat has no trout present, water depths greater than five feet that are annually persistent, and more than 3 suitable breeding sites within a one mile radius. Good quality habitat would support successful breeding and rearing >50% of the time. If unoccupied, locations with good quality habitat have a better than average chance at becoming recolonized from adjacent populations. There are no limitations to the species in excellent quality breeding habitat.

Habitat quality for juvenile and adult frogs is primarily based on the presence of trout and the presence of suitable habitat adjacent to trout bearing waters. Poor quality habitat has trout and no other water body within 100 feet of the trout water. Fair quality habitat may have trout, but there are a few (<3) ponds or potholes within 100 feet of the trout bearing water. Also, fair quality habitat consists of ponds or lakes without trout, but lake depth is less than 5 feet and may freeze to the bottom during winter. Good quality habitat has no trout, but primarily consists of streams rather than ponds or lakes. Excellent quality habitat has no trout and lake or pond habitat that does not freeze to the bottom during winter.

ALLOTMENT-SPECIFIC HABITAT ACCOUNT

Bell Meadow Allotment

There are about nine miles of perennial stream and 51 surface acres of ponds and lakes within primary and secondary use areas within the Allotment. About one mile of the perennial stream

mileage is in primary range with the remaining eight miles in secondary use areas. Overall habitat condition for the frog in the Allotment is fair, primarily limited by the extensive presence of trout in Bell and Lily creeks and in Bear, Camp, and Grouse lakes.

The habitat quality in Bell Creek where the known population is located is good to excellent. The stream flows out of the Emigrant Wilderness Area and habitat quality is compromised by intermittent stream flow in drier years and overall lack of deep, bedrock pools. However, isolated deep pools and the pond at the upper end of the stream are perennial and provide high quality habitat for the frog. The riparian areas surrounding the stream and pond have very little evidence of livestock or human use and are very much intact without any disturbances. Habitat quality in almost all of Lily Creek is poor to fair based on trout presence and lack of a nearby colonizing source population. Habitat quality in Bear, Camp, and Grouse lakes is poor to fair based on trout presence. Bear Lake has slightly higher suitability because there is a nearby, upstream population of the frog surrounding Y-Meadow Lake.

Eagle Meadow Allotment

There are nine miles of perennial streams in primary (2.8 miles) and secondary (7.1 miles) use areas. Haypress Lake (10.5 acres) is the only notable lake or pond within the Allotment and occurs on private property. Within primary and secondary use areas, the habitat quality for the frog is rated as poor in about 4.5 miles of Eagle, Long Valley, and Niagara creeks due to trout presence. The remaining small perennial and intermittent streams provide fair quality habitat because deep overwintering pools are the limiting factor for reproduction and survivorship.

Herring Creek Allotment

There are about 15 miles of perennial streams within primary (4.4 miles) and secondary (10.6 miles) use areas, providing fair to good quality breeding and juvenile/adult habitat. About 4.2 miles of perennial stream support trout fisheries, reducing the habitat quality in these reaches to poor to fair. Bloomer Lake, the pond at Lower Three Meadow, and the pond at Castle Meadow provide poor quality breeding and juvenile/adult habitat. The poor rating is based on shallow water depth (<3 feet) which increases the potential of freezing to the bottom during winter and heavy shoreline vegetation. The functioning condition of Willow Creek is excellent as based on the “proper functioning” PFC rating. However, the self-sustaining trout population reduces the habitat quality, especially for tadpoles and metamorphs, to poor. Adult habitat suitability is high as adults are too large to be eaten by the plentiful population of small trout that inhabit the stream. The following Forest roads lie upstream and within one mile of the occupied site: 4N12, 5N04, 5N63, and 5N63B.

Environmental Consequences

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Yosemite toad

Direct and indirect effects can result in detrimental impacts to individuals and habitats. The potential for direct effects to individuals is discussed and will be based on relative risk to multiple life stages (eggs, tadpoles, metamorphs, and subadults/adults) at different times during the grazing season. The reason this approach was taken is that there appear to be differential risks for various life stages, time of the year, and habitats used that are largely dependent upon dispersal capability. There is also discussion of how livestock can affect various habitat types that are used by different life stages at different times of the year.

Effects to Individuals

As noted previously, the proposed action would implement the Forest Plan standard and guideline that requires the exclusion of cattle from breeding habitat occupied by tadpoles until the tadpoles metamorphose. Implementation of this standard should effectively eliminate the risk of trampling or

disturbance to subadult and adult individuals prior to breeding activities through the time tadpoles require to complete metamorphosis. Also, egg and tadpole stage individuals and the early metamorphs (if multiple cohorts were present in the same breeding site) would not be subject to trampling or disturbance. Cohorts are considered to be age groups based on timing of egg deposition where early and late season egg masses could be separated by several weeks or even a month.

In terms of direct impacts to individual toads, there is the potential for injury or mortality associated with livestock grazing through trampling (Martin 2008), capture into deep hoof prints (Martin 2008), entrapment by fecal matter (Martin 2008), and physical disturbance. Cattle can step directly on metamorphs, subadult, and adult toads resulting in injury or death. The relative risk to the different life stages of the toad (metamorph, subadult, adult) is variable and is dependent upon extent of dispersal, choice of habitats used, and progression of the grazing season.

For metamorphs, the risk of direct impacts occurring to any one individual is considered to be highest, especially in the two to three weeks following metamorphosis. During this period, the metamorphs are concentrated around breeding sites and any use of this habitat by livestock increases the potential to be affected. Multiple individuals could be killed or injured if livestock use this habitat extensively. The relative risk decreases throughout the breeding season as the small toads disperse away from the breeding sites and into the surrounding meadow. Individuals seeking refuge in willow thickets or in non-meadow upland habitats are considered to be at a lower risk of direct impact than individuals occupying less protected habitats. The roots, logs, rocks, and other substantial surface objects decreases the potential for trampling, capture in hoof prints, and entrapment by fecal matter. The relative risk is higher for toads occupying unprotected habitats because they are poor hoppers (more like crawling) and tend to not sustain hopping for extended distances when disturbed. Other factors that may be important in determining risk (increasing or decreasing) include resource partitioning between toads and livestock (Roche et al. 2012a), frequency of livestock use in occupied meadows (McIlroy 2011), and timing of that use (McIlroy 2011). These implications of these factors are discussed in the Aquatics BE.

For subadults outside of the breeding and metamorphosis periods, the relative risk of direct impact to any one individual is considered to be low to low-moderate and is based on the proximity of this life stage to the breeding habitat. Morton and Pereyra (2010) indicated immature Yosemite toads were widely and evenly dispersed across the studied transect. This suggests the density of individuals is low on the landscape and the odds of being directly impacted are reduced due to this density. Also supporting the valuation of relative risk is the low rate of metamorph recruitment to later stages especially in small populations (Brown et al. 2012) and the three other factors identified for metamorphs. The relative risk to individual adults is similarly low and may be even lower given their tendency to disperse from breeding sites once breeding activities are over. Based on the dispersal behaviors mentioned above, females may be at lower risk than males because they move greater distances from the breeding sites. This suggests very low densities in the surrounding landscape and the risk of direct effect is very low. In support of this risk classification, Bulger, et al. (2003) state that amphibians with low densities in high quality upland habitats have a very low risk of impact to any one individual from incidental mortality. As with metamorphs, the choice of habitat plays a role in vulnerability to direct impact with open meadow associations increasing vulnerability compared to willow or talus associations.

The risk of indirect effects to individuals is considered to be a relatively minor issue and is associated with the direct effects of disturbance and loss of overhead cover. Excessive disturbance could result in lower fitness because normal behavior is periodically and temporarily interrupted which could increase stress and limit foraging opportunities. The anticipated outcome is a very minor effect on physiological fitness that would not result in a long term impact to an individual. The loss of overhead cover could lead to an increased risk in predation, primarily from avian predators. The risk is relatively low as determined by utilization limits and the ability of the animals to seek a range of

suitable refuge spots. The risk is highest for metamorphs, lowest for adults, and increases as the grazing season progresses since utilization levels increase from metamorphosis to the end of the season. Information on lower utilization of forage near breeding (Roche, et al. 2012a, 2012b) can be cautiously applied and the extent of loss of cover may not be adequate to substantially increase predation risk.

Spread of chytrid fungus by livestock

There is some concern that cattle may be a vector of spread for the amphibian chytridiomycete, *Batrachochytrium dendrobatidis*, a fungal pathogen that has been implicated in the decline of many amphibian species. As cattle walk throughout the Allotment, they could potentially carry the chytrid fungus from an infected area to a non-infected area. The fungus can remain viable for many weeks in water and presumably in wet soil which could be transported on the hooves or hair of cattle. It should be noted that many of these amphibian declines have occurred in relatively undisturbed areas (Bradford 1991, Berger et al. 1998, Lips 1998, Lips 1999, Muths et al. 2003) including Yosemite toad populations studied at Yosemite National Park (Kagarise Sherman and Morton 1993, Drost and Fellers 1996, Green and Kagarise Sherman 2001) where grazing was discontinued almost a century prior to the discovery of the disease (Longcore et al. 1999). Chytrid prevalence was also assessed as part of the Yosemite toad – grazing study, and the results indicated the fungus was present in almost all study meadows and prevalence among individuals was low to moderate (11-32%) (Lind et al. 2011). The spread of the amphibian chytrid can occur between individuals of same species and can also occur between individuals of different species (Rachowicz, et al. 2006).

Synthesizing this information into a summary suggests that the amphibian chytrid fungus is already present in most populations and some primary factor other than livestock is responsible for its uncontrolled spread. Livestock are a potential vector for spreading the fungus as they move through the Allotments; however, the importance of spreading the fungus seems to be an irrelevant point since the fungus is already wide-spread. The pertinent risk appears to be from spreading different strains of the fungus between populations at larger geographic scales, where some strains appear to be more “virulent” than others (Berger et al. 2005, Piovia-Scott, personal communication) rather than spread of the fungus at small spatial scales (that is, within an Allotment).

Effects to breeding habitat

Following metamorphosis, cattle affect/impact breeding and rearing habitat primarily by grazing in and walking through these areas. The direct and indirect effects to habitat include reduction in overhead cover, deposition of waste products (urine and feces) across the landscape, trampling in breeding pools, and sediment delivery to aquatic features. Grazing the herbaceous vegetation removes some of the overhead cover used by metamorphs and juveniles (primarily year 2 individuals). As noted above, grazing may expose the individuals, making the potential risk for predation greater. The consequences of this effect may be relatively minor to individuals. Removing the vegetation also allows more air circulation at ground level which can cause the ground to become drier and increase the potential that the moist, humid microclimate becomes less suitable. Roche, et al. (2012a) did not find a treatment effect from grazing on vegetative cover; however, they only associated cover with breeding pool occupancy and were not able to make any associations about the role of cover apart from breeding. For metamorphs, the associations between habitat suitability of overhead cover and metamorph use are unclear. It is likely that overhead cover is important to recent metamorphs in reducing predation by some species (birds), maintaining a cool, moist microclimate at the ground surface, and facilitating vegetation-based prey relationships; however, recent metamorphs are frequently observed in open habitats (margins of stream channels, bare patches) where they may be basking and/or foraging. As the metamorphs disperse across the landscape and utilize other vegetation types, the loss of cover may be slightly more important from a predation risk perspective, but relatively unimportant from a foraging and basking standpoint because they are capable of selecting habitats that provide a gradient of open/heavy cover to meet those needs.

Cattle walking in and trailing through breeding sites can result in pock marking, loss of soil cover, and compact moist soils. Constant trampling of hooves can also increase the amount of bare soil present in the meadow which can lead to erosion of sediment into streams or breeding areas. Current utilization standards are considered to be adequate to maintain soil cover and prevent erosion of fine sediment to aquatic habitats. In most instances, the drier portions of the meadows receive the higher levels of use and are more distant from stream channels. This separation of habitats effectively buffers the stream from overland runoff, allowing the surrounding meadow vegetation to assimilate most of the eroded sediment. Also, the relatively low slope of meadows means there is very limited energy in the water flowing across the meadow during periods of inundation. This makes extensive transportation (in terms of quantity and distance) of sediment to streams or other waterbodies unlikely.

Excessive cattle defecation in post-metamorphic breeding habitat can potentially increase nutrient loading in confined habitats the following year (Lemly 1998), resulting in delayed metamorphosis or reduced size at metamorphosis (Gerlanc and Kaufman 2005, D. Martin, personal communication in Federal Register 2002). Excessive nutrient loading can decrease aquatic insect diversity (Lemly 1998) and reduce the availability of adult aquatic insects as a source of prey. One unknown factor is the extent to which nutrient (primarily nitrogen and phosphorus) in cow excreta (manure piles or cow pats) enters a waterbody when deposited in various environments. For the small proportion of depositions occurring directly in waters, it is assumed that all nutrient contained in urine is readily diluted into the water and a majority of the nitrogen and phosphorous compounds in fecal pats is dissolved into the water. Following each one of these events, measurable increases in nitrogen and phosphorus compounds would occur, but the consequence of these events is believed to be minimal and limited by the low occurrence of post-metamorphic toads residing in surface water. In a wet meadow, it can be assumed that only a small portion of this nutrient is dissolved in surface water where it is diluted by snowmelt. This claim is substantiated by the early season water quality samples taken during the Yosemite toad/grazing study which indicated very low or no detectable levels of nitrogen and phosphorus compounds in surface waters (Allen-Diaz et al. 2010). For terrestrial deposits of urine and feces, the combination of ready assimilation of nitrogen and phosphorus from excreta and the dilute nature of leaching following snow melt make excessive eutrophication of breeding or other aquatic habitat unlikely.

Alterations to meadow hydrology have been attributed to cattle in meadows occupied by the toad (D. Martin, personal communication *in* Federal Register 2002, Martin 2008). Stream incision can lower the water table in meadow habitat and result in breeding habitats drying out prior to metamorphosis. As noted previously, many of the meadows in the analysis area were extensively damaged (i.e., altered meadow hydrology) by historic heavy livestock grazing and other factors, though a few remain in very good condition (water table near the meadow surface). In general, the predicted environmental outcome for the meadows relative to maintaining or improving hydrology is either no change or slight upward trend in condition from the existing condition (project record).

Livestock activity in breeding sites can create deep pock marks that are largely remediated in two or three years. Roche, et al. (2012a) indicate hoof trampling can fragment and widen breeding pools. Though they did not detect changes in occupancy associated with grazing during the study, the short time periods analyzed may not have been long enough to detect long-term degradation of this habitat type. Shallower, warmer, and higher concentrations of nutrients were associated with higher rates of breeding occupancy (Roche et al. 2012b); however, there is some concern that breeding pools could gradually become more shallow over long periods of time may be less suitable because they are more vulnerable to drying out. There is the possibility that gradual reduction in pool depth may make the breeding site unsuitable in some years due to rapid drying.

Excessive cattle defecation in post-metamorphic breeding habitat can potentially increase nutrient loading in confined habitats the following year (Lemly 1998), resulting in delayed metamorphosis or

reduced size at metamorphosis (Gerlanc and Kaufman 2005, D. Martin, personal communication in Federal Register 2002). A delay in metamorphosis could make tadpoles more vulnerable to mortality from mid-season (August) snowfall or freezing. However, this effect may be less important than desiccation of breeding sites in relatively undisturbed environments (Kagarise Sherman and Morton 1984). A reduced size at metamorphosis could affect the fitness of individuals following metamorphosis and prior to overwintering. Delayed metamorphosis and reduced size at metamorphosis could have longer term implications relative to reduced annual recruitment which could lead to smaller population sizes over long periods of time. However, this change may not be easily observed by the end of the 10 year analysis period because of the irregularity of female breeding (once every two to three years) and the variability of tadpole production as tied to annual precipitation trends (Allen-Diaz et al. 2011, Lind et al. 2012).

For the small proportion of depositions occurring directly in waters, it is assumed that all nutrient contained in urine is readily diluted into the water and a majority of the nitrogen and phosphorous compounds in fecal pats is dissolved into the water. Following each one of these events, measurable increases in nitrogen and phosphorus would occur, but the consequence of these events is believed to be minimal. Most waters in the Sierra Nevada are nutrient poor (Sickman et al. 2003), and this oligotrophic condition allows them to readily assimilate additional nutrients, primarily nitrogen and phosphorus compounds. When supplied in limited amounts as expected from the urine and feces, there would be a slight increase in primary productivity (algae growth) that can translate to increased secondary productivity (aquatic insect production) that could be beneficial to the toad because food resources may become more available (Smith et al. 1999). While this hypothetical benefit could occur, the real effect is likely very small and may benefit the toad negligibly since toads typically forage in upland habitats further away from the “enriched” waters.

Effects to Non-breeding Meadow Habitat

The main impacts that livestock have on non-breeding meadow habitat is loss of overhead cover, browsing and trampling of willows, and trampling of rodent burrows. As noted for other life stages, livestock eat vegetation that provides overhead cover for all life stages of the toad which could result in an increase in predation risk. There would be an annual impact wherein overhead cover is reduced gradually throughout the season. However, there should be no long-term (10 years) effect on the persistence of the vegetative types because the intensity of annual grazing is not high enough to cause plant community shifts (McIlroy 2008). Livestock also browse on the willows that provide refuge for all life stages of the toad. Typically the livestock eat the more nutritious tips of annual growth and not the older, woody stems. For established willows and willow patches, only a small portion of the plant(s) are available for foraging as the typical species grows taller than the livestock can reach, and the dense patches naturally exclude livestock from browsing extensively on the entire plant or patch. If allowable browse standards are met, then the vigor of the plants should not be adversely affected and the plants should be maintained over the term of the permit and beyond. Since livestock access to the above-ground root area is limited, there is no real impact to the spaces in the root network that provides protection for the toad. Cattle can also trample and collapse rodent burrows that are used by the toad for overwintering or seasonal refuge. A collapsed occupied burrow can trap the toad underground permanently (if there is only one entrance) or until the rodent re-opens the burrow entrance. Since grazing probably does not adversely impact the persistence of the burrowing animals (mainly ground squirrels) in meadow habitats, the result of burrow trampling is probably minor in extent (how many are impacted) and duration (annual effect, not additive between years) because the rodents continuously create new burrows and maintain existing entrances.

Effects to Upland (Non-Meadow) Habitat

As mentioned above, cattle can trample and collapse rodent burrows that are used by the toad for overwintering or seasonal refuge. Based on the description of the location of use areas and burrows ((Martin 2008, Liang 2010 and Morton and Pereyra 2010), burrows located in the non-meadow

upland have a low risk of damage from trampling because they are typically located in habitats (rocky areas, tree roots) not prone to collapse and intensity of livestock use is very low due to the lack of suitable forage. An exception to the intensity statement would be in lounging areas, typically in trees near the edge of the meadow, where livestock use is high despite the lack of forage. However, the risk of the burrow collapsing from the cows is considered to be low to moderate because the roots from the trees in the lounging areas make the burrows resistant to collapse.

Other Potential Impacts

The permittees and the people who help them manage livestock may also incur incidental and dispersed impacts to the toad during routine ranching activities. These activities include maintenance of Allotment structures (fences), herding by foot or horseback, and the operation of vehicles to support ranching operations. The activities may injure or kill toads in upland habitat by trampling or crushing and collapsing rodent burrows with the result of entrapment or mortality, or may briefly affect behavior through disturbance. Since the permittees do not extensively manage these Allotments (no daily management), the risk of impact to individuals or habitats is considered to be very low

The effects to occupied habitat that are listed above also apply to suitable unoccupied habitat. However, the consequences to the species are likely to be relatively insignificant in extensive areas that do not support any populations (as in the Bell Meadow Allotment) or where single populations are isolated from other populations by more than several miles or by geographic features that are effective barriers to dispersal. These statements are supported by the genetic variation work completed on the toad by Shaffer et al. (2000) who state "…we should probably expect that extirpated populations will not reestablish." Shaffer et al. (2000) base this statement on significant genetic substructure differences among breeding sites.

Summary of outcomes

This is a general summary of what is known across the two occupied Allotments which incorporates expected outcomes for all populations of the toad in the analysis area. As noted previously, some of the populations of the toad, particularly in the Herring Creek Allotment, are assumed to be very small. For these very small populations, there is moderate to high uncertainty as to the viability of these populations under or without the pressures from livestock grazing. For some of these populations, any loss of individuals may result in long-term reductions in population size, especially the loss of subadults (ages 2-3) and adults (3+ years). Combined with heavy losses at the tadpole and metamorph stages from natural causes and low recruitment to the adult stage, some populations may be at a critical stage for continued existence. There is a fair bit of uncertainty for the viability outcomes of all of the known populations on the two Allotments with toads. For the most at risk populations in the Herring Creek Allotment, there are multiple nearby populations that can serve as sources for repopulating or supplementing the numbers and genetics to enhance long-term survival. For other populations, regular (presumably annual) successful breeding has occurred even in very dry years. This indicates a supply of females that risk laying their eggs in habitats that may not be suitable for recruitment, which suggests population sizes that are large enough to be viable longer-term.

Population declines are apparent across the range of the toad even at locations where grazing has not occurred for several decades (Kagarise Sherman and Morton 1993). Livestock grazing may be contributing to some of the low population sizes, but grazing at current levels (numbers, duration, timing) may not be the primary factor for the continued decline of these populations. The results of the Yosemite toad – grazing study indicate the short-term impacts of grazing in and around occupied habitats minimally affect occupancy and some habitat factors. The limiting factor, at present, seems to be the historic reduction in or loss of suitable habitat in many meadows when the streams incised, and the water table lowered to the point where breeding habitats dewatered premature to tadpole development. Most of the meadows in the Allotments appear to be stable (even if degraded) and the expectation is that without further incision/dewatering, the existing extent of suitable breeding habitat

will be maintained for the foreseeable future, with or without grazing. This does not take into account the possible habitat-related effects associated with changing climate. As noted above, climatic variability associated with observed changes over the last several decades further adds uncertainty for these populations. Site-specific outcomes are discussed below.

These anticipated outcomes are consistent with the viability analyses conducted in the Sierra Nevada Framework Plan Amendment EIS (USDA 2001) and the Sierra Nevada Framework Plan Amendment Final Supplemental Environmental Impact Statement (FSEIS) (USDA 2004). A detailed description of the methodology used to support these environmental outcomes is provided in Volume 3, Chapter 3, part 4, pages 2 – 8 in USDA (2001).

Environmental outcomes (USDA 2001) for the species considered in this document are described below and include:

- **Outcome C**: Suitable environments are frequently distributed as patches or they exist at low abundance, or both. Gaps, where suitable environments are either absent or present in low abundance, are large enough that some subpopulations are isolated, limiting opportunity for species interactions. In most of the species range, subpopulations have the opportunity to interact as a metapopulation; however, some subpopulations are so disjunct or of such low density that they are essentially isolated from other populations.
- **Outcome D**: Suitable environments are highly isolated or they exist at very low abundance, or both. While some subpopulations associated with these environments may be self-sustaining, there is limited or no opportunity for population interaction. There has been an overall reduction in overall species range from historical conditions, except for some rare, local endemics that may have persisted in this condition since the historical period.
- **Outcome E**: Suitable environments are highly isolated and exist at very low abundance. Populations have little or no interaction, resulting in strong potential for local or regional extirpation, and low likelihood or recolonization.

In USDA (2001), the selected alternative (modified Alternative 8) was evaluated as having the lowest risk to the toad and likely to improve conditions for Yosemite toads by increasing the likelihood that suitable environments would continue to occur as patches and decrease the likelihood that suitable environments would be isolated. The management activities that the Forest Service could influence for the benefit of the toad included locally applied chemical toxins (pesticides), exotic fish stocking, livestock grazing, and pack stock. Elements of modified Alternative 8 relating to livestock grazing included utilization limits, livestock exclusion from willow flycatcher habitats and from toad breeding areas, and streambank disturbance standards. The two primary environmental outcomes for modified Alternative 8 were Outcome C (80) and Outcome D (18), with the numbers in parentheses indicating the average degree of confidence in the outcome being realized in 50 years of implementation of the alternative.

In USDA (2004), two action alternatives were considered and their effects (direct, indirect, and cumulative) were analyzed, with Alternative S2 chosen as the selected alternative. It is assumed that the intent to implement the Aquatic Management Strategy (AMS) would benefit the toad by providing protection for Yosemite toads and their habitat. The two factors that were used to assess environmental consequences were livestock grazing and pack and saddle stock use and recreational activities. Implementation of “Standard & Guideline 53” (in the 2004 Record of Decision) is the primary restriction to reduce the impacts of livestock grazing and presence on the toad and its habitat while at the larval stage. Other standards and guidelines pertaining to utilization limits, streambank disturbance, and willow flycatcher where the flycatcher’s habitat overlaps with the toad’s further work to reduce the impact to the toad and it’s habitat.

The environmental outcomes for the frog determined in USDA (2004) did not change from those determined in USDA (2001) which are shown above.

Sierra Nevada Yellow-Legged Frog

As with the Yosemite toad, livestock grazing can affect individuals and habitats. Cattle can step on adults, metamorphs, and tadpoles when in immediate riparian habitats or when in an occupied water body. The likelihood of injury or mortality is assumed to be very low because field observations have shown all three life stages readily invoke an escape response when disturbed. Tadpoles rapidly swim away to deeper water, while adults and subadults leap from the shoreline, swim ten feet or more through the water, and occasionally embed themselves under logs, rocks, or into the muddy substrate. Adults and subadults may be vulnerable in upland habitat that connects two suitable aquatic habitats, particularly when shallow habitats become dry and the frog moves overland to more suitable habitat. The likelihood of injury or death is assumed to be low because the frog is a good hopper, can sustain bursts of hopping, and can travel up to ten feet in ten hops as supported by personal observation. Even though the frog may be able to avoid injury or mortality, the cattle do disturb the basic behavior of the frog when the two come into immediate contact.

Even though the frog may be able to avoid injury or mortality, the cattle can disturb the basic behavior of the frog when the two come into close or immediate contact. As noted above, a “flight” response is typically invoked and individuals escape the perceived predation threat by seeking refuge in aquatic habitats. The consequence of infrequent, non-physically injurious disturbance is believed to be very minor and should have no consequence on long-term individual fitness. For tadpoles, the flight response is retreating into deeper waters and seeking overhead refuge (large woody debris, spaces between larger sized substrates). The effect of retreating is an increase in predation risk (trout) because the tadpoles are moving out of a low predation risk habitat (shallow water) to a higher risk area (deep water) and a temporary move to cooler waters combined with a cessation of feeding. If this disturbance occurs frequently, the increased predation risk could become important in constraining recruitment because fish (and other predators, example Sierra gartersnakes (*Thamnophis couchii*)) are present in the stream and the tadpoles are the most vulnerable stage to predation. Kupferberg, et al. (2011) found greater predation in foothill yellow-legged frog tadpoles that were exposed to changes in velocity which forced the tadpoles to seek refuge habitat.

Another consequence of frequent disturbance could be a minor to moderate effect on growth because the tadpoles do not feed when hiding, are in a less than optimal location for growth (they prefer warmer water), and may be affected by stress hormones. Slower growth may result in a reduced size at metamorphosis or a delay in metamorphosis. The consequences of these effects are not completely understood, but they may be important in subsequent population dynamics with larger size at metamorphosis affecting post-metamorphic growth, survival, and reproductive performance (Smith 1987, Semlitsch et al. 1988). Both Smith (1987) and Semlitsch, et al. (1988) found positive correlations between larger tadpole size at metamorphosis, larger adult size at reproduction, and earlier age at first reproduction in a chorus frog and an ambystomatid salamander, respectively. These effects on adults can play important roles in recruitment and population dynamics. If the converse of these findings is accurate and smaller size at metamorphosis occurs, then there could be subtle long-term constraints on population growth barring the interaction with other factors. It should be noted that neither Smith nor Semlitsch, et al. found a link between tadpole size at metamorphosis and survival to adulthood.

For post-metamorphic individuals, physical disturbance is more likely to interrupt basking than foraging, because the frog is an opportunistic ambush predator and likely spends most time in the terrestrial environment near the edge of water. Infrequent disturbance (low intensity and duration) is not expected to have deleterious impact on individual fitness, but more frequent disturbance could lead to increased time spent in refuge habitat or reduction in abundance in areas of high disturbance (Rodriguez-Prieto and Fernando-Juricic 2005). These authors suggest the increased time in aquatic habitats represents a loss of spatial and temporal terrestrial resources for the frog and is a trade-off between predation risk and resource use. The likely effect of more frequent disturbance could be a

shift in individuals to habitats that have less disturbance and possibly less preferred or available resources. Relegation to suboptimal habitats could influence reproductive capacity (a reduction) which could have a very long term impact on population size. Cattle presence along the shoreline of small ponds and streams can trample or slough the bank, adding sediment to aquatic habitats. Trampling and grazing can alter the vegetative structure of the banks, weakening them and making them more susceptible to erosion. Trailing paths that are hydrologically connected to suitable or occupied water can affect habitat in a similar way by intercepting and concentrating overland flow to the point where erosion of the path occurs. In excess, the sediment can reduce the volume of the pond or stream pools to the point where overwintering becomes unlikely.

The grazing of riparian vegetation (particularly tall sedges) can reduce overhead cover, thereby reducing the refuge quality of the habitat and exposing the frog to predation or desiccation (Jennings 1996). The consequences of this effect is considered to very minor because utilization standards limit the extent to which cover is removed and the frog has the ability to move and choose preferred habitat.

As noted for the Yosemite toad, livestock grazing in and around suitable aquatic habitat has the potential to increase nutrient concentrations in waters by the deposition of metabolic waste products (urine and feces). The discussion provided for the toad applies to the Sierra Nevada yellow-legged frog, and the reader is referred to the discussion above.

Cattle moving across the landscape pose a risk of transmitting the chytrid fungus, *Batrachochytrium dendrobatidis*, from an infected area to an uninfected area. The implications of this effect are addressed under Yosemite toad, and are the same for the Sierra Nevada yellow-legged frog. However, throughout its range, the Sierra Nevada yellow-legged frog appears to be more vulnerable to lethal infection than the toad thereby making the risk to the frog slightly greater than the risk to the toad.

CUMULATIVE EFFECTS

Yosemite toad

The spatial boundary for cumulative effects at this scale is the area encompassed by the discrete boundaries of the three Allotments because the livestock do not significantly stray off of the Allotment and the primary use areas are typically well embedded in the interior portions of the Allotments. The temporal boundary is from the present date, projecting ten years into the future which is the term of the permit. For the Bell Allotment, there would be no cumulative effect to individuals or occupied habitat since this Allotment is presumed to be unoccupied. There were no proposed actions identified that could cumulatively affect suitable, unoccupied habitat in this Allotment.

For the Eagle Meadow Allotment, there are private lands within the Allotments that are primarily seasonal residences. However, none of these private parcels are within the watershed occupied by the toad and the private parcels are about four miles from the Shell Meadow area. The distance of the private parcels to the nearest occupied site is much greater than the maximum dispersal distance known and any actions occurring on those parcels would not cumulatively affect any toad population. There is one present federal action that could potentially impact individuals and habitat at Shell Meadow. That project, the Shell Meadow Restoration Project , implemented corrective actions on a headcut at the lower end of the meadow and will remove encroaching conifers. Implementation of this project poses a potential risk to individuals (mortality, disturbance) occupying the meadow and upland. Initial mitigation measures include having a person on site to check the work areas for toads during the equipment operational period. The long term benefit to this population and breeding habitat is preventing the headcut from advancing upstream, causing a dewatering of the breeding pool. Implementation of the headcut repair is complete and implementation of conifer encroachment is proposed for 2016.

For the Herring Creek Allotment, all of the lands are publically owned and administered by the Forest Service. As such, there could not be any state or private actions that would cumulatively affect the Yosemite toad. There was one past project that could have impacted the toad. This project, the Hammill Canyon Hazard Tree Project, cut and/or removed dead or high-risk conifers from an area 300 feet along the roads in the analysis area. Operators and equipment (log skidders) were in close proximity to Bluff, Coyote, Groundhog, Lower Three, Middle Three, Tributary to Willow Creek #2, Upper Three, and Wire Corral Meadows. There is a possibility that toads were directly affected (injury, mortality, disturbance) if they were in the operating area of the equipment. The extent of this impact is unknown, but the loss of individuals from the smallest populations could have long term detrimental consequences to population viability. The equipment also removed some trees that could serve as refuge habitat (downed large woody debris) for the toad, but this effect on long term habitat suitability is assumed to be relatively minor because only a portion of the cut trees were merchantable and removed. The remaining trees that were felled remained on the ground, thereby providing cover.

Sierra Nevada Yellow-legged Frog

The spatial boundary for generalized cumulative effects at this scale is the area encompassed by the three Allotments because the livestock do not significantly stray off of the Allotment and the primary use areas are typically well embedded in the interior portions of the Allotments. The temporal boundary is from the present date, projecting ten years into the future which is the term of the permit. For the Bell and Herring Creek Allotments, all of the lands are publically owned and administered by the Forest Service. There are no federal actions proposed for the analysis area that are within the watershed occupied by the frog or within one mile of an occupied site. There were no actions proposed on private or federally administered lands that could impact the frog or its suitable habitats.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Yosemite toad

While there is no direct quantitative link between grazing and reductions in Yosemite toad populations (Federal Register 2002), the documented negative effects from livestock to the toad's habitat and direct mortality are sufficient to infer that livestock grazing has resulted in the decline of some populations of the toad (Jennings and Hayes 1994). In the absence of permitted livestock grazing, there would be no detrimental direct effects to the toad or its habitats. While unstudied, any beneficial direct effect associated with livestock grazing, likewise, would not occur. Based on the available literature, the exclusion of livestock would be beneficial to the toad and its habitat by alleviating one of the identified stressors (Federal Register 2002). The long term outcome for some populations may be a gradual decrease in the rate of population decline associated with the loss of individuals through direct mortality from livestock.

As noted in the Soil Report (project record), under this alternative there would be a slight improvement in the rate of recovery for the "functional at risk" and "non-functional" meadows relative to Alternative 1 (Proposed Action). Improvements in streambank stability would be expected within several years which could lead to a long term improvement in the overall stability of the stream. This improvement could also lead to a very gradual rise in water table as the riparian vegetation traps sediment and allows the channel to aggrade. For the breeding areas where water persistence is compromised from long term shallowing from trampling, there would be a stabilizing effect and the habitat would be expected to maintain its current condition. This could also contribute to longer term persistence of the smaller populations.

Sierra Nevada yellow-legged frog

There would be no direct effects to the frog or its habitats related to livestock grazing under this alternative. The areas associated with concentrated livestock presence (primarily trailing paths and

streambank disturbance) would revegetate in the next 3-5 years and reduce sedimentation from these sources. As noted for the toad, increased streambank stability would occur at some sites and the risk to functional condition (that is, downward to stable trend) would be partially moderated and improvements in functional condition could be observed within 25 years. This benefit would only occur at suitable but unoccupied sites because the two frog occurrences are close to desired condition (proper functioning).

CUMULATIVE EFFECTS

Yosemite toad

Since there would be no direct or indirect detrimental effects to the toad or its habitat, this alternative would not incrementally and detrimentally add to cumulative effects at the scale of the three Allotments. Since there could be a slight improvement in habitat conditions in the long term, there could be cumulative effects to habitat; however, no other actions were identified that could affect the toad's habitats in any of the three Allotments.

Sierra Nevada yellow-legged frog

Since there would be no direct or indirect detrimental effects to the frog or its habitat, this alternative would not incrementally and detrimentally add to cumulative effects. Since there could be a slight improvement in habitat conditions in the long term, there could be cumulative effects to habitat; however, no other actions were identified that could affect the frog's habitats in any of the three Allotments.

Alternative 3 (Current Management)

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

Yosemite toad

With the exception of a few specific elements addressed in the site-specific analysis section (Aquatics BE), there would be no measurable difference between the effects of Alternatives 1 and 3 on the aquatic species addressed in this document because grazing would occur under both with about the same timing and duration. Under each of these two alternatives, grazing would occur early in the season at lower elevations and then progress to higher elevations, essentially deferred until post-metamorphosis of the Yosemite toad. As such, the effects analysis of implementing Alternative 1 applies to Alternative 3. For a summary of direct, indirect, and cumulative effects of Alternative 3 refer to the discussion of anticipated effects of Alternative 1, above.

Sierra Nevada yellow-legged frog

As with the Yosemite toad, there would be no discernible difference between implementing this alternative and Alternative 1 (Proposed Action).

Alternative 4 (Resource Protection)

DIRECT, INDIRECT AND CUMULATIVE EFFECTS

Yosemite toad

Since livestock grazing would be eliminated entirely from habitats occupied by Yosemite toads, the direct, indirect, and cumulative effects on Yosemite toads for this alternative would be the same as described for Alternative 2 (No Action).

Sierra Nevada yellow-legged frog

There would be very little difference between implementing this alternative and implementing alternatives 1 and 3. While this alternative implements a 10% bank alteration standard in stream reaches occupied by the frog, the primary concerns of livestock grazing in occupied habitat are related to the direct effects which would still exist under this alternative. Under Alternative 4, the

level of near-stream activity would be less which would slightly decrease the risk of trampling (injury or mortality) or disturbance. Indirectly, the predation risk to individuals would be slightly reduced. For habitat, the direct effect of importance would be the reduction in streambank disturbance which could improve streambank stability over the long term. However, since the streams are at or close to desired condition, the benefit that could be realized would be small. The levels of allowable use along the occupied streams would also mean overhead cover would be slightly higher because grazing pressure along the stream would be reduced. The effect would presumably be a higher level of suitability for frogs seeking refuge in dense vegetation with high levels of overhead cover.

Cumulatively, there were no other actions in the past, present, or foreseeable future that would add to the direct and indirect effects of this alternative.

Summary of Effects Analysis across All Alternatives

Implementation of Alternatives 1 (Proposed Action) and 3 (Current Management) would be almost indistinguishable in the levels of relative risk and degrees of impact to individuals and habitats required by the Yosemite toad and Sierra Nevada yellow-legged frog. Direct effects to individuals of both species include injury, mortality, and disturbance from livestock activity in meadows, non-meadow areas surrounding meadows, and riparian areas. For the Yosemite toad, the greatest risk of direct effects is for metamorphs and come immediately following metamorphosis when the Forest Plan exclusionary standard is lifted. For all other life stages of the toad, the risk of direct effects varies from low-moderate to very low. For the Sierra Nevada yellow-legged frog, the ability of all life stages to readily flee into habitats less vulnerable to impact reduces the overall risk of direct effect to low. The primary indirect effect is associated with an increased predation risk. For the toad, the predation risk is increased as overhead cover is reduced from forage utilization. For the frog, the predation risk is associated with flight behavior following disturbance and is greatest for tadpoles and recent metamorphs. For both species, any livestock-related direct mortality to individuals may translate into downward trends in population size because all of the populations are assumed to be small or very small (<20 adults). The loss of females is more critical than loss of males, since availability of females is essential to supporting recruitment and males can reproduce with more than one female.

Livestock also have the potential to directly and indirectly impact habitats used by the toad and frog. For the Yosemite toad, direct effects to habitat include creating deep pock marks in breeding habitats, deposition of metabolic products (urine and feces) in water, and removal of overhead cover via grazing. All of these effects occur on an annual basis (except during years of non-use), and are considered temporary in that they are remediated over short periods of time (annually). For the frog, similar direct effects to habitat occur, including the deposition of metabolic wastes into water and reduction in overhead cover. Increased nutrients in water from urine and feces could result in measurable increases in nitrogenous products (primarily ammonia and ammonium), but high concentrations would last a short period of time through dilution and not have a long term effect on water quality because the nutrients would be assimilated readily into the food web. For both species, there is a very low risk that fine sediments could be delivered to critical aquatic habitats (breeding and rearing), but this effect should not result in an impairment of these habitats to the point of reduced capability or unsuitability.

Cumulatively, there were very few actions identified with the potential to add detrimental effects to the indirect and direct effects associated with implementing either action alternative. Both projects would affect the Yosemite toad and not the Sierra Nevada yellow-legged frog. Of the two projects, one would largely benefit the Yosemite toad by stopping the upstream movement of a headcut in Shell Meadow (Eagle Meadow Allotment). The headcut is active and advancing to breeding habitat and this restoration action is a beneficial action. There is little cumulative effect at Shell Meadow because the meadow is excluded from grazing. The second action that could have cumulatively

affected toads in the Herring Creek Allotment is a hazard tree sale along the 4N12 road. Direct effect to individuals was the most likely impact and may have resulted in mortality because log skidders were operated in forested areas adjacent to breeding habitats. For very small populations, there could be a long term decrease in population growth, but in larger populations there may have been no change in population size.

Compliance with the Forest Plan and Other Direction

The most applicable direction is provided below with a brief statement of compliance with that direction.

1. Species viability – Maintain and restore habitat to support viable populations of native and desired non-native plant, invertebrate and vertebrate riparian-dependent species.

   Based on information contained in the Watershed Report and Soil Report (project record), there would be no functional changes in the meadow ratings and currently suitable habitat would be maintained for meadow dependent species. Continued grazing at presently authorized stocking rates would impact aquatic habitats in the same way into the future and aquatic habitats would be maintained close to the existing condition.

2. Plant and animal community diversity – Maintain and restore the species composition and structural diversity of plant and animal communities in riparian areas, wetlands, and meadows to provide desired habitats and ecological function.

   Same compliance rationale given in 1 above.

3. Streamflow patterns and sediment regimes – Maintain and restore in-stream flows sufficient to sustain desired conditions of riparian, aquatic, wetland, and meadow habitats and keep sediment regimes as close as possible to those with which aquatic and riparian biota evolved.

   Utilization and streambank/shoreline disturbance standards would be implemented per Forest Plan Direction. Annual monitoring of key areas would document yearly compliance and long-term condition and trend monitoring plots would indicate long-term trends in meadow condition.

4. Stream banks and shorelines – Maintain and restore the physical structure and condition of stream banks and shorelines to minimize erosion and sustain desired habitat diversity.

   Same compliance rationale given in 3 above.

5. Provide habitat for diverse and viable populations of all native and desired non-native wildlife and fish. Maintain and improve habitat for federally listed Threatened and endangered species and give special attention to sensitive species to see that they do not become Threatened or Endangered.

   Meadow and stream habitats would be maintained under the proposed action because there would be no major changes to stocking rates, season of use, or distribution patterns of livestock. Livestock exclusion from occupied Yosemite toad habitat would partially protect the most vulnerable life stage. Compliance with viability standard may be in question and some populations may be at risk of continued viability due to factors unrelated to livestock grazing. Both species are federally listed as threatened (Yosemite toad) and endangered (Sierra Nevada yellow-legged frog).

6. Exclude livestock from standing water and saturated soil in wet meadows and associated streams and springs occupied by Yosemite toads or identified as “essential habitat” during the breeding and rearing season (through metamorphosis). If physical exclusion of livestock is impractical, then exclude grazing from the entire meadow.

The proposed action would implement this standard and guideline for both Allotments occupied by Yosemite toad.

7. Complete one survey cycle in suitable habitat for the Yosemite toad within this species' historic range to determine presence of Yosemite toads.

   Surveys of suitable Yosemite toad habitat have been completed.

8. Provide medium to high quality habitat for resident trout species.

   No fish stocking occurs within the analysis area and resident trout populations are self-sustaining. Self-sustaining populations indicate habitat conditions are suitable for meeting the needs for all life stages. Fine sediment values combined with aquatic macroinvertebrate assessment data indicates no impairment of stream habitat.

9. In wilderness, ecosystems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces.

   For the population of Sierra Nevada yellow-legged frog that occurs in the Emigrant Wilderness Area, livestock do not typically graze in this area due to natural barriers (bare rock expanse). As such, there is limited influence on this population from any human source.

10. Ensure that management activities do not adversely affect water temperatures necessary for local aquatic- and riparian-dependent species assemblages.

    The percentage of perennial stream that is within primary use areas by Allotment ranges from about 5 to 18% with a large majority of the stream mileage lying within forested areas. Because primary areas are meadows, the livestock do not affect the shading provided by the taller, woody vegetation that provides beneficial shade. Any area experiencing increases in stream temperatures is moderated by downstream forested areas.

11. Prevent disturbance to streambanks and natural lake and pond shorelines caused by resource activities (for example, livestock) from exceeding 20 percent of the stream reach or 20 percent of natural lake and pond shorelines.

    All action alternatives would implement these forest standards. Some level of annual monitoring would occur on the Allotments to determine yearly compliance with the standards.

12. Locate new facilities for gathering livestock outside of meadows and riparian conservation areas. During project-level planning, evaluate and consider relocating existing livestock facilities outside of meadows and riparian areas.

    The proposed action would create a new holding facility on the Eagle Meadow Allotment. The area proposed is in an upland area more than 0.25 mile from the nearest perennial stream. For the existing holding structure at Eagle Meadow (Eagle Meadow Allotment), the interdisciplinary team identified this structure to be within a riparian area, but a suitable location for a replacement structure was not identified. Additionally, the existing structure has historic/cultural significance which prohibited removal.

13. Limit browsing to no more than 20 percent of the annual leader growth of mature riparian shrubs and no more than 20 percent of individual seedlings.

    All action alternatives would implement this standard and some level of annual monitoring would occur to identify compliance.

3.03 BOTANY

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Management of Sensitive Plants on the Stanislaus National Forest is based on Forest Service policy set out in the Forest Service Manual (FSM 2670) and the Forest Service Handbook (FSH 2609.26), the Forest Plan Direction (USDA 2010), the Forest Sensitive Plant Management Guide and, where applicable, Species Management Guides.

It is the Secretary of Agriculture's policy to "avoid actions 'which may cause a species to become threatened or endangered.'" (FSM 2670.12). Further, it is a Forest Service objective to "maintain viable populations of all native ... plant species in habitats distributed throughout their geographic range on National Forest System lands" (FSM 2670.22). Forest Service policy set out in FSM 2670.32 is to "avoid or minimize impacts to [Sensitive] species whose viability has been identified as a concern." Further, where it is determined that impacts cannot be avoided, "the line officer with project approval authority, [may make] the decision to allow or disallow impact, but the decision must not result in loss of species viability or create significant trends toward Federal listing." Forest plan Direction states: “conduct field surveys for threatened, endangered, proposed, and sensitive (TEPS) plant species early enough in the project planning process so that the project can be designed to conserve or enhance TEPS plants and their habitat. … If additional field surveys are conducted as part of project implementation, document the survey results in the project file (USDA 2010).” It further states “Conduct surveys and monitoring necessary to detect potentially damaging disturbances, changes in known populations and locations of new populations.

General direction for management of Sensitive Plants under the LRMP is to "provide for protection and habitat needs of sensitive plants, so that Forest activities will not jeopardize their continued existence." Forest Plan Direction standards and guidelines advise to "modify planned projects to avoid or minimize adverse impacts to sensitive plants." Portions of three of these Allotments also fall under the Central Sierra Watershed Assessment. Desired condition number 12 is that “All threatened, endangered and sensitive (TES) terrestrial and aquatic plant and plantlike species are maintained as viable populations.”

An additional measure applicable to this project is the following:

> “Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map, and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans, and wheeled vehicles. Criteria for defining bogs and fens include, but are not limited to, presence of: (1) sphagnum moss (*Spagnum [sic] spp*.), (2) mosses belonging to the genus *Meessia[sic]*, and (3) sundew (*Drosera spp*.) Complete initial plant inventories of bogs and fens within active grazing Allotments prior to re-issuing permits.” (USDA 2010)

There is a Conservation Assessment for *Meesia triquetra* and *M. uliginosa* (Dillingham 2005). Conservation Assessments for *Epilobium howellii*, Botrychiums, and fens also exist.

Effects Analysis Methodology

Assumptions Specific to Botany

Cumulative effects for sensitive plants and fens were analyzed using the three range Allotment boundaries as proposed in Alternative 1 because it encompasses all of the proposed grazing activities and other projects that could affect sensitive plant species and fens within the project area.

This analysis of cumulative effects uses the existing condition as the baseline for analysis because: 1) the numbers of permitted livestock have remained constant over the past 10 years and the intensity of grazing would not change from the present rate; however, 2) the timing of range use in the Allotments with Yosemite toad have shifted to protect the toad. Timing of use can change the impacts to plants. In addition, 3) where legacy conditions (those presumed to have been caused by previous overgrazing or other management activities) have significantly altered sensitive plants or fen habitats, no significant improvement in habitat condition would occur without the intervention of major stream restoration.

Permanently wet areas are impacted more late in the season when most other areas have dried. Early season impacts are assumed to be lighter because these areas may be too wet and other resources are available.

As a corollary, late season use will affect the sensitive plants that grow in wet areas more than will use early in the season.

Meadows, stringer meadows, and streams are areas that are likely to be used by cattle. The types of impacts that could affect sensitive plants include trampling and soil compaction, trail creation, changes to hydrology, grazing, defecation, and introduction of noxious weeds. The types of impacts can vary depending on timing and duration of grazing, degree of utilization, and whether any rest rotation is implemented. Impacts from removal of grazing consist primarily of competition from other plants that may increase or grow taller. When grazing is removed, sedges increase in many areas and can shade out other, shorter species. Species that grow in dry habitats with less vegetation are unlikely to be affected very much by cattle except by weed introduction.

Grazing in areas that were previously ungrazed and shifting grazing to later in the season can cause the greatest impacts to wetland and late seral habitat species. Withholding grazing or increasing grazing can impact species that grow in mid seral habitats.

Data Sources

- Literature Review (references are listed in Appendix E).
- GIS layers with information on range resources and facilities, rare plant habitat and occurrences, and survey locations.
- On the ground surveys provided additional information.

Botany Indicators

- Occurrences of sensitive plants and their condition
- Suitable habitat for sensitive plants and its condition
- Overall range condition indicators and seral stage

Botany Methodology

A list of all federally listed Threatened, Endangered or Proposed plant species which might occur on the Stanislaus National Forest was requested from the U.S. Fish and Wildlife Service website.

A pre-field review was conducted to determine which species could be present and whether they could be affected by the activities of this project. Aerial photographs were examined to find additional meadows, particularly stringer meadows that were not included in the GIS meadows layer.

Surveys were conducted in 2005, 2006, 2007, 2008, 2010, and 2011. All surveys were based on the 2006 sensitive plant list. Surveys were directed toward those areas where impacts are more likely as indicated by the mapped primary use areas. Primary and secondary range areas were established by the Forest Range Specialist in conjunction with the permittees. These are the areas that are mainly used by the cattle and where most of the impacts would be. These were the areas targeted for surveys.

Affected Environment

In all of the Allotments the soils are weathered granitic till, recent alluvium, and fractured andesitic tuff. The recent alluvium is usually in meadows. In the Bell Meadow Allotment, there is also slightly weathered granitic rock. Volcanic parent materials are more porous and more likely to carry water to create fens. Contact areas between volcanic and granitic parent materials are also areas where more moisture is likely.

Meadow areas are reported to the nearest ten to 25 acres since they are derived from photographs and are approximate. Meadow information derives from a GIS layer created quickly from aerial and infra-red photos. This layer contains most of the meadows on the forest, and also included some patches of mule's ear (*Wyethia mollis)*, whitethorn (*Ceanothus cordulatus*) and rock outcrops. It was reviewed further for this project by examining orthophotos, and aerial photos where needed.

Meadows are a small portion of the total Allotment area, but are the major area of cattle impacts and of sensitive plant habitats. They are such a focus that two of the Allotments are named after the largest meadows in them. They will be the focus of this analysis. Not all of the meadows are in the main areas that cattle use. Surveys were directed toward those areas where impacts are more likely as indicated by the mapped primary use areas. The elevations range from 6,000 to 9,500 feet. The elevation of secondary range extends from about 6,300 to 9,100 feet.

This project also proposes additions to two of the Allotments. Since these are areas where the use will change, they will be addressed in more detail. Three addition areas are proposed: McCormick Pocket and Niagara Creek in the Eagle Meadow Allotment, and the Cascade Creek addition in the Herring Creek Allotment. McCormick Pocket has one mapped meadow at the upper end, but smaller meadows occur in the area. McCormick Pocket also contains areas with dense riparian shrubs, willows and mountain alder. In a single day survey, very few areas of grasses and grass-like plants were seen. The area is fairly open with both volcanic and some granitic outcrops. The proposed Niagara Creek addition is more forested. It has one small mapped meadow and other, smaller stringer meadows along the streams. Five plantation units are found in this area. Old wire fence lines and scattered dried cow pies are indicative of past use. The Cascade Creek addition is entirely within two mapped timber sales from the 1960's. Over 40 plantations occur in the Cascade Creek addition area. There are also three mapped meadows and two springs. The plantations are well distributed over the area, and often have grasses and other forage in the understory.

Sensitive Plant Review

No federally listed Threatened or Endangered plants could occur in this project. A Sensitive Plant is defined as a plant species "identified by a Regional Forester for which population viability is a concern, as evidenced by: "a. Significant current or predicted downward trends in population numbers or density." and "b. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution." Of the forty-six Sensitive Plant species on the Regional Forester's list for the Stanislaus National Forest (Table 3.03-1), known occurrences and unsurveyed suitable habitat for eleven species are present in areas of primary and secondary range. The analysis area is outside the known geographic or elevational range of *Allium jepsonii, Allium yosemitense, Arctostaphylos nissenana, Balsamorhiza macrolepis, Calochortus clavatus* var. *avius, Clarkia australis, Clarkia biloba* ssp. *australis, Clarkia lingulata, Eriophyllum congdonii, Eriophyllum nubigenum, Erythronium taylori, Erythronium tuolumnense, Fissidens aphelotaxifolius, Horkelia parryi, Hulsea brevifolia, Iris hartwegii* ssp. *columbiana, Lewisia congdonii, Lewisia kelloggii* ssp. *hutchisonii, Mielichhoferia elongata, Mielichhoferia shevockii, Mimulus filicaulis,* and *Mimulus pulchellus*. *S*uitable habitat for *Allium tribracteatum* and *Lomatium stebbinsii* (lava caps) does not occur in the primary and secondary range. There are only a few areas of possible habitat for *Cypripedium montanum.* They all have either been surveyed in past projects or are known to not be suitable habitat. *Botrychium tunux* (rocky), *Dendrocollybia racemosa* (shady with high duff), *Draba*

asterophora var. asterophora, D. a. var. macrocarpa (very rocky) and *Eriastrum tracyii* and *Tauschia howellii* (dry, open) grow in habitats that are unlikely to be affected by cattle. There is no suitable habitat within the elevation range for *Botrychium yaaxudakeit*. *Eriogonum luteolum var. saltuarium* has been found in small openings adjacent to trails. In one of the locations where it was originally reported, it may have been above a creek, but the creek bank was fairly open with low vegetation cover. For this reason, it is not considered likely to be impacted in this project. *Boechera evadens* is no longer considered likely on this National Forest. The occurrence on Calaveras is a different species. *Peltigera gowardii* ranges up to about 8,000 feet in elevation, but has not been found over 6,000 feet on the Stanislaus. Most of the occurrences are under 5,000 feet. The primary and secondary range in these Allotments ranges from 6,400 to 10,600 feet so it is not likely to occur in the area covered by this analysis. *Boechera tularensis, Botrychium ascendens, Botrychium crenulatum, Botrychium lineare, Botrychium lunaria, Botrychium minganense, B. montanum, B. pinnatum, B. pedunculosum, Bruchia bolanderi, Cinna bolanderi, Helodium blandowii* and *Meesia uliginosa* will be analyzed in this document. *Bruchia bolanderi* occurrences are known or tentatively identified in the Herring Creek and Bell Meadow Allotments.

Surveys

In 2005 and 2006, survey plans were based on the assumption that meadows are the primary areas where cattle congregate and that meadows and streams are the primary areas where impacts are likely to occur. Primary and secondary range areas were established by the Forest Range Specialist in conjunction with the permittees. These are the areas that are mainly used by the cattle, the areas where most of the impacts would occur, and the areas targeted for surveys.

Several other steps were taken to target survey areas for sensitive plant species. Aerial photos were reviewed and areas that might be fens were delineated within the primary and secondary range. Any additional meadows, including stringer meadows and smaller meadows that were below the minimum size for the GIS layer, were delineated. Some meadows in the BEH Allotments were surveyed in 2005 either by sensitive plants surveys for this project or by non-project fens surveys as part of a regional effort. Sensitive plant surveys continued during the 2006 field season. Surveys were planned to visit the meadows most likely to have fens. Surveys also targeted meadows in most parts of the primary/secondary range. Surveys for some *Lewisia kelloggii* ssp. k*elloggii* habitat were completed in 2008. In 2009 the Bell Meadow Allotment was surveyed, primarily for non-meadow species. In 2010, the Cascade project area was surveyed and there were surveys in the proposed additions and at Special Aquatic Features. Due to the change in the sensitive plant species list in late 2013, no surveys have been done for *Boechera tularensis* and *Cinna bolanderi.* In addition, new occurrences of *Bruchia bolanderi* and *Botrychium ascendens* were found after most of the surveys were completed. These indicated a change in elevation for the former and a better understanding of habitat for the other.

Additionally, *Botrychium spp.* can grow under fairly dense willows. Those are areas that cattle are unlikely to impact and were not surveyed. They can also grow along streams. Those areas were not targeted for surveys. Of the higher elevation meadows where *Meesia uliginosa* is more likely, many of the unsurveyed meadows are outside of the primary and secondary range areas where cattle are most likely to go.

The most likely areas of habitat have been surveyed in primary and secondary range for *Lupinus gracilentus.* These are the areas where cattle are most likely to be. The nearest known location is one-half mile from this project.

Table 3.03-1 Sensitive Plant species of the Stanislaus National Forest

Species Scientific Name	Species Common Name
Allium jepsonii	Jepson's onion
Allium tribracteatum	three bracted onion
Allium yosemitense	Yosemite onion
Arctostaphylos nissenana	Nissenan manzanita
Balsamorhiza macrolepis	big-scale balsamroot
Boechera evadens	hidden rockcress
Botrychium ascendens	upswept moonwort
Botrychium crenulatum	scalloped moonwort
Botrychium lunaria	common moonwort
Botrychium minganense	Mingan moonwort
Botrychium montanum	western goblin
Botrychium pedunculosum	stalked moonwort
Botrychium pinnatum	northwestern moonwort
Botrychium tunu	moosewort
*Botrychium yaaxudakeit**	giant moonwort
Bruchia bolanderi	Bolander's bruchia
Calochortus clavatus var. avius	Pleasant Valley mariposa lily
Clarkia australis	Small's southern clarkia
Clarkia biloba ssp. australis	Mariposa clarkia
Clarkia lingulata	Merced clarkia
Cypripedium montanum	mountain ladyslipper
Dendrocollybia racemosa	branched collybia
Draba asterophora var. asterophora	Tahoe draba
Draba asterophora var.macrocarpa	Cup Lake draba
Eriogonum luteolum var. saltuarium	Jack's buckwheat
Eriophyllum congdonii	Congdon's woolly sunflower
Eriophyllum nubigenum	Yosemite woolly sunflower
Erythronium taylori	Taylor's fawn lily
Erythronium tuolumnense	Tuolumne fawn lily
Fissidens aphelotaxifolius	brook pocket moss
Helodium blandowii	Blandow's bog moss
Horkelia parryi	Parry's horkelia
Hulsea brevifolia	short-leaved hulsea
Iris hartwegii ssp. columbiana	Tuolumne iris
Lewisia congdonii	Congdon's bitterroot
Lewisia kelloggii ssp. hutchisonii	Sierra Valley lewisia
Lewisia kelloggii ssp. kelloggii	Kellogg's lewisia
Lomatium stebbinsii	Stebbins' lomatium
Meesia uliginosa	broad-nerved hump-moss
Mielichhoferia elongata	elongate copper-moss
Mielichhoferia shevockii	Shevock's copper-moss
Mimulus filicaulis	Hetch-Hetchy monkeyflower
Mimulus pulchellus	pansy monkeyflower
Peltigera gowardii	veiny aquatic lichen, waterfan
Pinus albicaulis	White bark pine

Species Account and Habitat Status

The following paragraphs describe the sensitive plant species which occur or might occur in the project area, and their state and federal statuses. Additionally, the suitable habitat is described for

these sensitive plants. Suitable habitat for any species can be defined as the surroundings, substrate and environmental factors which allow that species to successfully grow and reproduce. Statuses and rankings of sensitive plants are summarized in the BE. Following is a description of the *species account and habitat status* for each sensitive plant species which could occur in the analysis area.

Boechera tularensis

Species Account - First described by Windham and Al-Shehbaz in 2007, this species is primarily known to the south of the Stanislaus National Forest with the nearest occurrence at El Capitan, a site with an unusually low elevation from 1939. There is a possible report from Emerald Bay in El Dorado County from 1930. For this reason, the species is considered to be possible on the Stanislaus National Forest. Most of the known collections are over 30 years old; many are much older.

Habitat status - *Boechera tularensis* occurs mainly on rocky slopes in montane to subalpine habitats. It may also grow near creeks, seeps, or meadows, on saddles or in canyons. It is usually shaded or partially shaded, and may favor east aspects. Soils may be derived from volcanic, granitic, metamorphic, or limestone parent materials.

Botrychium ascendens

Species Account - First described by Wagner and Wagner in 1986, *Botrychium ascendens* is widely scattered and rare in western North America. This moonwort is known to occur in Canada, Alaska, Nevada, California, and the Pacific Northwest. In California, it is known from Butte, El Dorado, Mono, Placer, Plumas, Nevada, Shasta and Tehama Counties. In 2011 the California Natural Diversity Database (CNDDB) showed 19 small occurrences. There are two known occurrences on the Stanislaus National Forest on the Summit and Calaveras Ranger Districts. There is suitable habitat on the Eagle Meadow Allotment. There are none known within the project area.

Habitat Status - *B. ascendens* is normally found in wet meadows or in riparian areas in coniferous forests. It has also been found along the dryer areas of fens. It ranges from 4,900 to 10,500 feet in elevation.

Botrychium crenulatum

Species Account - First described by Wagner and Wagner in 1981, *Botrychium crenulatum* has the widest distribution of the sensitive botrychiums across California. The 2011 CNDDB showed 59 small occurrences. Its range extends through the western United States and western Canada. Eight occurrences have been reported on the Stanislaus National Forest including one on the Summit Ranger District, but none are known within the project area. However, there is unsurveyed suitable habitat.

Habitat Status - *B. crenulatum* grows in moist habitats including meadows, seeps, springs, and riparian areas. It is most often found on lip or side of creek bank in conifer forest. It is also found in calcareous sites. It ranges in elevation from 4,800 to 8,300 feet.

Botrychium lineare

Species Account: - *Botrychium lineare* was described as a new species in 1994 by W. H. Wagner, based on type specimens from Wallowa County, Oregon. It was removed from the list of candidate endangered species in 2007. It is known from Alaska to the Sierra Nevada and southern California and extends east to northern Minnesota and western Quebec. Most populations range from 1 to 100 plants, with most having fewer than 10 plants. There is one known occurrence on the Stanislaus National Forest on the Summit Ranger District, but none are known within the project area. There is one small area of potential suitable habitat on the Eagle Meadow Allotment.

Habitat Status: - The habitat is generally calcareous and ranges from cliffs to forests, to mine tailings. Most occurrences are found in mid-successional meadows over calcareous bedrock or seepage. Habitat ranges in elevation from 8,200 feet to over 13,000feet in California.

Botrychium lunaria

Species Account - *Botrychium lunaria* has a circumboreal distribution. In North America, it occurs from Alaska to California, Arizona and the Great Lakes region. In California, it is documented in Modoc, Mono, Nevada, Tulare, and Tuolumne counties (CNDDB 2011). Occurrences on federal lands include four sites on the Modoc National Forest, two sites on the Inyo National Forest, one site on the Tahoe National Forest, and one site in Yosemite National Park. A number of the sites are very old and have not been relocated. There are no known occurrences on the Stanislaus National Forest. With recent changes in taxonomic understanding, it is unlikely to be found in the project area.

Habitat Status - *B. lunaria* occurs in moist habitats, often meadows, stream sides, seeps, and springs. Habitat ranges from 7,600 to 11,200 feet in elevation.

Botrychium minganense

Species Account - *Botrychium minganense* is distributed from Iceland to Alaska down to California. It is more abundant than the other rare *Botrychium* species. In California it is known to Butte, Fresno, Modoc, Placer, Plumas, San Bernardino, Shasta, Tehama Tulare, and Tuolumne Counties. The California Natural Diversity Database (CNDDB 2012) shows 28 occurrences. Most are on the Lassen National Forest, but they are also on six other national forests. In addition there is at least one occurrence in Sequoia Kings Canyon and 14 occurrences in Yosemite (Colwell 2012). Occurrences often consist of only a few plants so overall plant numbers in California are low. At least four occurrences have been found on the Stanislaus National Forest. None are in the project area.

Habitat Status - *Botrychium minganense*, Mingan moonwort, is usually associated with riparian areas, small streams, or fens in coniferous forests ranging from 5,000 to 10,200 feet in elevation (Baldwin et al. 2012).

Botrychium montanum

Species Account - *Botrychium montanum*, western goblin, is a small, primitive, perennial fern, *Botrychium montanum* occurs in scattered locations from British Columbia to Montana, California, Oregon, and Washington. In California it is found in Butte, El Dorado, Fresno, Lassen, Modoc, Plumas, Shasta, Sierra, Tehama (CNPS 2012). Only 23 occurrences are currently confirmed in the state (CNDDB 2011). The Lassen National Forest has had 19 documented occurrences. The Modoc, Plumas, Eldorado, and Sierra National Forests each have one occurrence. There is one known occurrence on the Stanislaus National Forest; none are known within the project area.

Habitat Status - *B. montanum* is found in varied wet habitats from marshes/meadows to coniferous forest/montane streamside areas, at elevations ranging from 4,900 to 10,200 feet (CNPS 2012).

Botrychium pedunculosum

Species account - Botrychium pedunculosum (stalked moonwort) was described by W.H. Wagner in 1986. Botrychium pedunculosum is found in the Rocky Mountains of northwestern Montana and northern Idaho and into northeastern Oregon (Farrar 2011a). There are disjunct occurrences in northeastern Quebec, northern Alberta and on the Alaska Peninsula (Farrar 2011b). There has been only one occurrence found in California. It is located in the Stanislaus National Forest, in the Rim Fire Hazard Tree project at the same meadow as the known occurrences of Botrychium crenulatum and Botrychium minganense. This occurrence of Botrychium pedunculosum is made up of two colonies. It is the most southerly occurrence of the species currently known. There are no occurrences known in this project.

Habitat status - It occurs in mountain meadows, under conifers or tall forbs, and sometimes in forests or woodlands and on roadsides or on scree slopes (Farrar 2011a). The elevation range of this species is 4,800 to 7,000 feet.

Botrychium pinnatum

Species account - *Botrychium pinnatum* was described as a new species in 1929 (Harold St. John 1929) based on specimens from the state of Washington. It occurs from northern California to near sea level in Alaska and extends east to Colorado and Montana. It is known from the Stanislaus and from three other occurrences in the state. It occurs from 6,200 to 9,200 feet in California. There are none known within the project area.

Habitat status - *Botrychium pinnatum* occurs in a range of habitats including closed canopy forests, but it is most commonly found in moist grassy sites in open forests and meadows. It often occurs near streams and other sites where soil moisture is constant (Wagner 2009).

Bruchia bolanderi

Species Account - *Bruchia bolanderi* is a rare, inconspicuous moss. First described from Yosemite National Park, it has been found in the central Sierra Nevada and in Oregon (Christy, 1980). At known sites, areas of the occurrences are relatively small (project record). At least 28 known occurrences exist in California and four on the Stanislaus National Forest (CNDDB 2011, CNPS 2012, personal observations). There is one occurrence in Cooper Meadow, one in Upper Hull, and three other occurrences in the Emigrant Wilderness. Numbers of plants are not recorded for mosses. Two specimen collections from the Bell Meadow and Herring Creek allotments are possibly *Bruchia bolanderi*, however moss experts have indicated that the identification could not be conclusive without capsules.

Habitat Status - *Bruchia bolanderi* is found in the largest amounts on the vertical soil banks of streams in upper montane meadows (elevations about 5,500 to 8,500 feet). At higher elevations it can occur in fens. It can also occur on root mounds of wind thrown trees or scattered under other vegetation (Christy 1980), but locations known so far on the Stanislaus National Forest are on stream banks or a similar condition of a road bank above standing water. It is usually in meadows and open habitat.

Cinna bolanderi

Species Account - Cinna bolanderi (Bolander's woodreed) is a perennial herb in the grass family, Poaceae. It was first described by Scribner in 1984. The range of Cinna bolanderi is the southern Sierra Nevada from Mariposa County to Tulare County. There are no known occurrences in the Stanislaus National Forest. However, there are occurrences in Yosemite National Park.

Habitat Status - *C. bolanderi* grows in wet meadows and along streams. Members of the genus *Glyceria* are similar in appearance to *Cinna bolanderi* and grow in the same habitat types. It is likely that *Cinna bolanderi* has been overlooked as a result. *Cinna bolanderi* grows in both granitic and metasedimentary soils. The elevation range of this species is 6,050 to 7,900 feet.

Helodium blandowii

Species Account - *Helodium blandowii* is known from Europe, Asia, and across northern United States from New Jersey and Ohio west to California and Nevada, and northwards to Canada (Flowers 1973). In California it has been reported from Fresno, Inyo, and Mono Counties. There is one occurrence on the Stanislaus National Forest in Tuolumne County. One area of very good suitable habitat is located in the project area in the Eagle Meadow allotment.

Habitat Status - *Helodium blandowii* grows in high elevation fens, wet meadows, near alpine lakes, and in seeps in forests. The occurrence on this forest is in the largest wetland and fen on known on the forest. It ranges in elevation from 6,000 to 9,000 feet.

Meesia uliginosa

Species Account - The geographic range includes Alaska, Canada, and Greenland. There are twenty eight occurrences in California, all in National Forest, and State and National Parks. They range from the San Jacinto Mountains to the Modoc National Forest. Over half of the occurrences are on the Tahoe National Forest (project record). It has not yet been found on the Stanislaus National Forest, but has been found to the north and south.

Habitat Status- *Meesia uliginosa* grows in meadows and seeps with members of the *Carex luzulina* complex. It is often found on or near logs. The elevation range is about 6,500 feet to 9,500 feet.

Environmental Consequences

The analysis of direct and indirect effects is focused on the cattle use areas. The analysis area considered in the cumulative effects portion of the analysis for each Allotment is the entire Allotment, including proposed additions. Direct, indirect, and cumulative impacts are analyzed by sensitive plant species, which have been grouped according to the habitat types shown in Table 3.03-2.

Table 3.03-2 Habitat types and sensitive plant species that occupy each habitat type

Habitat Type	Sensitive Plant Species
Stream Channels	*Bruchia bolanderi*
Seeps, Stringer Meadows, Meadow Edges	*Botrychium ascendens*
	Botrychium crenulatum
	Botrychium lunaria
	Botrychium minganense
	Botrychium montanum
	Epilobium howellii
Fens and Wet Areas of Meadows	*Helodium blandowii*
	Meesia triquetra
	Meesia uliginosa
Lodgepole Forest	*Lupinus gracilentus*

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Stream Channel Habitat - Bruchia bolanderi

Most of the suitable habitat for *Bruchia bolanderi* has been surveyed within the areas of primary and secondary range. It has limited habitat at these elevations since many meadows do not have perennial streams with steep, moist vertical banks, going through them. This condition is limited in the project area. It is fairly unlikely that there are other occurrences that are not known. In the areas outside of primary and secondary range, less than half of the known areas of suitable habitat have been surveyed.

Bruchia bolanderi has predominantly been found on steep, moist vertical banks of streams on this forest. The occurrences confirmed by the presence of capsules have been in granitic areas. These are areas that can be impacted if cattle go down the slope to water or walk up and down the stream. Those types of impacts were not seen when the collections were made. Cattle generally avoid steep stream banks in favor of those that allow easier access to the stream. They tend to continue to use the same access points. Forest plan Direction Standards and Guidelines limit livestock disturbance to no more than 20% of the streambank. It is unlikely there would be additional access points created through steep banks that are suitable habitat for *B. bolanderi*. Therefore there would be no direct effects in this alternative.

An indirect effect would be on the amount of sunlight reaching the sites. There is topographic shading provided by the stream banks. There can also be shading by vegetation on the banks. This species is very low and does not compete well with other species, so it must be able colonize new areas as established areas get revegetated. With grazing, the vegetation along the banks would not be as tall and would be less likely to shade it out.

There are no known impacts from cattle to the areas of possible occurrence of *Bruchia bolanderi* in this project and with stream bank alteration standards and proposed addition in the Herring Creek Allotment, it is unlikely that impacts would increase. No overall effects would result from this alternative.

Seeps, Stringer Meadows, Meadow Edges - Boechera tularensis, Botrychium ascendens, B. crenulatum, B. lineare, B. lunaria, B. minganense, B. montanum, B. pinnatum, B. pedunculosum, and Cinna bolanderi

Botrychiums are small and are not affected much by the loss of their above-ground structures because they derive a portion of their energy from mycorrhizal fungi (Johnson-Groh and Farrar 1996). However, if they are pulled rather than clipped the underground structures that would produce the next year plants may be damaged. The primary impacts from cattle would be from trampling, soil compaction, and defecating in areas where they may be growing. The impacts would be different in different habitats. In meadows, grazing could remove taller plants which could be shading the Botrychiums. Preliminary observations at an exclosure to protect Botrychiums in a meadow suggested that grazing helps the Botrychiums by removing competing vegetation. However in moist shaded areas near a stream the numbers were maintained in the exclosure due to the disturbance provided by the stream (Ahlenslager, pers. comm. Reported in Beatty *et al.* 2003). *B. minganense* was trampled heavily and only occurred where a log protected it in a streamside habitat that was near a cattle holding pen (pers obs. in Washington). On the Stanislaus visits to known sites after cattle had been through showed that only those plants growing in sites protected from cattle were not grazed. On the Kootenai National Forest Botrychiums grow in the roadside ditches along with other wetland species. Cattle graze in those areas and do not appear to affect *B. crenulatum* (Vanderhorst 1997). These are more open habitat that might resemble meadows. The timing of grazing is also a factor since grazing before the spores are mature would prevent reproduction.

The primary habitat in these Allotments is meadows. Those are the areas where cattle spend the most time. That is the type of habitat where impacts from cattle are less apparent. Many of the meadows have streams through them and are connected by streams. It is likely that cattle would move along the streams where riparian vegetation present. Those are the same conditions where Botrychiums would grow. If the vegetation if fairly dense, the effects would be similar to those in the meadow habitat. If the vegetation is sparse, then the cattle would probably pass through on the trail or might travel a different way. Impacts would be mostly confined to the trail and would not change as a result of this alternative.

For Botrychiums, habitat includes about 9 miles of suitable stream in Bell Meadow, 5 miles in Eagle Meadow, and 15 miles in Herring Creek Allotment. About 4 miles of stream in Bell Meadow could have suitable habitat and have not been surveyed - two miles of this is likely good habitat. Stream channel incision is prevalent, so there may be fewer actual areas of suitable habitat. In Eagle Meadow about half of the length is in an addition. It is heavily forested, although about one half mile looks like it could be good habitat based on surveys in another part of that addition. The Niagara drainage has another mile or so of possibly good habitat. This portion is not near enough to volcanic soils to be as likely. Herring Creek contains 3 miles of good habitat in the Cascade Creek addition, and less than a mile of unsurveyed suitable habitat in the existing Allotment.

All of the areas except Bell Meadow have had former timber sales in these areas. Because clearcut units are on both sides of a stream, it is more likely that the stream between those units may be heavily impacted by cattle (personal observations on Washington). There are three areas with

plantations on both sides of the stream. All of them are in the Herring Creek Allotment, two in the proposed addition, and one in the original Allotment. Since these clearcuts happened long ago, these impacts have likely already occurred in the existing Allotment, but may not have occurred in the proposed addition. A Botrychium was noted along a range transect in Round Meadow (Bell Meadow Allotment). It was not identified to species because it was not in a plot. It is likely to be *Botrychium simplex* ssp. *compositum*, a more common Botrychium, based on the habitat where it was found. Botrychiums found in open meadow are usually this species. If the Botrychium is found and is sensitive it will be protected in some way if protection is needed.

To summarize what this could mean in terms of Botrychiums, if there is cattle trailing and grazing along those creeks and there are Botrychiums present, they could be impacted. Over half of the unsurveyed habitat is in the proposed additions, particularly the Cascade Creek addition in the Herring Creek Allotment. It is not known how the cattle may move in those areas. Due to the dispersed plantations in the Herring Creek Allotment, there is likely to be more dispersion in that addition. Since two of the areas of particular concern are in an addition to the Herring Creek Allotment, this alternative could have the greatest possible effect on Botrychiums. One way to mitigate this would be to survey the areas of concern for Botrychiums.

Since there have been no surveys in the project area for *Boechera tularensis* and *Cinna bolanderi*, the extent of effects is not completely known. For *Cinna bolanderi*, I will use continuing presence of *Glyceria elata* as a proxy. *Glyceria elata* is another tall grass that is more abundant and grows in similar habitat to that of *Cinna bolanderi*. It is primarily along streams and is a little less likely to be in general meadow habitat. A review of my survey forms showed that *Glyceria elata* was present in many of the locations surveyed, usually in a patchy or scattered distribution. It was not noted as rare on any of those forms. It is a tall grass and it is likely that some would be affected by grazing and trampling along streams and in meadow, but that it is likely to persist.

There is no proxy for *Boechera tularensis*. It is noted as being in dry habitat and also along the edges of more moist areas that cattle would use. I have never seen any plants in that genus in moist meadows, and that genus is not favored by cattle. So impacts would probably be limited to some trampling by cattle as they access the meadow or seek shade under trees adjacent to the meadow and random partial consumption. Fens and wet areas of meadows - *Helodium blandowii* and *M. uliginosa*

There are no known occurrences of these species in this project area. Project surveys and fen surveys targeted the type of habitats where these species could occur. After several years of meadow surveys in most of the Allotments on the Forest, only one occurrence of *Helodium blandowii* has been found. It is fairly unlikely that these species are present in these Allotments. In addition, *Meesia uliginosa* primarily grows on decaying wood in wet habitat and would be less likely to be impacted. It is much less common, has not yet been found on this Forest and is unlikely to be found given how limited *M. triquetra* appears to be on this Forest. The most likely areas for *Helodium blandowii* were surveyed. Surveys were done before *Helodium blandowii* was found on the forest and may not have been adequate to identify mosses growing in with sedges. The area with the best habitat for *Helodium blandowii* is in Eagle Meadow, which is used as a gathering pasture.

Areas of unsurveyed suitable habitat for *Meesia* uliginosa exist in all three Allotments. Volcanic soils and adjacent areas can have more moisture and would be more likely habitat. Unsurveyed areas of volcanic soils include 16 locations in the Eagle Meadow Allotment (3 in primary/secondary range), 47 in Herring Creek Allotment (45), and 8 (2) in Bell Meadow Allotment. The Herring Creek Allotment, with far more meadows also has more unsurveyed meadows. These are about one-quarter of the meadows or less in each of the Allotments within the primary and secondary range. Generally under half of the meadows outside of the primary and secondary range have been surveyed for these species.

There is a small chance that these species could be present. If they are present, there could be impacts associated with continued grazing, particularly in drought years when the moist habitat where they grow is favored by cattle. This alternative increases the amount of area that is available for grazing in two of the three Allotments, so impacts should be smaller than may have occurred in the past. There is a measure in this alternative that would protect any sensitive plants that are found in the future. Cattle can cause bare areas through pocking and would reduce the area of suitable habitat where *Helodium blandowii* could grow. *Meesia uliginosa* primarily grows on decaying wood in wet habitat and is less likely to be impacted.

CUMULATIVE EFFECTS

Stream Channel Habitat - Bruchia bolanderi

Since there would be no direct or indirect effects in this alternative there would be no cumulative effects.

Seeps, Stringer Meadows, Meadow Edges - Boechera tularensis, Botrychium ascendens, B. crenulatum, B. lineare, B. lunaria, B. minganense, B. montanum, B. pinnatum, B. pedunculosum, and Cinna bolanderi

A meadow restoration in the Gooseberry Ecological Restoration project would affect Round Meadow where a *Botrychium* plant is located. The known plant location would be protected in that project and it is some distance from the streams where the work would take place. The primary impacts from this action would be shading from the increased growth of other plants, particularly graminoids, while cattle are excluded. Botrychiums are able to stay underground for a number of years and do not appear to rely on photosynthesis entirely for their energy needs. Since the meadow would be excluded for at least five years, this would be only a short term impact.

The primary effect to *Epilobium howellii* has been from the fencing of Three Meadows. That took place about 15 years ago, but the fence is not always up and effective. *Epilobium howellii* was found in a year when grazing occurred and has not been found in a year when grazing did not occur. The overall status and potential cumulative effect to that occurrence is not known.

Fens and wet areas of meadows - Helodium blandowii and Meesia uliginosa

There are no other known projects that would affect the areas of unsurveyed suitable habitat in the future. Past activities include logging, which avoided meadows, a ski area expansion, pack station operations, and recreation. Meadows have been increasingly protected by moving roads and trails out of them. These would not contribute negative effects to this habitat type.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Stream Channel Habitat - Bruchia bolanderi

There would be no direct effects in this alternative since there is no action proposed. The steep bank habitat where this species occurs is primarily a legacy of intensive grazing and management in the past. It is in recovery now and would eventually have more vegetative cover in the areas where the bank is moist. This would reduce suitable habitat. The process is slow and would take decades (Jim Frazier personal communication 2006). There would not be much change in the foreseeable future so the effect would be negligible. In the short term, the primary effect would be that there could be taller plants shading more of the stream banks. Growth of grasses and forbs on the edge of the bank would probably cause any occurrences to shift slightly in location.

Seeps, Stringer Meadows, Meadow Edges - Boechera tularensis, Botrychium ascendens, B. crenulatum, B. lineare, B. lunaria, B. minganense, B. montanum, B. pinnatum, B. pedunculosum, and Cinna bolanderi

There would be no direct effects in this alternative since there is no action proposed. The primary indirect effect in this alternative would be the growth of sedges and other tall plants that could shade out these shorter species. , This could happen to *Botrychium* plants that occur in meadows. In the

areas under shrubs they are generally fairly protected already. Since they generally grow in ephemeral draws and have been found in areas outside of Allotments, it is likely this alternative would be beneficial.

For *Cinna bolanderi*, this alternative would be beneficial. It is a tall grass and would not be affected much by the growth of other plants. For *Boechera tularensis*, it would be beneficial, but to a lesser extent since impacts are less likely.

Fens and wet areas of meadows - Helodium blandowii and Meesia uliginosa

There would be no direct effects in this alternative since there is no action proposed. With the removal of cattle a number of meadow areas would move toward late- seral status. This would tend to increase cover and increase the amounts of sedges which are some of the dominant fen creating species. This would be beneficial for the fens. As discussed above, not all meadows respond to the removal of cattle, even over the course of decades. The specific areas where *Meesia uliginosa* grows are less likely to change. At the known occurrence in an Allotment that has not been used for 13 years the occurrence is relatively large and appears to be doing well. The effects of this alternative would be beneficial. No known harmful effects would occur.

CUMULATIVE EFFECTS

Stream Channel Habitat - Bruchia bolanderi

Since there would be no direct or indirect effects in this alternative there would be no cumulative effects.

Seeps, Stringer Meadows, Meadow Edges - Boechera tularensis, Botrychium ascendens, B. crenulatum, B. lineare, B. lunaria, B. minganense, B. montanum, B. pinnatum, B. pedunculosum, and Cinna bolanderi

As mentioned above, the Gooseberry Ecological Restoration project could have some short term effects to one *Botrychium* plant that may or may not be a sensitive species. Cumulative effects for this alternative would be similar to those described for Alternative 1.

Fens and wet areas of meadows - Helodium blandowii and Meesia uliginosa

The primary effect to these species is beneficial, so the contribution to cumulative effects would also be positive. There are no anticipated effects to fens in the project area from other projects.

Alternative 3 (Current Management)

DIRECT AND INDIRECT EFFECTS

This alternative represents current management and does not incorporate the plant protection measures that are in Alternatives 1 and 4.

Stream Channel Habitat - Bruchia bolanderi

The effects to *Bruchia bolanderi* for Alternative 3 would be essentially the same as in Alternative 1. There would be no change to the Bell Meadow and Herring Creek Allotment areas, so impacts would continue unchanged.

Seeps, Stringer Meadows, Meadow Edges - Boechera tularensis, Botrychium ascendens, B. crenulatum, B. lineare, B. lunaria, B. minganense, B. montanum, B. pinnatum, B. pedunculosum, and Cinna bolanderi

Because there are no proposed additions in this alternative fewer possible impacts to *Botrychium spp*. are expected. There is still one area of concern in the Herring Creek Allotment. This would be subject to the same impacts that have occurred under previous (current) management. Since it was not surveyed, some effects are assumed for these species. For *Cinna bolanderi*, the effects would be somewhat more than in Alternative 1 because there would be less monitoring and adaptive management. Impacts to *Boechera tularensis* would not be very different.

Fens and wet areas of meadows - Helodium blandowii and Meesia uliginosa

In this alternative there would be no additional monitoring of special aquatic features, so suitable habitat for these species could decline in quality. In addition, the same number of cattle would graze in a smaller area for two of the three Allotments in this alternative, so impacts would be somewhat greater in this alternative.

CUMULATIVE EFFECTS

Stream Channel Habitat - Bruchia bolanderi

No direct, indirect or cumulative effects in this alternative.

Seeps, Stringer Meadows, Meadow Edges - Boechera tularensis, Botrychium ascendens, B. crenulatum, B. lineare, B. lunaria, B. minganense, B. montanum, B. pinnatum, B. pedunculosum, and Cinna bolanderi

The contributions of past and future projects would be the same in this alternative as in Alternative 1.

Fens and wet areas of meadows - Helodium blandowii and Meesia uliginosa

The cumulative effects to these species for this alternative would be the same as in Alternative 1.

Alternative 4 (Resource Protection)

There are no proposed additions in this alternative, specific areas would be excluded from grazing, and mitigation measures would be implemented to protect the condition of special aquatic features and meadows. The area that would be excluded in the Herring Creek Allotment has many of the unsurveyed meadows and unconfirmed possible fens. It is an area that would be otherwise grazed late in the season. Late season grazing is particularly harmful to fens because they remain green all year. This alternative also includes measures for sensitive plant protection.

DIRECT AND INDIRECT EFFECTS

Stream Channel Habitat - Bruchia bolanderi

All of the possible occurrences of *Bruchia bolanderi* in this project are in areas that would not be considered suitable for grazing in this alternative. So the effects in this alternative for this species would be similar to the effects in Alternative 2.

Seeps, Stringer Meadows, Meadow Edges - Boechera tularensis, Botrychium ascendens, B. crenulatum, B. lineare, B. lunaria, B. minganense, B. montanum, B. pinnatum, B. pedunculosum, and Cinna bolanderi

As with Alternative 3, the proposed additions are not included in this alternative. This removes the two largest areas of concern for the botrychiums. This alternative also maintains a lower density of cattle, similar (proportionate) to Alternative 1. Some impacts are expected for this alternative, primarily in the unsurveyed area, but the predominant impacts are positive, particularly for *Botrychium* spp. This alternative would have fewer impacts to *Cinna bolanderi* and *Boechera tularensis* since impacts would correspond to those in Alternative 1, but a smaller area would be impacted.

Fens and wet areas of meadows - Helodium blandowii and Meesia uliginosa

As noted previously, many of the unsurveyed meadows in the Herring Creek Allotment are excluded in this alternative. For unsurveyed suitable habitat in the meadows that are excluded, this alternative is beneficial. For other unsurveyed suitable habitat the impacts are similar to Alternative 1 because the densities of cattle are proportionate to that alternative. In addition, this alternative would monitor the condition of special aquatic features, so the habitat would be further protected. This alternative would have the fewest negative impacts of all the action alternatives.

CUMULATIVE EFFECTS

Stream Channel Habitat - Bruchia bolanderi

No cumulative effects would occur under this alternative.

Seeps, Stringer Meadows, Meadow Edges - Boechera tularensis, Botrychium ascendens, B. crenulatum, B. lineare, B. lunaria, B. minganense, B. montanum, B. pinnatum, B. pedunculosum, and Cinna bolanderi

The Botrychium occurrence at Round Meadow is probably the non-sensitive species based on habitat and it would be protected in the Gooseberry Ecological Restoration project.

Fens and wet areas of meadows - Helodium blandowii and Meesia uliginosa

No known future projects would affect the areas of unsurveyed suitable habitat for these species.

Summary of Effects Analysis across All Alternatives

Table 3.03-3 Summary of effects across all alternatives

Sensitive Plant Species	**Alternative 1** (Proposed Action)	**Alternative 2** (No Action)	**Alternative 3** (Current Management)	**Alternative 4** (Resource Protection)
Botrychiums	Most impact (addition areas)	Beneficial	Less impact	Less impact
Bruchia bolanderi	No impact	No impact	No impact	No impact
Epilobium howellii	Mixed positive and negative, more impact than 2 &4 (addition areas)	Mixed positive and negative	Most impact	Mixed positive and negative (same as 2)
Helodium blandowii	Some impact	Beneficial	Greatest Impact	Least impact of action alternatives
Lupinus gracilentus	No impact	No impact	No impact	No impact
Meesias	Some impact	Beneficial	Greatest Impact	Least impact of action alternatives

Compliance with the Forest Plan and Other Direction

The Forest Service Manual, Section 2670.32 states that "the line officer, with project approval authority, makes the decision to allow or disallow impact, but the decision must not result in loss of species viability or create significant trends toward Federal listing." This project has been modified by incorporating protective measures for known sensitive plants and habitat and newly discovered sensitive plant occurrences. These modifications are designed to reduce, minimize or alleviate adverse effects to sensitive plants. Therefore, this proposed project would comply with current management direction and Forest Service policy.

3.04 CULTURAL RESOURCES

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Direction relevant and specific to the proposed action as it affects cultural resources includes:

The Forest Service is directed to identify, evaluate, treat, protect, and manage cultural resources by several laws. However, the NHPA, as amended (16 U.S.C. 470 et seq.), provides comprehensive direction to federal agencies about their historic preservation responsibilities. Executive Order 11593, entitled *Protection and Enhancement of the Cultural Environment*, also includes direction about the identification and consideration of cultural resources in Federal land management decisions.

The NHPA extends the policy in the Historic Sites Act of 1935 (49 Stat. 666; 16 U.S.C. 461-467) to include resources that are of State and local significance, expands the National Register of Historic Places (NRHP), and establishes the Advisory Council on Historic Preservation and State Historic Preservation Officers. NHPA Section 106 directs all Federal agencies to take into account effects of their undertakings (actions, financial support, and authorizations) on properties included in or eligible for the National Register. The Advisory Council on Historic Preservation (ACHP) regulations (36 CFR 800) implements NHPA Section 106. NHPA Section 110 sets inventory, nomination, protection, and preservation responsibilities for Federally-owned cultural resources.

Section 106 of the NHPA and the ACHPs implementing regulations, *Protection of Historic Properties* (36 CFR Part 800), require that federal agencies take into account the effect of their undertakings on cultural resources, and that agencies provide the ACHP with an opportunity to comment on those undertakings. Programmatic agreements (36 CFR 800.14(b)) provide alternative procedures for complying with 36 CFR 800. Region 5 has such an agreement: *Programmatic Agreement Among The U.S. Department Of Agriculture, Forest Service, and the Advisory Council On Historic Preservation Regarding Rangeland Management Activities on National Forest System Lands* (Rangeland PA, project record). This agreement provides a national heritage resource management strategy by which Forest Service Regions and individual Forests may meet their historic preservation mandates for the issuance and administration of term grazing permits, and for management of other rangeland activities, such as range improvements and Allotment plans, which require National Environmental Policy Act compliance. Additionally, the *Memorandum of Understanding (MOU) Among the USDA Forest Service Pacific Southwest Region, California State Historic Preservation Officer, and the Nevada State Historic Preservation Officer Regarding Rangeland Management Activities* (Range MOU, project record) provides guidance for Pacific Southwest Region Forests in meeting their Section 106 responsibilities for grazing.

Executive Order 11593: *Protection and Enhancement of the Cultural Environment*, issued May 13, 1971, directs Federal agencies to inventory cultural resources under their jurisdiction, to nominate to the National Register of Historic Places all Federally owned properties that meet the criteria, to use due caution until the inventory and nomination processes are completed, and to assure that Federal plans and programs contribute to preservation and enhancement of non-Federally owned properties.

Forest Plan and other management direction specific to cultural resources includes the following:

- Complete a cultural resource inventory prior to any land disposal action or any Forest or Forest-permitted or assisted action, activity or program that has the potential of altering prehistoric or historic cultural values to identify all potentially eligible cultural properties which may be affected (36 CFR 219.24).
- Consult with members of the potentially affected local Native American community to identify specific locations and issues.

- Assess the scientific, historic and ethnic significance for each cultural property before determining further treatment (36 CFR 219.24).
- Use appropriate Programmatic Agreements and Treatment Plans whenever possible.
- Apply the National Register of Historic Places criteria in 36 CFR 60 and regulations in 36 CFR 63 to determine the eligibility of a cultural property to the National Register.
- Use FSM 2361, FSM 1680, and Advisory Council on Historic Preservation's "Treatment of Archaeological Properties: A Handbook", and the traditional values of local Miwok, Washoe and Paiute Indian communities as guidelines for evaluating significance.
- Evaluate the effect of Forest undertakings on the resource.
- Apply the Criteria of Effect in 36 CFR 800, and follow FSM 2361 for determining the effect of an undertaking.
- All identified cultural resources are to be protected until they are evaluated. The integrity and significant values of eligible properties and National Historic Landmarks are to be protected. When necessary, mitigative excavation or data recovery may be accomplished.
- Use the guidelines in FSM 2361 and FSM 1680 for developing and implementing protective measures.
- Comply with 36 CFR 800 regulations and follow the guidelines in 36 CFR 66, FSM 2361, and the 13 principles in the "Treatment of Archaeological Properties" Handbook (ACHP).
- Utilize law enforcement patrols to help prevent site vandalism and conduct law enforcement investigations when cultural resources are impacted using the Archaeological Resources Protection Act (ARPA), 36 CFR 261.9, and other applicable laws and regulations.
- Plan interpretation, research and restoration projects for the benefit of the public and of cultural resources.
- Treatments of cultural properties, including maintenance of cultural resources, should be appropriate to their assessed values (as documented in the Statement of Significance in the Request for Determination of Eligibility and National Register nomination form), the state of knowledge and methods of cultural resource disciplines, and the public interest.
- The significant values of National Register and eligible historic structures shall be conserved by physical protection and maintenance or recording to professional standards if physical preservation is not possible.
- Work with Interpretive Services to develop high quality brochures, publications and/or audio-visual presentations. Work with cooperators to develop high quality interpretive, stabilization, and/or restoration projects.
- Encourage the Sierra Miwok, Washoe, and Mono Lake Paiute to contribute to the Forest's cultural resource management activities, to enhance public understanding of their traditional and contemporary cultures.

Effects Analysis Methodology

Assumptions Specific to Cultural Resources

1. Commercial livestock grazing is an ongoing activity and has already affected cultural resources, especially within primary range, concentration areas and livestock trails.
2. Under the action alternatives, in areas currently grazed by livestock, use will continue at current levels or be reduced (Alternative 4) with the authorization of continued grazing.
3. According to the Rangeland PA, all archaeological and historical sites identified within the APE for all alternatives are considered cultural resources for the purposes of this undertaking, unless they already have been determined not eligible in consultation with the SHPO or through other agreed on procedures (36 CFR 60.4; 36 CFR 800).
4. A majority of adaptive options are not considered an undertaking subject to the NHPA. However, construction of new range infrastructure is considered an undertaking.

5. Authorization of continued grazing, when combined with the past, present and foreseeable future actions are not expected to cumulatively lead to increased impacts to cultural resources.

Data Sources

1. Site-specific cultural resource inventories. The District Archaeologist conducted cultural resources field surveys for this undertaking. The primary objectives of these surveys were to identify cultural resources in the APE that may be affected by the undertaking and collect information on their current condition.
2. Existing information from cultural resource records, historic archives, maps, and GIS spatial layers was also used.

Cultural Resources Indicators

Indicators of direct and indirect effects include exposure of surface artifacts by grazing, trampling and/or crushing of vegetation as cattle move through the area. Visual inspection was used to identify and document any unusual breakage, shifting or damage to artifacts.

Cultural Resources Methodology by Action

In August 2005 a survey strategy was designed to investigate areas where high concentrations of cattle overlapped with areas of high archaeological probability. Each Allotment was researched using land-use patterns already established by previous survey coverage. The strategy focused on areas identified by the Forest Range Specialist as primary and secondary range. The strategy was consistent with the Rangeland PA and Range MOU. Both agreements encourage survey strategies to be commensurate with the level of anticipated affects. Important to the integrity of this design was to determine whether evidence of use indicates a high potential for resource damage. Therefore, it was important to monitor the effects of grazing on known sites.

Affected Environment

Existing Conditions

Bell Meadow Allotment

A Forest Range Specialist's review of the Bell Meadow Allotment identified that of the total 10,717 acres, 1,668 acres were determined to primary and secondary range. A pre-field review determined that 1,070 acres of this primary and secondary range had been previously surveyed for cultural resources through various other projects. An additional 531 acres of primary and secondary range was identified as needing archaeological survey in order to make the determination of cattle effects on cultural resources.

Fourteen past and present field surveys have been conducted to identify cultural resources of interest likely to be affected by trampling in high cattle concentration areas. The result of these surveys identified 37 prehistoric and historic properties within the Allotment boundaries of which 18 are located within the areas identified as primary and secondary range.

Of these, there are 35 prehistoric sites related to food processing (bedrock milling features), stone tool processing (lithic scatters) and temporary living areas (rock shelters). These sites are associated with land use by the native inhabitants of the region, known as the Central Sierra Me-Wuk.

The two historic properties within the Allotment are primarily associated with early cattlemen and/or early settlers. These site types include arborglyphs (aspen carvings) and a collapsed wooden structure with associated historic artifacts.

Contemporary Native American Use

There are no known traditional collection areas within the Allotment boundary and to date no input has been received from the Tuolumne Me-Wuk Tribal Council regarding any such locations. This

project was presented at the Annual Heritage Resource Tribal Consultation Day in April 2011. This project is not anticipated to have any effects on cultural values, particularly plant species important to California Indian Basketweavers or other Native American gatherers.

Historic Use

Historic records, maps and oral accounts encompassing the Allotment boundary indicate moderate livestock grazing occurred from the 1850's to present. Much of the existing trail system is probably connected to moving livestock to summer pasturage; many of the trails link and/or pass by the areas where Kerrick Corral (Aspen Pack Station), Belle Meadow Camp, and Crabtree Camp were located. The remains of a collapsed wooden structure (cabin) (FS 05-16-53-577) are most likely a range cabin and associated artifacts place an approximate date of the 1920's for the structure.

Additionally, early pioneer exploration and settlement impacted the proposed project area. Several historic trails pass through the Allotment area, most notably the 1852 Walker River-Sonora route. This trail depicted in the APE as Forest Road 4N24 and portions of 4N37 is the accepted alignment of the near disastrous Clark-Skidmore Party (1852) and Duckwall Party (1853). Though there are no remaining physical features such as "blazed trees", stone work or earthworks that indicate this route, there are historic markers in the form of arborglyphs (aspen carvings) left behind. Site FS 05-16-53-578,is an aspen carving with a date of July 12, 1885 and letters DOMEK or DONNEK; it is most likely related to these early pioneers.

Eagle Meadow Allotment

A Forest Range Specialist's review of the Eagle Meadow Allotment identified that of the total 19,200 acres, 4,375 acres were determined to be range. A pre-field review determined that 3,240 acres of this primary and secondary range had been previously surveyed for cultural resources. No additional archaeological survey was deemed necessary to make the determination of cattle effects on cultural resources.

Eight previous field surveys have been conducted to identify cultural resources of interest likely to be affected by timber sale activity, cattle grazing or other permitted forest activity. The result of these surveys identified 100 prehistoric and historic properties within the Allotment boundaries of which 37 are located within the areas identified as primary and secondary range.

Of these, there are 92 prehistoric sites related to food processing (bedrock milling features), stone tool processing (lithic scatters) and temporary living areas (rock shelters). These sites are associated with land use by the native inhabitants of the region, known as the Central Sierra Me-Wuk.

The eight historic properties within the Allotment are the result of early forest activities, livestock grazing (cattle and sheep), and mining. These site types include an historic cow camp, historic refuse/can scatters, arborglyphs (aspen carvings), and remains of a wooden structure (cabin) with associated historic artifacts.

Contemporary Native American Use

There are no known traditional collection areas within the project boundary and to date no input has been received from the Tuolumne Me-Wuk Tribal Council regarding any such locations. This project was presented at the Annual Heritage Resource Tribal Consultation Day in April 2011. This project is not anticipated to have any effects on cultural values, particularly plant species important to California Indian Basketweavers or other Native American gatherers.

Historic Use

Historic records, maps and oral accounts encompassing the Allotment boundary indicate moderate livestock grazing occurred from the 1860's to present. These records indicate that as early as 1861 W. F. Cooper (associated with Cooper Cow Camp and Cooper Allotment) drove cattle seasonally up to the headwaters of the Stanislaus which includes the Eagle Meadow and Long Valley area. By the

1880's the range camp that became Martin's Cow Camp (FS 05-16-53-313) was constructed by the McCormick family as a range cabin and base of operations for butter production in this area.

Historic evidence of past sheep grazing is evident in the form of carvings on aspen trees (arborglyphs) left by Basque sheepherders. These carvings have been found located throughout the Allotment particularly in Barn Meadow (FS 05-16-53 -790) and along Niagara Creek, Eagle Creek and Long Valley Creek.

Mining activity also impacted the area within the Allotment. In 1955, uranium was discovered at Juniper Mine adjacent to Sardine Meadow. Hundreds of test pits, claim markers and other exploratory drillings are scattered throughout the Allotment.

The majority of the claims belong to Carrigan Mines, Inc. whose headquarters/office remains, (FS 05-16-53-622) are located at Niagara Creek. The office was removed by the Forest Service in 1972.

Early emigrant routes skirt the boundary of the Allotment but did not directly impact it. The Sonora-Mono Toll road, finished in 1864, forms the western boundary of the Eagle Meadow Allotment and the Niagara addition. Built primarily for hauling goods to the gold and silver boom towns of Aurora and Bodie, use of the road diminished until 1901 when it was taken over as a State Highway (Highway 108). Major improvements were made to the highway 25 years later.

As with the Bell Meadow and Herring Creek Allotments, much of the existing recreational trail system is connected to moving both cattle and sheep livestock to summer pasturage; many of the trails leading in and out of the Allotment boundaries link and/or pass by Martin's Cow Camp, Cooper Cabins (05-16-53-10) and Kennedy Cabin (FS 05-16-53-117) areas.

Herring Creek Allotment

A Forest Range Specialist's review of the Herring Creek Allotment identified that of the total 17,246 acres, 3,182 acres were determined to be primary and secondary range. A pre-field review determined that 2,240 acres of this primary and secondary range had been previously surveyed for cultural resources through various other projects. An additional 34 acres of primary and secondary range was identified as needing archaeological survey in order to make the determination of cattle effects on cultural resources.

Fifteen past and present field surveys have been conducted to identify cultural resources of interest likely to be affected by trampling in high cattle concentration areas. The result of these surveys identified 68 prehistoric and historic properties within the Allotment boundaries of which 21 are located within the areas identified as primary and secondary range.

Of these, there are 63 prehistoric sites related to food processing (bedrock milling features), stone tool processing (lithic scatters) and temporary living areas (rock shelters). These sites are associated to land use by the native inhabitants of the region, known as the Central Sierra Me-Wuk.

The 5 historic properties within the Allotment are the result of early forest activities, logging and livestock grazing by early cattlemen. These site types include historic trails, arborglyphs (aspen carvings), remnants of a logging activity area, and a collapsed wooden structure with associated historic artifacts.

Contemporary Native American Use

There are no known traditional collection areas within the project boundary and to date no input has been received from the Tuolumne Me-Wuk Tribal Council regarding any such locations. This project was presented at the Annual Heritage Resource Tribal Consultation Day in April 2011. This project is not anticipated to have any effects on cultural values, particularly plant species important to California Indian Basketweavers or other Native American gatherers.

Historic Use

Historic records, maps and oral accounts encompassing the Allotment boundary indicate moderate livestock grazing occurred from the 1880's to present. The first permit issued in 1913 for the Allotment was to the Sanguinetti family who currently holds the Allotment permit for the adjacent Cooper Allotment. As with the Bell Meadow Allotment, much of the existing recreational trail system is connected to the moving of livestock to summer pasturage. Adjacent to one of these trails along Herring Creek are the remains of a collapsed wooden structure (FS 05-16-53-188) and iron artifacts possibly related to a range cabin. Other historic trails include a supply route (1934) (FS 05-16-53-576) leading to the location of the former Pinecrest Lookout (1934) (FS 05-16-53-607).

Additional historic evidence of past sheep grazing is evident in the form of carvings on aspen trees (Arborglyphs) left by Basque sheepherders. These carvings have been found located adjacent to various trails throughout the Herring Creek Allotment.

Early emigrant routes skirt the boundary of the Allotment but did not directly impact it. The Sonora-Mono Toll road, finished in 1864, forms the western boundary of the Herring Creek Allotment and the Cascade addition. Built primarily for hauling goods to the gold and silver boom towns of Aurora and Bodie, use of the road diminished until 1901 when it was taken over as a State Highway (Highway 108). Major improvements were made to the highway 25 years later.

Water development of Herring Creek began in 1857 with the construction of a wood and dirt filled dam by the Tuolumne Water and Power Company as part of ditch and flume system to provide water to the miners in the Columbia area. Herring Creek Dam (FS 05-16-53-74) was improved in 1931 when a concrete dam was constructed to provide drinking water to the local community.

Environmental Consequences

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Extensive inventory and monitoring has determined that cattle are not causing any direct impacts to heritage resource sites. Potential indirect effects are minimal but may include the exposure of surface artifacts as vegetation is removed through grazing or as trampling/crushing of brush occurs as cattle move through the area. Visual inspection of lithic scatters within the areas identified as high cattle concentration found no unusual breakage, shifting or damage to artifacts.

The addition of proposed infrastructure will have no effect to nearby cultural resources. The proposed construction of a new corral at the junction of 5N13Y and 5N01 (Eagle Meadow Road) will have no effect to cultural resources. The construction of a corral and handling facility at the junction of Road 4N25 and Road 4N02Y (Bell Meadow Road) is near several historic and prehistoric sites. These sites will be "flagged and avoided" for protection per the Treatment Measure C(V)(D)(2)(a) of the Rangeland PA prior to the construction activity. Placement of fencing between Hammill Canyon and Bloomer Lake Units will be reviewed by the District Archaeologist prior to implementation. Once need and location of additional fencing has been determined, the placement will need to be reviewed by the District Archaeologist prior to implementation.

CUMULATIVE EFFECTS

Since there would be no direct effects and indirect effects are expected to be incidental/minimal, there are would be no cumulative effects to cultural resources resulting from Alternative 1.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

There are no anticipated direct or indirect effects to historic or prehistoric properties under this alternative, as no project activities (grazing) would occur.

CUMULATIVE EFFECTS

Since there would be no direct effects and indirect effects, there would be no cumulative effects to cultural resources resulting from Alternative 2.

Alternative 3 (Current Management)

DIRECT AND INDIRECT EFFECTS

Anticipated direct and indirect effects under Alternative 3 (Current Management) are the same as Alternative 1. Historic grazing would continue with no direct effect and minimal indirect effects. Because the additional modifications are incidental and have no direct ground disturbing ramifications that could affect cultural resources, this alternative will have no effect. Based on this analysis and the actions described above, the District Archaeologist has made the determination that this undertaking will have no effect on heritage resources. This no effect recommendation is made in accordance with the Rangeland PA.

CUMULATIVE EFFECTS

Since there would be no direct effects and indirect effects are expected to be incidental/minimal, there would be no cumulative effects to cultural resources resulting from Alternative 3.

Alternative 4 (Resource Protection)

DIRECT AND INDIRECT EFFECTS

Bell Meadow Allotment

Anticipated direct and indirect effects under Alternative 4 (Resource Protection) are the same as Alternative 1. Historic grazing would continue with no direct effects and minimal indirect effects to cultural resources. Based on this analysis and the actions described above, the District Archaeologist has made the determination that this undertaking will have no effect on heritage resources. This no effect recommendation is made in accordance with the Rangeland PA.

CUMULATIVE EFFECTS

Since there would be no direct effects and indirect effects are expected to be incidental/minimal, there would be no cumulative effects to cultural resources resulting from Alternative 4.

Summary of Effects Analysis across All Alternatives

For all action alternatives, historic grazing would continue with no direct effect, minimal indirect effects and no cumulative effects to cultural resources. Anticipated effects for alternatives 3 and 4 are the same as Alternative 1. There are no anticipated direct, indirect or cumulative effects to cultural resources under Alternative 2 (No Action), as no grazing would occur.

Compliance with the Forest Plan and Other Direction

All alternatives comply with all Forest Plan S&Gs as well as with all federal laws identified in the Analysis Framework.

3.05 INVASIVE SPECIES

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Forest Service Manual 2900 Invasive Species Management, Forest Plan Direction (USDA 2010) and the Region 5 Noxious Weed Management Strategy require that a noxious weed risk assessment be conducted to "[d]etermine the risk of introducing, establishing, or spreading invasive species associated with any proposed action, as an integral component of project planning and analysis, and where necessary provide for alternatives or mitigation measures to reduce or eliminate that risk prior to project approval."

Invasive species are defined in FSM 2900 as causing, or be likely to cause, harm and be exotic to the ecosystem it has infested. Forest Plan Direction for invasive species states:

- Include weed prevention measures, as necessary, when amending or re-issuing permits (including, but not limited to, livestock grazing, special uses, and pack stock operator permits).
- Encourage use of certified weed free hay and straw. Cooperate with other agencies and the public in developing a certification program for weed free hay and straw. Phase in the program as certified weed free hay and straw becomes available. This standard and guideline applies to pack and saddle stock used by the public, livestock permittees, outfitter guide permittees, and local, State, and Federal agencies.

Effects Analysis Methodology

Assumptions Specific to Invasive Species

1. Invasive plants and noxious weed distributions are primarily determined by the vectors that carry them. They have potential to infest much more area than they currently infest in the project area.
2. The areas where the cattle arrive and spend the first few days are the most likely areas to receive new introductions of weeds.
3. Existing weeds may be spread further by cattle movement within the Allotment.
4. Weeds are likely to persist long-term once they are established in meadows. The habitat is moist and sunny and changes slowly.
5. The cattle enter the Bell Meadow Allotment at Aspen Pack station, which is a commercial pack station and a Forest Service pack station. It would be very difficult to attribute weeds to sources in that area.

Data Sources

1. References used in the analysis are incorporated into the references section of this document.
2. GIS layers with information on range resources and facilities, noxious weeds and invasive plants, infestations, and surveys locations.
3. On the ground surveys provided additional information. Most areas were surveyed in 2005 or 2006. In 2010 the areas where cattle come on the Herring Creek and Eagle Meadow Allotments were surveyed.

Invasive Species Indicators

1. Location and size of infestations of invasive plants and noxious weeds
2. Distance to nearest infestation of the same species (to show if they are outliers).

Invasive Species Methodology

This invasive plant risk assessment evaluates the risk for invasive plant introduction and spread by the project by considering the risks of and vulnerability to invasive plant establishment and possible factors for invasive plant introduction and spread.

Affected Environment

Invasive species are defined as "causing, or be likely to cause, harm and be exotic to the ecosystem it has infested" (FSM 2900). This section evaluates the risk for invasive plant introduction and spread by the project by considering the risks of and vulnerability to invasive plant establishment and possible factors for invasive plant introduction and spread.

Known Noxious Weeds and Invasive Plants

BELL MEADOW ALLOTMENT

White top (*Lepidium latifolium*), a State list B weed, was found at Aspen Pack Station. This is one of only two or three infestations known on the forest. There is a small infestation of State C list Bull thistle (*Cirsium vulgare)* along a trail near Lily Lake. There is a larger infestation in a meadow south of Mud Lake. The invasive plant ox-eye daisy (*Leucanthemum vulgare*) was found in a number of locations around the Dodge Ridge ski area. The areas of allotment boundary adjustment are small in this project and there are no known weeds in those areas or near those areas.

EAGLE MEADOW ALLOTMENT

State C list Bull thistle and non-native invasive wooly mullein (*Verbascum thapsus*) are scattered along the road to Eagle Meadow. They may have come in on hay. At Martin's Cow Camp on the edge of Eagle Meadow, a number of ruderal species were seen in the horse corral. Most were not in a stage that is easy to key and do not have final identifications. Curly dock (*Rumex crispus*) was found near the corral and spreading downstream along Eagle Creek from the Cow Camp area. Knotweed (*Polygonum aviculare* ssp. *depressum)* was also found. This is a common invasive at lower elevations and is primarily found in heavily disturbed areas. It is fairly uncommon at the elevations of the project except in areas with high disturbance and vectors.

HERRING CREEK ALLOTMENT

The State B list weed Canada thistle (*Cirsium arvense*) was found at the Leland Gully Restoration. It is associated with timber sale activity there. Cattle are excluded from the area following restoration. The infestation is being eradicated. This infestation will not be considered further in this analysis.

State C list Bull thistle was found along several roads and the stream near Fiddler's green. It is also in Cow and Cascade Creeks. Most of the infestations known in this project are in the Herring Creek Allotment. It may be due to having had more surveys for other projects. Himalayan blackberry (*Rubus discolor*), an uncommon invasive plant at this elevation, was found at one site just inside the Allotment boundary along a road. It was treated, but has not been surveyed recently. Non-native invasive wooly mullein is also present. There is cheatgrass along roads and associated with bulldozer use outside of primary and secondary range. The corral where cattle enter the Allotment was bare. At Burt Reed meadow where cattle stay the first few days, there is Timothy (*Phleum pratense*) which appears to be associated with the old cabin. A number of non-native grasses and dandelions are widespread in the meadow. In the area of addition to this allotment, there is bull thistle. The weeds are similar to the weeds in the lower portion of this allotment.

Habitat Vulnerability

The meadows, roadsides, and other openings are the most vulnerable to weeds. There are lots of meadows in these Allotments and these are the primary use areas for cattle. There are roads through about one-third of the Bell Meadow Allotment, two thirds of the Herring Creek Allotment, and most of the Eagle Meadow Allotment. About one-sixth of the Bell Meadow Allotment burned in the Mountain and Box fires. Smaller areas have burned in the Herring Creek and Eagle Meadow Allotments in 2007, 2010, and 2011. It is still very vulnerable to weeds due to increased light, moisture, and nutrients. There are extensive areas of open land with seasonal moisture that may be sensitive to Bull thistle spread. There are a number of streams where Himalayan blackberry can

spread. The highest known occurrence on the forest is at 6300 feet which is the lower range of these Allotments. It would be most likely in the Bell Meadow Allotment. Due to the higher elevation, there are fewer weed species that are likely in the project area.

Vectors

Since this project involves reauthorization of an ongoing activity, consideration is given to the possible vectors and sources for the weeds that are already there as an indication of relative risk in the future. Most of the possible sources were mentioned above and generally are not related to cattle. Those that could be related to cattle will be discussed below.

BELL MEADOW ALLOTMENT

The two infestations of Bull thistle are away from roads and along trails. The Aspen Pack Station is on the edge of this Allotment, so there is a lot of horse use in this area. Although cattle have more complex digestive systems than horses and mules, studies have found about the same amounts of seeds or that cattle may have more in the manure (Cosyns et al. 2005, Vignolio and Fernandez 2010, Malo and Suarez 1995). The ox-eye daisy is in an area where heavy equipment worked on a water system and probably was introduced on that equipment.

EAGLE MEADOW ALLOTMENT

Bull thistle and wooly mullein are scattered along Eagle Meadow Road. They may have come in on hay. They have not been found on the road past Eagle Meadow even though there are a number of private inholdings. There is at least one large yearly gathering of equestrians in that area that could bring in hay. A cow camp at Eagle Meadow has at least two invasive species from lower elevations.

Dandelions are one of several invasive plants that can spread in wildlands. In another Allotment they were primarily observed in areas where cattle move and may have been brought in and moved by the cattle or by horses used to herd the cattle. Dandelions can grow at higher elevations than bull thistle and wooly mullein and could infest most of these Allotments.

In summary, most of the known weed infestations have been introduced by non-project vectors. The two main vectors associated with cattle that may have introduced weeds are the possible use of hay and the introduction on the vehicles that deliver the cattle or on the cattle themselves. These two possible sources will be addressed in prevention measures.

HERRING CREEK ALLOTMENT

There is Bull thistle and wooly mullein near the corral in Section 9 where the cattle enter the Herring Creek Allotment. There is also Bull thistle just up the road at Fiddler's Green. It has spread along the roads and the stream from there. These introductions could be due to cattle or due to other activities in the area. There have been timber and silvicultural activities and there is camping at Fiddler's Green. The activities associated with the Leland Gully Restoration project have reduced the Bull thistle there. The non-natives at Burt Reed Meadow probably came in with hay except perhaps the dandelions.

Environmental Consequences

Habitat Alteration Expected as a result of Project

There is soil disturbance in meadows that can increase bare ground in moist areas where weeds can establish. Weeds are likely to persist long-term once they are established in meadows. Disturbed areas (such as corrals and gathering areas) are particularly vulnerable to weeds. There is a moderate risk for increased weed and invasive species establishment and spread due to habitat alteration.

Increased Vectors as a result of Project implementation

Since the project represents an ongoing activity, the vectors remain the same except in the areas of addition. Those vectors associated with the project are cattle which can have seeds on their hair or in

their intestines when they come onto the Allotment, any hay that is brought in, the vehicles that deliver the cattle and any horses associated with the operation. These vectors come from lower elevations where weeds are more abundant and where more species of weeds can grow. However, many of those weeds may not be able to establish at higher elevations. The risk continues to increase over time due to the increasing numbers of weeds species and spread of weeds in the state and in the area. In addition, weeds that are less common have been found in areas of fuel reduction even with equipment cleaning.

Although these Allotments are fairly high elevation, the species known on the forest or nearby that could still spread into the project areas (based on known elevation ranges) include Russian knapweed (*Acroptilon repens*) - eradicated at Pinecrest stables, diffuse knapweed (*Centaurea diffusa*), spotted knapweed (*C. maculosa*), tocalote (*C. melitensis*), yellow starthistle (*C. solstitialis*), which has been found at Sonora Pass, Canada thistle (*Cirsium arvensis*), Field bindweed (*Convolvulus arvensis)* Dyer's Woad (*Isatis tinctoria*), Perennial pepperweed (*Lepidium latifolium*), and Russian thistle (*Salsola tragus = S. iberica*). Canada thistle seems to be at least partially associated with horses and has been found at a meadow area adjacent to Dimond O Campground and along the County Line Trail in the Carson Iceberg Wilderness.

New corrals are proposed in Bell Meadow and Eagle Meadow Allotments in Alternatives 1 and 4. The exact locations were not available at the time surveys were made, so they have not been surveyed. These areas have increased risk for weed and invasive plant introductions. There is a moderate to high risk of increased vectors or introductions as a result of project implementation.

The areas proposed for addition to the allotments will have increased vectors. Evidence indicates that there was cattle use in addition areas in the past, but use would increase from current levels. The addition areas are not near where cattle enter and leave the allotments, so the risk is somewhat lower. They do have open areas and moist areas that are particularly vulnerable to weed introduction.

Analysis/Synthesis

The greatest areas of risk for weed introduction are the areas where the cattle are brought onto the Allotment. If weeds establish in those often heavily disturbed areas, infestations can later spread to other parts of the Allotment. For that reason, monitoring for weed introduction would take place in the areas in each Allotment where cattle are unloaded (Appendix G, Monitoring Plan).

Hay is cleaner now and work is ongoing for certification of weed-free hay. Weed-free does not mean that it would be free of other invasive plants that could spread. Spotted knapweed was known to be spread by cattle in Washington. Russian knapweed occurred at the Pinecrest stables in the past, so it was in the hay at one time.

Alternatives 1 and 4 propose new locations where cattle would enter the Bell Meadow and Eagle Meadow Allotments. It would help for tracking introductions to survey the area before it is used and after a couple of years.

Summary of Effects Analysis across All Alternatives

There is a risk of weed introduction with all of the action alternatives. Mitigation and other requirements, including monitoring and adaptive management, would be implemented for Alternatives 1 and 4 to reduce the risk of weed and invasive plant introduction and spread. Alternatives 1 and 4 would have reduced risk of weed and invasive plant introduction and spread compared to Alternative 3.

Compliance with the Forest Plan and Other Direction

All alternatives except Alternative 3 would meet Forest Plan direction.

3.06 RANGE

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

- P.L. 104-19 Section 504 of the 1995 Rescissions Act, as amended, require each National Forest to establish and adhere to a schedule for completing NEPA analysis and updating Allotment Management Plans for all rangeland Allotments on National Forest System lands.
- Congressional intent allows grazing on suitable lands where it is consistent with other multiple use goals and objectives as authorized through several Congressional Acts (Organic Administration Act of 1897, Multiple Use Sustained Yield Act of 1960, Wilderness Act of 1964, Forest and Rangeland Renewable Resources Planning Act of 1974, Federal Land Policy and Management Act of 1976, National Forest Management Act of 1976, and the Public Rangelands Improvement Act of 1978);
- Code of Federal Regulations (CFR) directs the Forest Service to meet multiple-use objectives, including managing for livestock grazing on forage-producing National Forest System lands (36 CFR 222.2 (c));
- It is Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing consistent with land management plans (Forest Service Manual (FSM) 2203.1); and
- It is Forest Service policy to continue contributions to the economic and social well-being of people by providing opportunities for economic diversity and by promoting stability for communities that depend on range resources for their livelihood (FSM 2202.1)
- Forest Plan Direction (USDA 2010) presents the current management direction, based on the original Forest Plan as amended (USDA 2010):

FOREST GOAL FOR RANGE:

Manage livestock to utilize available forage while avoiding adverse impacts on soil, vegetation, water quality, wildlife, fisheries and riparian zones.

FOREST GOALS FOR AQUATIC, RIPARIAN, AND MEADOW ECOSYSTEMS AND ASSOCIATED SPECIES

The strategy for aquatic management provides broad goals (listed below), which are endpoints toward which management moves watershed processes and functions, habitats, attributes, and populations. The goals provide a comprehensive framework for establishing desired conditions at larger scales, including river basin, watershed, and landscape scales. Moving ecosystem conditions toward these goals will restore and maintain the physical, chemical and biological integrity of the region's waters as mandated by the Clean Water Act, and will support the Forest Service's mission to provide habitat for riparian - and aquatic-dependent species under the National Forest Management Act, Organic Act, Safe Drinking Water Act, Endangered Species Act, and Electric Consumers Protection Act. The following goals are part of the Aquatic Management Strategy:

Water Quality: Maintain and restore water quality to meet goals of the Clean Water Act and Safe Drinking Water Act, providing water that is fishable, swimmable, and suitable for drinking after normal treatment.

Species Viability: Maintain and restore habitat to support viable populations of native and desired non-native plant, invertebrate and vertebrate riparian-dependent species. Prevent new introductions of invasive species. Where invasive species are adversely affecting the viability of native species, work cooperatively with appropriate State and Federal wildlife agencies to reduce impacts to native populations.

Plant and Animal Community Diversity: Maintain and restore the species composition and structural diversity of plant and animal communities in riparian areas, wetlands, and meadows to provide desired habitats and ecological functions.

Special Habitats: Maintain and restore the distribution and health of biotic communities in special aquatic habitats (such as springs, seeps, vernal pools, fens, bogs, and marshes) to perpetuate their unique functions and biological diversity.

Watershed Connectivity: Maintain and restore spatial and temporal connectivity for aquatic and riparian species within and between watersheds to provide physically, chemically and biologically unobstructed movement for their survival, migration and reproduction.

Floodplains and Water Tables: Maintain and restore the connections of floodplains, channels, and water tables to distribute flood flows and sustain diverse habitats.

Watershed Condition: Maintain and restore soils with favorable infiltration characteristics and diverse vegetative cover to absorb and filter precipitation and to sustain favorable conditions of stream flows.

Streamflow Patterns and Sediment Regimes: Maintain and restore in-stream flows sufficient to sustain desired conditions of riparian, aquatic, wetland, and meadow habitats and keep sediment regimes as close as possible to those with which aquatic and riparian biota evolved.

Stream Banks and Shorelines: Maintain and restore the physical structure and condition of stream banks and shorelines to minimize erosion and sustain desired habitat diversity.

RANGE MANAGEMENT PRACTICES

Allotment Management

Activities and cooperation to develop and implement allotment management plans. Three levels are specified:

1. Intensive

Intensive management of existing grazing allotments with the intent to increase forage production and utilization of forage allocated to livestock. All available technology for range and livestock management will be considered. Cooperate with range permittees, monitor range use, and maintain existing range improvements (replacement of range improvements will be made on a 20 year schedule or as needed). Development of structural and nonstructural range improvements and implementation of complex grazing systems will be emphasized. Preparation of range allotment plans or other plans involving the management of the range resource will be based on a 10 year schedule. Existing range agreements with other agencies or landowners will be maintained or amended to conform with this plan, as needed.

2. Extensive

Extensive management of existing grazing allotments with the intent of fully using forage allocated to livestock. Management systems and techniques, including fencing and water developments, are applied as needed to obtain relatively uniform livestock distribution and plant use, and to maintain plant vigor. No attempt is made to maximize livestock forage production by cultural practices such as seeding. Generally it involves season-long grazing. Cooperate with range permittees, monitor range use, and maintain existing range improvements (replacement of range improvements will be made on a 20 year schedule or as needed). No development of nonstructural improvements will occur, however, the prudent development of structural improvements will occur for protection and enhancement of forage production. Preparation of range allotment management plans or other plans involving the management of the range resource will be on a 10 year schedule. Existing range agreements with other agencies or landowners will be maintained or amended to conform with this plan, as needed.

3. Maintenance

Maintenance of existing range permits where livestock use is within the apparent capacity. Improvements are minimal and construction is done only to the extent needed to attain livestock control and maintain the range resource in the presence of grazing. No attempt is made to achieve livestock distribution. Cooperate with range permittees, monitor range use, and maintain existing range improvements. Preparation or revision of range allotment plans or other plans involving management of the range resource is based on a 10 year schedule or longer as needed. Existing range agreements with other agencies or landowners will be maintained.

Range Improvements - Nonstructural (Permanent and Transitory Range Types)

Prescribed fire and mechanical practices used to achieve the goals of the allotment management plan. Nonstructural improvements such as seeding, use of chemicals and fertilization are included.

Range Improvements - Structural (Permanent and Transitory Range Types)

New structural improvements designed to achieve AMP goals. Cost of construction will be proportioned between the Forest Service, permittee, and any other interested parties.

Grazing Permit Administration

Activities undertaken to administer allotment grazing permits, including: billing, allotment inspections, livestock counts, permit renewals, etc.

Range Studies

Studies and other activities to inventory, catalog, and evaluate data on range vegetation and soil condition, forage production, livestock utilization levels, etc.

FORESTWIDE STANDARDS AND GUIDELINES FOR RANGE

Allotment Management

Livestock grazing and all other uses are based on soil and vegetative resources. Maintaining these resources in satisfactory condition is the first priority of range management on this Forest. Any management practice that maintains or causes unsatisfactory soil or vegetative conditions in an area must be modified or if necessary, eliminated from that area. (36 CFR 219.20(b)) AUM increases are possible in allotments with satisfactory resource conditions. In many cases, improving resource conditions leads to increased forage production.

Improve ecological condition of rangelands, where currently unsatisfactory, through improved management, and structural and non-structural improvements.

Develop Range resources to their reasonably attainable potential and manage them on a sustained yield basis. Manage grazed lands to achieve a stable or upward vegetative trend, except in specified areas of transitory range. Use management strategies that protect the soil and vegetative resources and other resources in a cost effective manner. Consider all vegetation dependent uses when developing allotment management plans.

Revise range allotment management plans to be consistent with law, regulations, Executive Orders, Forest Service direction and Forest Standards and Guidelines, by 1997. Revise and develop allotment management plans in consultation with all involved parties, including permittees, State or other agencies, and any other involved parties.

On any allotment or unit of allotment, grazing management will be based on the vegetative type or soil type contained which is most susceptible to damage through improper grazing management. Examples: a riparian drainage through annual grassland; meadows within transitory range. Allowable use standards will be established in the allotment management plans and annual operating plans for each unit of each allotment. The standards will be based on Regional standards in R5 FSH2209.21.

Priority will be given to range improvement on allotments with a high percentage of primary rangeland in unsatisfactory condition, or high conflicts between livestock grazing and other resources and uses.

On allotments where discontinuous grazing systems are not in effect, adjust the permitted Animal Unit Months to achieve allowable use on the primary range. Transportation systems in established range allotments will include fences and cattle guards where new roads open up natural livestock barriers. Reduce or eliminate livestock grazing from ranges in unsatisfactory range condition which cannot be improved through better management or treatment at the current level of grazing.

Annual Range

Includes any segment of the California annual grassland either in large pure types or small types interspersed with shrubs and hardwoods. When management is based on this type the following apply:

Determine livestock on-dates based on soil moisture conditions and expected readiness date on associated perennial range to which the livestock are moved.

Perennial Range

Includes meadows, perennial grassland, sagebrush, broadleaf and riparian vegetation types. When grazing management is based on perennial range the following apply:

On allotments or pastures under intensive management provide rest or deferment during the growing season at least every third year.

On allotments under intensive management, as part of an approved discontinuous grazing system, allow grazing use to exceed normal use (as defined in R5 FSH 2209.21) up to one year out of two.

Under extensive or maintenance management where continuous season-long grazing is allowed, remove livestock when grazing reaches the allowable use level specified for the designated key areas.

Under all management strategies base on-dates for livestock on the phonological development of key forage or indicator species. Refer to R5 FSH 2209.21 for range readiness standards or use comparable criteria for species not listed. One exception is where an intensive management system limits early grazing to that which the range can withstand.

When primary range occurs within riparian areas: Allowable herbaceous forage utilization levels will be set according to Regional methods at standards that will contribute to the achievement of good to excellent vegetative and soil conditions (FSH 2209.21, Range Analysis Handbook).

Transitory Range

Includes all forage available following logging or fire, whether natural or seeded where there is no intention of permanently managing the type for forage production because tree or shrub canopies will grow to severely limit forage production. When management is based on transitory range the following apply:

Maximize forage utilization consistent with other resource values. Utilization may exceed normal range allowable use standards, but soils, watershed, riparian, wildlife or recreation considerations may modify use.

Initiate grazing use to complement silvicultural needs. Heavy grazing can help control grass and shrubs and prevent them from dominating the site.

Grazing

To protect hardwood regeneration in grazing allotments, allow livestock browse on no more than 20 percent of annual growth of hardwood seedlings and advanced regeneration. Modify grazing plans if hardwood regeneration and recruitment needs are not being met.

Grazing utilization in annual grasslands will maintain a minimum of 60 percent cover. Where grasslands are in satisfactory condition and annual precipitation is greater than 10 inches, manage for 700 pounds residual dry matter (RDM) per acre. Where grasslands are in satisfactory condition and annual precipitation is less than 10 inches, manage for 400 pounds RDM per acre. Where grasslands are in unsatisfactory condition and annual precipitation is greater than 10 inches, manage for 1,000 pounds RDM per acre; manage for 700 pounds RDM per acre where grasslands are in unsatisfactory condition and precipitation is less than 10 inches. Adjust these standards, as needed, based on grassland condition. This standard and guideline only applies to grazing utilization.

Where professional judgment and quantifiable measurements find that current practices are maintaining range in good to excellent condition, the grazing utilization standards above may be modified to allow for the Forest Service, in partnership with individual permittees, to rigorously test and evaluate alternative standards.

Grazing Permit Administration

Table 3.06-1 sets forth maximum allowable forage utilization levels for some common range vegetation types of the Stanislaus National Forest. Allowable uses limit the extent to which one or a group of key species may be grazed in key areas. The allowable use level must provide for sufficient herbage residue to ensure favorable plant vigor and soil protection on good and excellent condition range, or to contribute to improvement in lower condition range.

Table 3.06-1 Maximum Forage Use Levels

Allowable Management	**Rest-Rotation (1 year in 2 or 3)**
Meadow	
Good or Better	75
Fair	60
Poor	30
Very Poor	10
Upland Bunchgrass/shrub	
Good or Better	60
Fair	45
Poor	20
Very Poor	10
Riparian Primary Range	
Revise “meadow levels as needed to achieve riparian area goal.	

Allowable use levels for specific areas will be set at or below these maximums to conform to local range condition, soil stability, or special circumstances. Allowable use levels will be detailed in the allotment management plan for each allotment. Pastures receiving periodic full growing season rest can have higher allowable use levels, as shown. If condition classes of vegetation and soil vary, use the lower class to establish the allowable level.

Monitor at least 85 percent of allotments yearly to determine grazing use levels and condition of range facilities.

Noxious Weed Management

As part of project planning, conduct a noxious weed risk assessment.

Encourage use of certified weed free hay and straw.

Include weed prevention measures as necessary, when amending or re-issuing permits (including, but not limited to, livestock grazing, special uses, and pack stock operator permits).

Water Quality Management

Implement water quality Best Management Practices (BMPs) as needed for all Forest management activities.

Effects Analysis Methodology

Assumptions Specific to Range

Key species are generally an important component of a plant community. Key species serve as indicators of change and may or may not be forage species. More than one key species may be selected for a stratum, depending on management objectives and data needs. In some cases, problem plants (poisonous, exotics, etc.) may be selected as key species. Key species may change from season to season and year to year.

Key areas are indicator areas that are able to reflect what is happening on a larger area as a result of on-the-ground management actions. A key area should be a representative sample of a large stratum, such as a pasture, grazing Allotment, wildlife habitat area, herd management area, watershed area, etc. depending on the management objectives being addressed by the stud. Key areas represent the "pulse" of the rangeland. Proper selection of key areas requires appropriate stratification. Statistical inference can only be applied to the stratification unit (USDI 1996b)

Primary range is defined as those range types that contain a predominant cover of grass and grass-like species. S*econdary range* are defined as those range types that produce browse and forage and are capable of doing so on a sustained basis with consideration that these areas are less accessible or less preferred by livestock under the current extensive system of management. *Non-capable range* is defined as range types that have no grazing value for domestic livestock or should not be used for grazing because of physical or biological restrictions, or lacks improvements that would allow use (Range Analysis Planning Guide, Glossary, 1997). This analysis does not imply there would be no grazing on non-capable acres. Incidental use likely occurs in otherwise non-capable areas as livestock move through the Allotment.

Data Sources

In describing the rangeland resources in the project area and analyzing alternatives, the following GIS data files were used along with permittee consultation:

- Allotment and unit/pasture boundaries
- Land ownership
- Key areas Primary and secondary rangeland areas
- Designation of concentration areas and use areas
- Monitoring site locations
- Structural improvements

Range Indicators

In order to describe site conditions and plant ratings the following indicators and categories were used:

- Meadow Ecological Status: high, moderate, low
- Meadow condition: excellent, good, fair, poor, very poor
- Trend: Stable, Up or Down
- Plant species rating: early-, mid-, late-seral

Plant species were rated according to an estimated successional seral status: early, mid, or late (USDA 1998). These ratings were based on the relative abundance of the functional groups represented on a site. Plant function was considered in assigning these rating but not tabulated. The R5 Long-Term Condition and Trend Monitoring (R5 LTCTM) uses a different rating that tabulates plant functional traits that have been assigned to over 580 plant species occurring throughout California. The R5 LTCTM provides rationale for placing species in early, mid, and late seral status class. While plant functional ratings/score are similar to the older seral rating, the concept of a linear succession is not implicit in the plant functional rating, making the functional approach more adaptable to nonlinear successional theory. Thus, the seral status rating of 50% relative cover and the 40% relative frequency have been found to be in agreement for most species in the key areas monitored when compared and examined for condition and trend analysis (Weixelman and Zamudio 2001, Weixelman 2003, Weixelman Personal Communication April 2012). Additionally, where there were no quantitative data available to compare desired condition to existing condition, professional judgment by resource specialists was used.

Range Methodology

The method used to determine the effects on rangeland resources was qualitative comparison of each alternative's likelihood of desired conditions identified in Forest Plan Direction. Existing conditions were determined through field visits, monitoring data, historical records, grazing permittee consultation and scoping of interested public.

Affected Environment

Ecosystems within the project area are primarily sierra mixed-conifer forest interspersed with montane meadows and riparian corridors. Within the forest openings, the vegetation is mostly considered herbaceous and browse type vegetation. Herbaceous vegetation occurs within meadows and along riparian corridors. Riparian vegetation includes willow, shrubs, other riparian herbaceous vegetation and occasional aspen stands. Herbaceous understory vegetation occurs in upland forested areas with less than 40% canopy cover. As the forest canopy cover increases, the understory vegetation decreases and provides only limited forage.

Approximately 20-30% of the Allotments are assumed to be covered with primary and secondary rangeland vegetation. Species vary depending on the ecological development phase of the plant communities (successional continuum). Pioneering plant communities are considered early-seral communities that consist of grasses and forbs. The mid-seral plant communities of annual grasses, perennial grasses and forbs lead to late-seral successional communities comprised mainly of perennial grasses. These perennial communities are better able to withstand a host of environmental stresses. Community types from all successional stages are represented in the three Allotments, creating an ecologically diverse landscape.

Rangeland Capability and Suitability

A Rangeland Capability/Suitability analysis was performed during project analysis and is summarized in Appendix F. Project-level rangeland capability and suitability was determined using a two-step process and recommended criteria described in Appendix K of the 2001 Sierra Nevada Forest Plan Amendment (USDA 2001). Incidental grazing does occur in areas of non-capable range as livestock pass through to more favorable vegetation. Occasionally, incidental trespass also occurs in areas excluded from grazing.

PRIMARY AND SECONDARY RANGE

Primary Range - All of the meadows are considered primary range (concentration areas) and are about 1 to 20+ acres in size. These meadows make up the majority of the primary range, about .01% (181 acres) of the total Allotment acres. Primary range also includes stringers of forbs, grasses and

browse along the drainages of the surrounding meadows and streams with adequate forage production. Willow and aspen communities along streams are also a component of primary range.

Secondary Range - The conifer and mixed montane vegetation types with under 40% canopy cover are considered secondary range. About 18% (2,343 acres) of the project area (current Allotment boundaries) has a tree canopy of less than 40% allowing for an understory development of grasses and shrubs that meets the secondary range criteria.

Rangeland Vegetation

The vegetation within the project area is a mosaic of forest stands, meadows and riparian corridors. Wet runs and meadows are found throughout the project area and are considered the key areas that reflect the primary use. The composition of these meadows consists of various species of sedges, rushes, clovers, and grasses. The most characteristic and representative species in wetter herbaceous areas are *Muhlenbergia filiformis* (Pull-up Muhly), *Poa pretensis* (Kentucky Bluegrass), *Trifolium spp* (clover), *Carex nebrascensis* (Nebraska sedge), *Carex integra* (smooth beaked sedge), *Carex scopulorum* (mountain sedge), and *Juncus spp*. (rushes). The perennial weed types are dominated by Wyethia mollis (mule's ear) and are classified secondary range because of the quality of forage, distance to water, a decrease in grass understory, accessibility and/or percent slope. The riparian browse species are mostly willows and aspens which are meeting desired condition in most areas. Water is abundant in the creeks and drainages, but scarce on the ridges and mid-elevation slopes.

Historic and Current Allotment Management

BELL MEADOW ALLOTMENT

Historic overgrazing in the Bell Meadow Allotment has affected the hydrologic function of meadows in the Allotment. The 1965 Bell Meadow Allotment Management Plan (AMP) noted that cattle grazed exclusively in the Allotment from 1912-1959 and that during these years use varied from 600 AUMs to 1560 AUMs (project record). For reference, current use in the Allotment is 268 AUMs. Allotment boundaries have changed since 1965, but the size of the Allotment is roughly the same. The 1965 AMP states, "the unstable nature of the soil and the poor condition of the meadow types reflects this history of over-use." It also notes serious erosion along Bell Creek. In addition, a 1961 memo from Alan A. McCready, Forest Service staff, noted that deep gullies "lowered the water table over much of the private land in Bell Meadow proper" and that there was general agreement that "it began with overstocking during the homestead days" (USDA 1961).

Past grazing records, up until 1975, indicated that the overall forage and soil conditions in this Allotment ranged from poor to fair with a slight upward or stable trend (project record). Improvements to the range condition have been made since 1975 due to reduction of livestock numbers and/or improved management.

Currently, 80 cow/calf pairs graze this Allotment from July 1 to September 15. A majority of grazing occurs in meadows, riparian areas, and forest openings. The Allotment, in general, is considered to be in fair condition with a stable or slightly upward trend in most key areas with the exception of Crab Meadow.

The current Allotment is managed as one pasture unit. The main areas grazed and monitored include Crab Meadow, Round Meadow, Gianelli, Mud Lake and Bell Meadow Complex (Lower Bell Meadow and Middle Bell Meadow). The following areas are also monitored to ensure grazing is meeting desired conditions: Mud Lake Meadow, Pine Valley Meadow, Grouse Lake, and Bear Lake. Grazing is not permitted in Upper Bell Meadow which is within the Bell Meadow Research Natural Area.

EAGLE MEADOW ALLOTMENT

Historic overgrazing in the Eagle Meadow Allotment has affected the hydrologic function of meadows in the Allotment. In 1925 the season of use for the Eagle Meadow Allotment was from June 1-October 15 and the stocking rate was 4475 sheep. Allotment survey notes from 1925 indicated that Eagle Meadow showed past overuse by sheep which depleted the drier portions and caused streambank cutting (USDA 1925b). In addition, the Mono-Sonora Road (now Highway 108) was used as a sheep and cattle driveway, causing overgrazing along the route. This "driveway" went through the proposed Niagara addition (USDA 1925c).

Current season of use is July 1- September 30 for 150 cow/calf pairs. Cattle are managed through intensive herding and dispersal system to control the amount of forage used in a given area. The Sardine unit is rested in even years and the Long Valley unit is rested in odd years. The main forage units for the Eagle Meadow Allotment are: Niagara, Eagle, Long Valley, Sardine, and Haypress units.

HERRING CREEK ALLOTMENT

Historic overgrazing in the Herring Creek Allotment has affected the hydrologic function of meadows in the Allotment. In 1924 the season of use for the Herring Creek Allotment was from June 1-October 15 and the stocking rate was 510 cattle. The boundaries of the Herring Creek Allotment have changed slightly since 1924, but the acreage is roughly the same. Records from 1925 indicate that meadows to the west and southwest of Cooper Peak were in poor shape due to heavy use and streambank erosion (USDA 1925). Range inspection notes from 1953 indicated active erosion along creeks in Hammill Canyon and that Castle, Coyote, and Wire Corral have been "fed to the bone and absolutely nothing remains" (USDA 1953).

Current season of use is July 1- September 30 for 156 cow/calf pairs. Cattle are managed under an intensive herding and dispersal system to control forage utilization. The main forage units for Herring Creek Allotment are the Bull Run, Hammill Canyon and Willow Creek units

Monitoring

Two types of monitoring have occurred on the Allotments: implementation monitoring and effectiveness monitoring. Implementation monitoring is short-term monitoring that is conducted to evaluate whether activities are meeting Forest Plan Standards and Guidelines. Effectiveness monitoring is long-term monitoring that is conducted to determine whether the Standards and Guidelines are sustaining or moving rangeland conditions toward desired conditions and to establish baseline information for future planning. Monitoring records are on file at the Stanislaus National Forest Supervisors Office, located in Sonora, California.

Key areas of the Bell Meadow, Eagle Meadow and Herring Creek Allotments have been monitored to determine rangeland health conditions, range readiness and forage utilization for over 50 years. A variety of data have been collected and recorded on these Allotments using various methodologies. Long-term monitoring techniques include Parker 3-step, toe point, rooted frequency and rapid assessment. These techniques generally involve comparing the species composition of the existing plant community to the expected species composition of the desired potential natural (also referred to as climax) plant community. In summary, all information was considered from these sources and most plots show a general upward or stable trend from previous readings.

IMPLEMENTATION MONITORING

There are two types of annual, or implementation, monitoring: range readiness and utilization monitoring.

- Range readiness monitoring defines the time in plant growth cycle when grazing may begin and determines if the soil is firm enough to prevent trampling damage to soil and vegetation (Heady and Child 1994) (USDA 1969). Selected indicator plants are evaluated to determine if the

standard of rangeland readiness for that species has been achieved. Rangeland readiness is the life cycle of the plant species as related to climate conditions, elevation, and soil saturation.

- Utilization monitoring measures the remaining key vegetative species using either the height/weight method (USDI 1996b) or stubble height method (USDI 1996b, Clary & Leininger 2000). Height/weight monitoring is the measurement of the height of grazed and ungrazed vegetative species to determine average utilization, expressed as the percentage of weight removed from key vegetative species. Stubble height is the measurement of the average height of residual key vegetative species left ungrazed and is typically expressed in inches. One monitoring method is used per key area, depending on the management objective and/or key vegetative species. The main purpose of annual monitoring is to determine the amount of vegetation being utilized by cattle. It is also used as an indicator to move livestock. Utilization standards are based on best available science and are designed to ensure a sufficient amount of residual vegetation to protect meadows from degradation. Effectiveness monitoring is used to evaluate whether the utilization standard set by Forest Plan Direction facilitates trend towards the desired condition.

The following tables summarize monitoring data and actual use (livestock numbers) information that was collected collaboratively by range staff and permittees. Table 3.06-2 summarizes actual use (livestock numbers) information.

Table 3.06-2 Summary of Actual Use (Livestock Number in cow/calf pairs)

Allotment	2005	2006	2007	2008	2009	2010	2011	2012
Bell Meadow	80	80	80	80	80	80	80	80
Eagle Meadow	0	156	156	156	156	0	0	80
Herring Creek	0	156	156	156	156	50	0	156

Table 3.06-3 summarizes utilization monitoring data that was collected collaboratively by range staff and permittees. The data evaluates whether the Allotments met the forage utilization Standards and Guidelines outlined in the Forest Plan Direction.

Table 3.06-3 Summary of Annual Utilization Monitoring within Key Areas

Allotment	Key Area	2005	2006	2007	2008	2009	2010	2011	2012
Bell Meadow	Lower Bell Meadow	MS	MS	MS	MS	MS	MS	MS	MS
	Middle Bell Meadow	MS	MS	MS	MS	MS	MS	MS	MS
	Mud Lake	MS	MS	MS	MS	MS	MS	MS	MS
	Pine Valley	MS	MS	MS	MS	MS	MS	MS	MS
	Crab Meadow	NS	NS	NS	NS	NS	NS	NS	NS
	Round Meadow	MS	MS	MS	MS	MS	MS	NS	NS
Eagle Meadow	Barn Meadow	MS	MS	MS	MS	MS	NG	NG	MS
	Eagle Meadow	MS	MS	MS	MS	MS	NG	NG	MS
	Lower Eagle Meadow	MS	MS	MS	MS	MS	NG	NG	MS
	Long Valley	NG	MS	NG	MS	NG	MS	NG	MS
	Sardine Meadow	MS	NG	MS	NG	MS	NG	NG	MS
	Red Rock Meadow	NS	NS	NS	NS	NS	NS	NS	NS
	Niagara	MS	MS	MS	MS	MS	MS	MS	MS
Herring Creek	Bull Run Meadow	NG	MS	MS	MS	MS	MS	MS	MS
	Herring Creek	NG	MS	MS	MS	MS	MS	MS	MS
	Willow Creek	NG	MS	MS	NM	NM	NM	NM	NM
	Hammill Canyon	NG	MS	MS	MS	MS	MS	MS	MS

MS=Met Standard NS=Not to Standard NM=Not Measured NG=Not Grazed

The above information for Bell Meadow, Eagle Meadow, and Herring Creek Allotments indicate that within the past eight years, most key areas monitored within these Allotments were meeting utilization standards according to Forest Plan Direction. In Crab Meadow, Round Meadow (Bell Meadow Allotment), Red Rock Meadow (Eagle Meadow Allotment) and Hammill Canyon (Herring Creek Allotment) where annual use data does not meet utilization standards, the discrepancies may be due, in part, to legacy issues that are not directly connected to current management.

The utilization standards, for those key areas that met standards, are set at the proper utilization level, as verified by meadow ecological status and condition. Where annual utilization met standards but meadow ecological status is not consistent with desired conditions, there exists a need to move resources towards desired conditions in a manner that is timely and consistent with Forest Plan Direction goals and objectives.

Monitoring for bank trampling and riparian browse are conducted using Multiple Indicator Monitoring (MIM) or similar techniques (USDI 2011). This technique is used to monitor the effects of livestock management on stream channels and streamside vegetation. Monitoring is recommended on sites where field observations indicate browse use and stream bank trampling may be having an effect on stream dependent species or contributing to stream erosion. Livestock will be removed from any area when streambank disturbance or riparian browse standards are met or exceeded (USDA 2010).

EFFECTIVENESS MONITORING

Management of mountain meadows to maintain biologic integrity is a common goal of management agencies (Ratliff 1985). The R5 Long-Term Condition and Trend Monitoring (R5 LTCTM) provides rationale for rating species in early, mid, and late seral status. The purpose of the R5 LTCTM is to provide long-term monitoring of range ecological key areas to determine if the range is trending towards or meeting desired conditions (USDA 1998). This monitoring is designed to provide ecological classification and quantitative condition status for each key area. Key areas are indicator areas that reflect what is happening on a larger area as a result of on the ground actions and should be considered as a representative sample of Allotment condition.

Table 3.06-4 Summary of 2005-2011 R5 Long-Term Condition and Trend Monitoring

Allotment	Meadow	Type*	Vegetative Score	Overall Score	2005 Trend	2010-11 Trend
Bell Meadow	Round Meadow	RF	Moderate	Moderate	Up	Stable
	Crab Meadow	RF	Low	Low	Down	Stable
Eagle Meadow	Barn Meadow	RF	Moderate	Moderate	Stable	Stable
	Red Rock Meadow	RF	Moderate	Moderate	Stable	Stable
	Long Valley Meadow	RF	Moderate	Moderate	Up	Stable
Herring Creek	Bull Run	RF	Moderate	Moderate	Stable	Stable
	Herring Creek	RF	Low	Moderate	Stable	Stable
	Herring Creek	GL	Low	Low	Up	Stable
	Willow Creek	GL	Moderate	N/A	Up	--
	Wire Corral	RF	Moderate	Moderate	Stable	Stable

*Type refers to monitoring method, where RF=Rooted frequency and GL=Greenline.

Within these three active Allotments, using R5 LTCTM, initial monitoring was completed to determine the baseline ecological status of key areas in 1999-2001. Monitoring is conducted about every five years to determine trend. If status and condition are found to be moving in a downward trend, modifications to grazing management, including adaptive management options, may be implemented to reverse downward trend. If monitoring determines that trend is meeting desired

condition an opportunity may exist to increase grazing capacity. Table 3.06-4 provides a summary of the 2005-2010 Long-Term Condition and Trend Monitoring.

In addition to the R5 LTCTM plots, other key areas are monitored using the Rapid Assessment protocol to determine ecological condition. Some meadows were also rated for condition based on field observations by the Forest Range Specialist and interdisciplinary team specialists during site specific condition assessment monitoring. In areas where these additional field assessments were made, a condition rating of good, fair and poor were applied to further define ecological condition of an area for verifying proper utilization levels in these areas to meet desired conditions. Table 3.06-5 summarizes rapid assessment monitoring of meadow condition and Table 3.06-6 displays range condition based on field observations made in 2005 and 2006.

Table 3.06-5 Rapid Assessment of Ecological Condition

Allotment	Meadow Name	Survey Year	Ecological Condition	% Late Seral Plants
Bell Meadow	Mud Lake	2010	Moderate	32%
Bell Meadow	Bear Lake	2010	High	87%
Eagle Meadow	Haypress Meadow	2006	High	50%
Eagle Meadow	Sardine Meadow	2006	High	50%

Table 3.06-6 Range Condition based on field observation

Allotment	Meadow Name	Survey Year	Range Condition
Eagle Meadow	Eagle Meadow Pasture (West)	2006	Fair
Eagle Meadow	Lower Eagle Meadow	2006	Poor
Herring Creek	Bull Run	2006	Good
Herring Creek	Bluff	2006	Good
Herring Creek	Castle	2005	Fair/Poor
Herring Creek	Coyote	2006	Good
Herring Creek	Groundhog	2006	Good
Herring Creek	Herring Creek Reservoir	2006	Fair
Herring Creek	Lower Three Meadows	2006	Fair
Herring Creek	Middle Three Meadows	2006	Fair
Herring Creek	Upper Three Meadows	2006	Poor
Herring Creek	Upper Willow Creek	2006	Fair
Herring Creek	Lower Willow Creek	2006	Good
Herring Creek	Wire Corral	2006	Good

Sensitive Resources

RIPARIAN VEGETATION

Shaw (1991) studied the effects of cattle grazing on willow. She found no effect on seedling growth under light/moderate spring and fall grazing. Shaw also found that heavy deer browsing prevented most seedlings from growing beyond the reach of grazing animals. Skovlin (1984) found that heavy grazing could result in heavy mortality of seedlings, and concluded that the long-term effect of heavy grazing is detrimental to regeneration of woody species.

Jones et al. (2011) state that during the early-growing season cattle forage mainly on meadow and aspen understory herbaceous vegetation, normally avoiding aspen. Pre-season monitoring of these meadows and riparian vegetation indicate there is diversity in age class, structure, composition and cover of riparian vegetation, including aspen and willow. However, since aspen and willow suckers have more nutritional quality compared to aspen understory and meadow vegetation, especially at the

end of the season, late season grazing can have an impact on regeneration, if not monitored for a change in preference.

Monitoring has noted browsing on aspen and willow during the early-growing season is within standards on all Allotments. However, site visits to these meadows in 2004-2005 and again in 2010-2011 by range staff, wildlife staff and interdisciplinary team members, indicated aspen regeneration in several areas is periodically being affected by over-browsing during the late-growing season. Out of eighteen sites monitored, six sites had browsing over the 20% standards. However, three of these sites had no cattle grazing. Late season field observations have noted increased recreational packstock and wildlife use (Cassinetto, personal communication, 2005).

Occasionally, small groups of livestock return to these aspen areas and may affect aspen health. This late-growing season browsing is exceeding standards and guidelines in some areas, but it is unknown whether the majority of browse is attributable to livestock, packstock, or wildlife or a combination of all browsers (USDA 2010). A need exists to continue monitoring of aspen populations to facilitate better understanding of timing, grazing patterns and competition between recreational packstock, permitted livestock, and wildlife on aspen browsing. Continued monitoring will also improve understanding of livestock preferences and regeneration strategies for restoration efforts, if needed.

Aspen browsing in the project area has been noted to exceed standards and guidelines in scattered locations. Overall, there is diversity in age class, structure, composition and cover of the mapped aspen stands within the project area.

GREAT GRAY OWL HABITAT

Livestock are excluded from a two acre area within the Lower Eagle Meadow Great Gray Owl (GGO) Protected Activity Center (PAC). The temporary fence is used to protect an historical GGO site and enhance prey population habitat. The remainder of the Lower Eagle Meadow area is affected by legacy activities including historic floods. These events have changed the stream channel's hydrologic function so that the stream has lost floodplain connectivity and altered the water table. The drier meadow currently consists of patches of remnant sedges, perennial grasses and willow that is difficult to monitor using current utilization standards. The fence is also a constant maintenance issue and is often compromised by other forest users. A need exists to construct a more permanent fence around the meadow and to establish a minimum vegetative cover height of 5 inches to better measure and assess habitat cover for GGO prey species.

WILLOW FLYCATCHER

There are four Willow Flycatcher sites in the action area, designated as "occupied" by the 2004 Sierra Nevada Forest Plan Amendment but are now designated as "historically occupied" following results of a completed 10-year survey cycle to protocol: Willow Meadow (Herring Creek Allotment), Long Valley Creek, Eagle Meadow (Eagle Meadow Allotment), and Upper Bell Meadow (Bell Meadow Allotment) (project record).

YOSEMITE TOAD

A Forest Plan Standard and Guideline (S&G) directs that livestock are excluded from meadows occupied by Yosemite toad until after metamorphosis of the toad. This exclusion may be waived if a site specific management plan has been initiated. A management strategy was developed in the AOI to minimize impacts to Yosemite toad and their habitat in the Eagle Meadow and Herring Creek Allotments to facilitate implementation of livestock exclusion from meadows occupied by Yosemite toad. This is accomplished by managing the movement of stock around wet areas by fencing, herding, or avoidance.

The Herring Creek Allotment was one of several Allotments studied in the five-year USFS Yosemite toad study (Roche et al. 2012). The purpose of this study was to identify key habitat conditions

associated with Yosemite toad occupancy of potential breeding pools. The objective was to determine if fencing to exclude cattle from meadows would affect pool habitat conditions. In February 2013, the Regional Forester issued "Regional Guidance Regarding Livestock Grazing and Yosemite toad Conservation". The document stated that given the implications of Roche et al. 2012, which constitutes the best available science on the effects of cattle grazing on the Yosemite toad, continued exclusion of livestock from meadows occupied by the Yosemite toad may not be necessary for toad conservation.

The results of this study did not support the management strategy to exclude toad breeding areas within meadows as a means to improve upon breeding pool habitat conditions. Additionally, the results did not indicate habitat impairment under standard Forest Service grazing management, suggesting that current grazing management guidelines are meeting toad management objectives and that cattle production and amphibian conservation can be compatible goals within a working landscape (Roche et al. 2012). However, because there is a strong connection between water table levels and plant communities and their associated attributes (McIlroy, Allen-Diaz 2012), some form of monitoring such as Multiple Indicator Monitoring may be appropriate on selected sites with sensitive meadow dependent species no matter which approach is selected.

This guidance directs local line officers not to be strictly bound by Standards and Guidelines for Yosemite toad Conservation and depending on site-specific conditions, may pursue an alternative approach with Regional discussion.

SPECIAL AQUATIC FEATURES

The Forest Service conducted Proper Functioning Condition (PFC) monitoring within the project boundaries (BLM 1999) on all known special aquatic features (Fens, seeps, and springs) that were identified in Allotment surveys and GIS mapping. Inventory of these sites were conducted to determine existing condition, and to identify any impacts to special aquatic features attributable to grazing.

About half of the 44 special aquatic features assessed in these Allotments were properly functioning. The remaining sites were Functional – At Risk. Further monitoring is needed to determine if these aquatic habitats are stable or moving in an upward trend. Adjustments in management will be made based on trends in PFC. Detailed PFC monitoring results can be found in the project record.

MEADOW HYDROLOGIC FUNCTION

Meadow hydrologic function in some meadows appears to have been degraded by legacy activities. Nearly all of the alteration appears to have been initiated over 50 years ago, as evidenced from range reports, aerial photograph interpretation, and/or indicators of natural recovery. Almost all of the degraded meadows are now showing evidence of natural recovery from legacy effects. These effects range from slight to severe. While recovery progress varies from slow to substantial between (and even within) meadows, the long term trend of hydrologic function in most of these meadows is upward due to a combination of natural recovery and much less intensive grazing than in the distant past (i.e., reduced number of cattle, lower utilization standards, shorter season of use).

Environmental Consequences

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Bell Meadow Allotment

Skovlin (1984) reported that timing, intensity and duration of grazing has a much greater effect on vegetation response than any type of grazing system. Alternative 1 would adjust the grazing rotation on the Bell Meadow Allotment, divide the Allotment into units and implement a deferred grazing

system. This would improve distribution by managing the timing, intensity, frequency and duration of forage utilization and facilitate protection of sensitive resources. Skovlin (1999) suggests that proper grazing can improve meadow habitat rather than total exclusion. Alternative 1 would reduce stocking rates in each unit by controlling herd movement to reduce intensity of grazing. This would implement a grazing rotation that improves livestock dispersal and the timing and duration of forage use to minimize impacts in sensitive areas. Alternative 1 would alter frequency, the number of times forage plants are grazed during a grazing season, decrease revisits of preferred plants during a growing season, and increase productivity within the unit by rotating livestock through the units. Alternative 1 would alter duration to control how long the cattle are allowed to stay.

These factors would shape the impacts of grazing within the Allotment under Alternative 1 and would limit the potential effect of intense grazing on meadows and riparian areas. It would also decrease potential loss of cover and introduction of non-native species. Alternative 1 is expected to increase plant vigor and productivity, and enhance species composition (Allen-Diaz et al.1999).

Bell Meadow Allotment is currently one single unit. Alternative 1 proposes creating three units which would be used to improve distribution of livestock throughout the Allotment improving timing, intensity and duration of livestock use. Alternative 1 would split the cattle into two separate herds, implement a deferred grazing system, decrease forage utilization to sensitive resources and improve livestock production and quality of feed by more manageable control of livestock. These factors are expected to benefit rangeland resources through increased herding and more controlled livestock movement.

The new handling facilities for livestock shipping/receiving, away from the Aspen pack station, would allow for a more effective and efficient strategy for loading cattle on and off the Allotment, increase safety, decrease dust and congestion on the main road and manage recreational stock use separate from commercial livestock.

Modifying the Bell Meadow Allotment boundary along the Northeastern edge of the Allotment to align with natural barriers would decrease livestock entry into unauthorized areas and provide a more consistent and manageable boundary line.

Crab Meadow has more than 10% of the meadow vegetation in early seral status. However, in meadows already impaired, meadow hydrologic function is not likely to show significant improvement by changing livestock management alone.

Eagle Meadow Allotment

Alternative 1 would add the Niagara Creek and McCormick Pocket addition areas to the Eagle Meadow Allotment.. The Niagara Creek addition to the west of the current Allotment boundary would result in similar improvements to grazing management by altering the timing, intensity, frequency and duration of grazing and improving livestock distribution. The Niagara Creek addition would add about 2,427 acres to the Eagle Meadow Allotment, of which about 184 acres are capable and suitable. This addition would improve distribution, reduce the potential for browsing effects to woody riparian vegetation, and extend grazing opportunities in the Niagara unit to delay entry into the Sardine unit which will reduce the threat of Larkspur poisoning.

The McCormick Pocket addition, to the south of Eagle Meadow is about 2426 acres, of which 235 are capable and suitable acres. This would allow about 20-25 cow/calf pairs to disperse into an area not currently used, add opportunities for late season grazing, reduce grazing pressure and trespass on private lands, improve livestock distribution, reduce impact to sensitive habitats and reduce overall utilization in the Long Valley unit.

Alternative 1 would change utilization standards to 40% from 60% on the Eagle Meadow Allotment. This change would be consistent with Forest Plan Direction for units that are grazed every year. Flexibility to adjust to an intensive grazing system would be allowed if the permittee continues a year

of rest in between years of grazing in certain units. The maximum allowable utilization could be raised to 50% for rested units, as long as resource conditions continue to meet or move towards desired condition.

A change of grazing utilization standards at Lower Eagle Meadow from stubble height to a maximum vegetative cover height would properly measure and assess habitat cover for Great Gray Owl prey species. Replacement of a temporary exclosure fence with a permanent fence, would better protect the prey species in GGO foraging habitat.

Red Rock Meadow would continue to have a stable ecological status because low seral species are slightly decreasing and moderate seral species are slowly increasing. It is unlikely high seral species would increase appreciably due to a transition from its historic wet meadow to a sagebrush community type. This transition is expected to continue due to the lowered water table and loss of floodplain connectivity, although revegetation and aggradation of sediment is occurring at a new but lower floodplain level along the stream channel. It is expected the meadow would remain stable but would not meet the desired condition of 50% or greater late seral vegetation without restoration.

Herring Creek Allotment

Alternative 1 would implement a deferred rotational grazing strategy for the Herring Creek Allotment by creating four units within the Allotment: Bull Run Unit, Cascade Unit, Hammill Canyon Unit and Willow Unit. Alternative 1 would improve livestock distribution, reduce utilization in areas that receive concentrated use and defer grazing in Yosemite toad habitat. This would result in similar improvement in timing, intensity, frequency and duration of grazing and improving livestock distribution..

Modifying the Herring Creek Allotment by adding 3413 acres to the Northwest of the Allotment (Cascade Creek) and by removing 2563 acres to the Southeast (Waterhouse Lake) would result in a net gain of about 850 acres to the Herring Creek Allotment. This addition would add about 427 capable and suitable acres and slow the movement and entry of livestock into Hammill Canyon and decrease impacts to Herring Creek. Alternative 1 would improve streambank health and meadow condition by improving livestock dispersal and the distribution of forage utilization.

Alternative 1 is expected to reduce riparian browse. The proposed deferred rotation grazing systems would reduce the potential for early season browsing by livestock on woody riparian species. Browsing on aspen and willow may still occur in some locations and site specific aspen browsing may occasionally exceed standards and guidelines by a combination of browse users (Shaw 1991). It is expected that the proposed action would improve distribution and timing of forage utilization of livestock that may provide a delay in a change of preference from herbaceous forage to riparian browse Allotment-wide.

It is assumed that most meadows and riparian areas may be affected by up to 5% from hoof action by livestock (Allen-Diaz, 1999). Forest Plan Direction limits trampling and trailing from hoof action to 20% of streambanks and shorelines. In areas where this disturbance or alteration was within standard and vegetation was rated as moderate or high, the ecological status are expected to remain stable in desired condition or moving towards 50% or more of late seral species. The associated stream functions connected to these meadows are expected to continue to improve as floodplains reach their potential. In areas where hoof action, including chiseling, trampling and trailing of streambanks, may be approaching or exceeding standards in the Forest Plan Direction, it is expected that implementation of Alternative 1 would reduce these impacts.

CUMULATIVE EFFECTS

Cumulative effects are most appropriately analyzed at the Allotment boundary level because primary and secondary range identified for analysis fits into this assessment scale. At this level cumulative

effects can be best understood in context with other past, present and reasonably foreseeable management activities.

Ground disturbances within the project area include recreation and fuel reduction activities. All of the active Allotments have developed recreation facilities, dispersed recreation use, and Off-Highway-Vehicle (OHV) routes. Ground disturbance from dispersed recreation such as campsites, trails (hiking and pack stock) and OHV routes add to the trailing and trampling effects in some high use areas. About one percent of the active Allotments have been disturbed due to recreation activities (Frazier personal communication 2006).

Recreation growth mirrors population growth in and around the project area and leads to an increase of more forest users. Unauthorized OHV and motorcycle use impacts livestock distribution in many areas. These impacts include disrupting rotation movements, occasionally running livestock through fences, leaving gates open and/or cutting fences. These actions may have a cumulative effect on the health and condition of rangeland riparian ecosystems due to accelerated erosion or loss of vegetative cover.

Pack stock use is essentially unmanaged use and has been occurring within all of the Allotments. This use is expected to increase within the next 10 years as open space in urban areas decreases and recreation pressures on the Forest increase. Pack stock grazing in meadows and adjoining aspen communities has been reported as impacting aspen regeneration (Cassinetto, personal communication 2005). It is expected that grazing pressures within meadow complexes would increase from deer, pack stock, and domestic livestock within these remaining herbaceous environments.

Fuel reduction projects have occurred in the past and in recent years or are in the planning stages in portions of the active Allotments (Appendix C). These projects include hazard fuel reductions, tree thinning projects, and salvage harvests. Currently, Bell Meadow (3% of the watershed) and Herring Creek (20% of the watershed) have thinning projects proposed that may open up canopy cover and increase herbaceous vegetation and forage capacity.

Sheppard (Sheppard 2004 and Sheppard et al. 2006) suggests aspen regeneration is dependent on moderate to intense disturbance. Suppressing natural fires, lack of active management such as cutting or ripping to encourage sprouting (suckering) or prescribed fire, and conifer encroachment may be contributing to the lack of aspen regeneration in some areas rather than exclusively livestock grazing. In addition, the subsequent conversion of aspen stands toward conifer dominated communities has led to the loss of aspen. Meadow restoration projects have occurred within the active Allotments and would continue into the foreseeable future. These projects typically include stream restoration, conifer removal within or along meadow edges. Meadow condition and aspen regeneration are expected to improve or remain consistent in these project locations if Forest Plan S&Gs are implemented.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Under the no action alternative no grazing would be permitted on the Allotments. Meadows rated as high (desired condition/good) would maintain desired condition and the meadows would continue to support an herbaceous plant community. Late-seral species would increase, and mid- and early-seral species would decrease. Meadows would likely become less diverse.

Meadows in moderate (fair) condition would continue to recover and would likely move towards desired condition. Mid-seral species would continue to increase, late-seral species would increase and early-seral species would decrease. Most of the hydrologic functions are in satisfactory condition and over time natural recovery to the meadows would occur including an increase of willow and riparian species to support streambank stability. Willow would likely choke out streams leaving reduced access for wildlife.

Meadows rated in low condition (poor or very poor) are identified as areas that are disconnected from their floodplain by widened or gullied channels. It is expected that vegetation cover would improve over time by natural recovery as these stream channels reach a new but lowered stream channel. For those meadows that are severely degraded (such as Round Meadow and Castle Meadow) it is expected these meadows would start to trend towards or reach desired condition in the long term (50+ years), , but not likely any faster unless restoration is included. In the case of Crab Meadow, it is likely in portions of the meadow, early-seral species would continue to persist and late-seral species would stabilize but not significantly increase due to the shallow rocky soils that do not support late-seral species.

Without intervention, Red Rock Meadow (Eagle Meadow Allotment) is not expected to show improvements in ecological status because stream connectivity has been lost and the water table has been lowered resulting in the loss of herbaceous cover. This meadow would continue to transition from a wet meadow with a sedge type community to a more xeric sagebrush type community. In the long term (25-35 years) this meadow habitat would continue to decrease. A new much smaller flood plain will develop within the incised channel.

By eliminating livestock grazing, the aquatic habitats, including riparian areas and their associated herbaceous plant communities are expected to improve within 1-5 years. In the secondary range (uplands), the communities with flatter slopes, relatively close to water, primary travel routes, entry and exit gates, and those areas grazed early in the season when upland grasses are at their most palatable would improve in cover or composition. In most instances, there would be an increase to vegetation with native grass species increasing and some forbs decreasing.

Conversely, there may be a slow decrease in the biodiversity of the aquatic habitats as some native forbs and mosses are suppressed by the increased grass growth. Over time, (20-50 years), grass plants, such as bunchgrasses would tend to stagnate due to the absence of disturbance. Without some disturbance, such as grazing, conifer encroachment would increase in meadows and riparian species composition would decrease.

Exclusion of livestock would result in some benefits to soils where there are currently trailing or trampling impacts. For the most part, these effects are relatively minor and localized. Any improvement therefore would not be significant and would likely occur over a short time period as indicated by experience with other vacant and/or abolished Allotments.

Under the no action alternative, aspen communities within the Allotments would continue to provide variety in age class, structure, composition and amount of cover within riparian areas. Over time aspen stands may decrease due to conifer encroachment from a lack of disturbance. However, it is likely that aspen browse may continue to exceed standards where recreational stock horse use and other browsers have over browsed individual aspen stands, resulting in a short-term (< 1-2 years) effects to those individuals by reducing annual growth. In the long term (5 years plus), in the areas where aspen is growing, the aspen communities would continue to be diverse.

CUMULATIVE EFFECTS

No adverse cumulative effects would occur as a result of livestock grazing since there would be no grazing allowed on any of the Allotments under Alternative 2.

Alternative 3 (Current Management)

DIRECT AND INDIRECT EFFECTS

Under current management, the key areas that are stable or trending toward desired conditions would remain the same or continue to improve. Utilization levels in those areas would continue to be managed at 40% of available forage, with the exception of rested units in the Eagle Meadow Allotment.

Bell Meadow Allotment

Under a 40% utilization level, Crab Meadow ecological status is expected to remain in poor condition with early-seral species continuing to increase and late-seral species decreasing. This meadow may never meet desired condition because portions of the meadow have shallow rocky soils which do not support late seral species that are more deeply rooted. The northwest corner is expected to remain denuded with limited water holding capacity and the plant community in this area would remain in poor ecological status.

Mud Lake Meadow would continue to be grazed at the current utilization level (40%). A Rapid Assessment in 2010 determined the current ecological condition is fair. The Bell Meadow Allotment was not grazed for a three year period (2002-2004). It is expected the ecological condition would remain fair, and trend stable but with season long grazing across the entire Allotment, recovery rates would not increase.

Eagle Meadow Allotment

In the Eagle Meadow Allotment, which is under an intensive grazing system, a 60% utilization standard could continue to be implemented in the Sardine, Haypress and Long Valley units, as well as Eagle Meadow gathering pasture. The 2006 Rapid Assessment ecological condition in Sardine Meadow and Haypress Meadow indicates that at current management these units meet Forest Plan Direction. However, it is unknown if grazing this unit consistently at 60% would cause the ecological condition to change due to allowable use limits not tested at 60%.

Eagle Meadow Pasture has several fens, some of which are rated Functional-At Risk. Condition and trend of the fens is not apparent and it is unknown if livestock grazing is causing or contributing to the drying and exposed bare soil of the fens or whether these factors are within control of management. There is also a decadent aspen stand that is in poor condition with little regeneration. The eastern side of the meadow is not connected to the streambed and is rated in poor condition and no longer functioning as a meadow. The west side of the meadow is in desired condition. The pasture is currently used for late season gathering (2 weeks) and the utilization standard is 60%. However, 60% utilization has not been tested and it is unknown if continued use at 60% could continue to meet Forest Plan Direction under an intensive grazing system where a meadow is maintained in a late-seral status if meadow-associated species are being impacted. The ecological status of the meadow is expected to continue to remain fair in the west side of the meadow that still has connectivity to the stream but it is not known if condition of the fens will improve to Proper Functioning Condition under 60% utilization.

Red Rock Meadow would continue to have a stable ecological status because early-seral species are slightly decreasing and mid-seral species are increasing. However, it is unlikely late-seral species would increase appreciably due to a continued transition from its current dry meadow type to a sagebrush community type. This transition is expected to continue due to the lowered water table and loss of floodplain connectivity, although the stream is showing revegetation and aggradation of sediment at a new but lower floodplain level. Utilization would remain the same due to an intensive grazing strategy (rest-rotation) developed for the Sardine, Haypress and Long Valley units. This strategy is not expected to have any substantial effect on the ecological status of Red Rock Meadow because cattle would continue to pass through the meadow due to limited forage. This grazing management strategy also moves cattle into the uplands which reduces the concentrations of cattle in this meadow. It is expected the meadow would remain stable but would not meet the desired condition of 50% or greater late-seral herbaceous vegetation without hydrologic intervention.

Lower Eagle Meadow would continue to measure utilization at 6” stubble height within the exclosure to protect Great Gray Owl habitat. Utilization monitoring occurs mid to late August after cattle have left the unit and it is expected that this standard would continue to be met. Rotation into the Sardine Unit is timed to allow larkspur to mature and become less toxic to cattle. The 6” utilization standard

generally allows cattle to remain long enough to let larkspur cure in the Sardine Unit and limit exposure. The 6 inch stubble height standard does not conform to the 5” cover height established by the Forest.

Herring Creek Allotment

Under Alternative 3, Herring Creek has several locations of Yosemite toad habitat that are excluded from livestock grazing through metamorphosis. Grazing alternatives are severely limited on this Allotment until after toad metamorphosis (about the middle of August). The distribution of livestock in the current management strategy does not allow movement into any other area including Waterhouse Lake area, due to lack of accessibility. This concentrates cattle in the Hammill Canyon/Herring Creek area for extended periods of time to meet Forest Plan Direction for Yosemite toad conservation. Under this alternative, cattle enter Hammill Canyon and portions of Herring Creek at the same time each year with no opportunities for early entry into higher elevation grazing. Proper Functioning Condition (PFC) results along Herring Creek indicate that these areas are either functioning at risk or non-functional and not consistent with Forest Plan Direction that are, in part, due to legacy grazing issues.

In the remaining areas rated as moderate or properly functioning, the ecological status is expected to remain stable or trending towards desired conditions. The associated stream functions connected to these meadows are expected to continue to improve as floodplains reach their potential.

It is expected there would be limited early season grazing of riparian browse, including aspen and willow by cattle because there are more palatable herbaceous species available that are favored at this time of the year. Monitoring data indicates early season grazing use in riparian areas meets Forest Plan Direction. Late season browsing on aspen may still occur in some locations and site specific aspen browsing does occasionally exceed standards and guidelines. However, it is difficult to manage aspen browse, especially in areas where livestock, deer and recreational packstock co-exist.

CUMULATIVE EFFECTS

The cumulative effects of this alternative are the same as for Alternative 1. There is no substantial difference between these alternatives in respect to cumulative effects.

Alternative 4 (Resource Protection)

DIRECT AND INDIRECT EFFECTS

This alternative was developed in response to scoping comments. Alternative 4 would implement resource protection measures immediately where a need for change in management was identified during project analysis. The alternative would make forage available to qualified livestock operators in a manner that is consistent with management direction but not sustainable economically. Alternative 4 would move existing conditions toward desired conditions but limit livestock grazing on these Allotments. Livestock grazing would be minimized or excluded in areas where certain resource concerns were identified. Permitted livestock numbers for the Bell Meadow, Eagle Meadow, and Herring Creek Allotments would be reduced by an amount proportionate to the reduction in suitable foraging area caused by exclusion of those areas with resource concerns. The Resource Protection Alternative would also reduce the permitted grazing area for all three Allotments due to exclusion of sensitive areas.

Livestock management may have adjustments each year in terms of timing and actual livestock numbers. This alternative may not provide permittees with a viable grazing strategy for economic stability. The overall objectives may not be met by staying within the sideboards outlined in the design criteria depending only on changes to livestock management (Allen-Diaz 1999).

As with the Proposed Action, the Resource Protection Alternative would move existing conditions toward desired conditions while continuing to allow livestock grazing on these Allotments. However,

the Resource Protection Alternative decreases acres that were identified as suitable and capable for resource protection. Reduced grazing areas and livestock numbers may affect the economic viability of the Allotments and does not allow for utilization of available forage. It also does not consider the management implications of the Yosemite toad Study (Roche et al. 2012), which does not support livestock exclusion from breeding habitat. This study suggests that current grazing management guidelines are meeting objectives for Toad conservation. It also does not consider other adaptive management solutions that could avoid a reduction of livestock numbers or season of use.

Under Alternative 4, it is unknown whether aspen regeneration would improve or if a reduction in suitable acres would increase grazing pressure on aspen stands. It is expected there would be limited early season grazing of riparian browse, including aspen and willow by cattle because there are more palatable herbaceous species available that are favored at this time of the year. Monitoring data indicates early season grazing use in riparian areas meets Forest Plan Direction. Late season browsing on aspen may still occur in some locations and site specific aspen browsing does occasionally exceed standards and guidelines. However, it is difficult to manage aspen browse, especially in areas where livestock, deer and recreational packstock co-exist.

It is expected that with reduced numbers and acres there will still be a need to improve livestock distribution and/or rotation in these areas and continue monitoring of aspen browse and regeneration trends.

CUMULATIVE EFFECTS

The cumulative effects of this alternative are the same as for Alternative 1. There is no substantial difference between these alternatives with respect to cumulative effects.

Summary of Effects Analysis across All Alternatives

A summary of effects is provided in Table 3.06-7

Table 3.06-7 Summary of effects to meadow condition

Resource	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Meadow Condition	Key areas that are stable or trending toward desired condition would remain the same or continue to improve.	Meadows rated as high would maintain desired condition. Meadows in moderate condition would continue to recover and would likely move towards desired condition. Meadows rated in low condition would improve overtime by natural recovery.	Key areas that are stable or trending toward desired condition would remain the same or continue to improve, but recovery rates would not increase.	Key areas that are stable or trending toward desired condition would remain the same or continue to improve.

Compliance with the Forest Plan and Other Direction

This project is in compliance with Forest Plan Direction (USDA 2010) because standards and guidelines and permit administration are implemented to trend towards or meet desired future conditions.

3.07 RECREATION

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Forest Plan Direction (USDA 2010) includes forestwide standards and guidelines and Wild and Scenic River, Near Natural, Scenic Corridor, General Forest, and Developed Recreation management area direction that apply to this project. The Recreation Opportunity Spectrum (ROS) is the basic inventory that was used to create recreation-opportunity "zoning" in these plans. In summary, Forest Plan direction specific to recreation emphasizes providing a variety of quality recreation opportunities while protecting the natural setting and natural resource values. Specific elements address livestock grazing and related activities to optimize recreation opportunities while minimizing conflict with grazing, encouraging public participation, managing conditions on the ground, and assuring effective and sustainable management. Trailheads, campgrounds, and recreation residence tracts generally fall within the Developed Recreation Management Area. Forestwide direction for Allotment management excludes grazing within all developed recreation sites (Appendix C, Forest Plan Direction).

Effects Analysis Methodology

Assumptions Specific to Recreation

1. The authorization of continued grazing does not change ROS classes.
2. The Forest NVUM report accurately expresses the most popular recreation activities for analysis.
3. An adaptive management strategy will provide options that may be used in the future where a need is identified due to conflicts between grazing and recreation. These projects, if needed, may need additional NEPA analysis.

Data Sources

1. Forest Plan
2. GIS
3. NVUM reports

Recreation Indicators

1. The extent of recreation activities that are potentially affected.
2. The proximity of primary grazing areas to recreation areas.
3. The number of public comments received related to conflicts between grazing and recreation.

Recreation Methodology

Effects analysis involved consideration of known and potential grazing conflicts with management direction for ROS classes and popular recreation activities.

Affected Environment

Recreation opportunities within the project area include: scenic viewing, hiking, backpacking, biking, camping, horseback riding, hunting, and off-highway vehicle opportunities. The recreation use period generally occurs from late May (based on snow free access) through mid-November with the highest use occurring from July 1 through Labor Day. Higher use within this period occurs on weekend days. Use peaks again significantly on the opening weekend of rifle season for deer hunting (the third weekend in September).

The National Visitor Use Monitoring (NVUM) reports from 2003 and 2007 indicate that the Stanislaus National Forest receives over 1.8 million visitors annually (USDA 2008). About thirty seven percent of the respondents to the survey visited the forest from within 75 miles from their home location. The study also showed that between 17 and 22 percent of the visitors surveyed used general

forest areas for recreation purposes. A larger percentage of the respondents visiting the forest did so to hike versus participate in equestrian activities (6% hiking vs. 2% equestrian).

Visitors to dispersed use, non-wilderness areas within the project boundaries are generally repeat visitors and are aware that the Forest Service is the land management agency whose policy guides uses for these areas.

BELL MEADOW ALLOTMENT

Most areas within the project analysis area are within Roaded Natural ROS Class with smaller sections within Semi-Primitive Motorized and Semi-Primitive Non-Motorized ROS classes. The analysis area includes two developed horse campgrounds, one developed trailhead and three undeveloped trailheads. There are about 21 miles of non-motorized trails within the analysis area. Popular activities within the area include dispersed camping, hunting, day trip horseback riding, hiking, backpacking to wilderness destinations, and scenic travel.

EAGLE MEADOW ALLOTMENT

The project analysis area is within Roaded Natural, Semi-Primitive Motorized and Semi-Primitive Non-Motorized Recreation Opportunity Spectrum Class (ROS). The Eagle Meadow Allotment area includes one developed horse campground, one developed OHV campground; one developed non-motorized trailhead and three undeveloped motorized trailheads. There are about 9 miles of non-motorized trails and 11 miles of designated OHV trails within the analysis area[1]. Popular activities within the area include camping, dispersed camping, hunting, OHV and OSV activities, mountain biking, horseback riding and scenic travel.

The Allotment and proposed addition are proximate (within ¼ mile) to two recreation residence tracts (Niagara and Mill Creek) and one additional developed campground (Mill Creek Campground). The recreation residence tracts have a total of nine permitted cabins. The cabins are used seasonally by the permit holders and their families and/or friends.

HERRING CREEK ALLOTMENT

The project analysis area is predominantly within Roaded Natural, with small sections in Semi-Primitive Motorized and Semi-Primitive Non-Motorized Recreation Opportunity Spectrum Class (ROS). The analysis area includes one designated horse campground, two campgrounds; four non-motorized trailhead and two undeveloped motorized trailheads. There are about 10 miles of non-motorized trails and 7 miles of designated OHV trails within the analysis area[1]. Popular activities within the area include camping, dispersed camping, hunting, OHV and OSV activities, mountain biking, hiking and backpacking to wilderness destinations, interpretive trail use and scenic travel.

The proposed addition is proximate (within ¼ mile) to one recreation residence tracts (Cascade Creek). The recreation residence tract has a total of fifteen permitted cabins. The cabins are used seasonally by the permit holders and their families and/or friends.

Environmental Consequences

Studies found “limited evidence that perceptions of livestock use are associated with recreation activity style…and demographic characteristics”. Hunters were significantly less likely to report that seeing cattle detracted from their recreation experiences, and more likely to report that seeing cattle enhanced the experience. Anglers were more likely to be aware of riparian impacts from grazing than hunters. Mitchell et al. (1996) found that visitors in dispersed campsites tended to be more critical of grazing than those in developed campgrounds, which are usually fenced off from livestock use. An unpublished study by J.E. Mitchell, G.N. Wallace, and M.D. Wells (1986) found that most visitors were neutral about facilities associated with livestock management on rangelands (e.g. corrals, cattle guards, watering tanks, salt blocks, and fences).

Studies were inconclusive regarding the idea that the size of the visitor's home community affected their attitudes about grazing. Studies by Mitchell et al. and Brunson and Gilbert found that visitors from rural communities and local visitors were less likely to find that grazing negatively impacted their recreation experiences. In the study conducted by Brunson and Gilbert (2003), visitors were more likely to say grazing detracted from the experience if they were from an urban area or hiked, while the study by Mitchell et al. (1996) found no connection between the size of a visitor's home community and the presence of livestock as a detractor from their recreation experience.

The location of encounters with grazing also affects visitor perceptions (Brunson and Gilbert, 2003). Sanderson et al. (1986) found that frequent visitors to an area were more likely to accept intensive grazing management, but they also found that people who experienced close contact with cattle were more likely to express negative perceptions. Studies also found that visitors tended to be more tolerant of grazing in areas known to be managed for multiple uses and/or without a protective status such as wilderness or National Parks/Monuments (Johnson et al. 1997).

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Bell Meadow Allotment

No changes to the ROS designations would be made. July 1 generally starts the highest use period for recreation activities throughout the forest. Delivering cattle to an area near Kerrick Corrals Horse Camp may have some impact on users of this campground were the animals to be delivered during this period. The option to deliver within two weeks on either side of the July 1 start time would lessen the possibility of cow/visitor encounters. Users of the Horsecamp are generally from ranching and/or local communities, familiar with livestock and grazing use of the forest and are likely more accepting of this activity. It is anticipated that the cattle would be managed to stay out of this developed site thereby minimizing overlap and potential conflicts.

Dispersing the cattle into units and into small herd sizes will minimize the possibility of potential user conflicts in the Crab and Mud units. The Crab and Mud units contain high use trailheads providing access to wilderness destinations. Users to these areas are generally mixed, consisting of hikers and equestrian enthusiasts. As noted in previous studies, it is likely that hikers may have a different perception of cattle grazing on their experience than that perceived by a horseback rider (wilderness use impacts will be addressed separately).

There is an overlap of high use periods at the Crabtree/Gianelli/Bell trailheads and the timing of moving the animals into the units. All of these trailheads are adjacent to creeks thereby increasing the possibility of animal/visitor encounters. Common complaints by visitors would likely result from the increased presence of flies which would reduce the quality of the recreation experience. It is likely that visitors to these areas are aware that they are visiting National Forest lands and may be more accepting of grazing as a multiple use management activity.

The animals may be moved out of the Allotment prior to opening weekend of rifle season, thereby reducing the possibility of potential hunter conflicts. The area is not a popular use area for OHV users therefore impacts to this user groups are anticipated to be minimal.

An indirect effect of continued grazing may result in visitors recreating in areas or periods where no grazing occurs for future events. There is no net decrease in visitation anticipated as a result of the proposed action.

Eagle Meadow Allotment

No changes to the ROS designations would be made. July 1 generally starts the highest use period for recreation activities throughout the forest. Users to these areas are generally mixed, consisting predominantly of OHV users and equestrian enthusiasts. Forest Plan guidelines provide that cattle

will be kept out of developed recreation sites. This may be accomplished either through more intense herding or fencing. The Forest Service has not received complaints regarding cattle occurrence in Niagara Creek Campground or Niagara ORV Campground. It is not anticipated that continued grazing will negatively impact user experiences in these two developed sites.

Users of the Eagle Meadow Horsecamp are generally from ranching and/or local communities, familiar with livestock and grazing use of the forest and are likely more accepting of this activity. It is anticipated that the cattle would be managed to stay out of this developed site.

While it was noted in some studies that dispersed users were more likely to report that grazing negatively affects their recreation experience, based on use in this particular area, impacts are expected to be minimal. Some users may experience increased flies in their favorite dispersed campsite which will detract from their experience. Additional dispersed sites in the Niagara Creek addition, not previously impacted by cattle use may be impacted. Users to these particular sites may be more likely to be affected by cattle grazing because it has not previously occurred in this area.

It is anticipated that fences on the west side of the Niagara Creek addition will minimize the occurrence of cattle in or near the Mill Creek Campground and Mill Creek Recreation Residence Tract. It is not anticipated that Niagara or Mill Creek Recreation Residence Tracts will be affected by the addition of this subunit.

The Eagle Meadow, Niagara and Long Valley areas provides numerous dispersed camping and OHV opportunities. As previously noted dispersed users are the most likely user type to become negatively impacted by grazing activities. This is likely the result of the fact that dispersed camping sites generally occur near streams or other water features where cattle also congregate. Grazing has occurred in this area for decades. Changes that have occurred in this area are the increasing number of users to the area. The increasing popularity of OHV activities accounts for much of this increased use. As use continues to increase, it is likely that more users will encounter the results of grazing activities.

Increased education and visitor information regarding forest multiple use management and grazing activities in the area may assist in increasing visitor awareness and setting expectations for their forest visit. Users to this area are generally local and/or from the central valley where they may be more accepting of grazing activities.

An indirect effect of continued grazing may result in visitors recreating in areas or periods where no grazing occurs for future events. There is no net decrease in visitation anticipated as a result of the proposed action.

Herring Creek Allotment

No changes to the ROS designations would be made. July 1 generally starts the highest use period for recreation activities throughout the forest. On a relative scale limited dispersed use occurs in the area where the cattle are delivered. While it was noted in some studies that dispersed users were more likely to report that grazing negatively affects their recreation experience, based on use in this particular area, impacts are expected to be minimal. Some users may experience increased flies in their favorite dispersed campsite which will detract from their experience. Additional dispersed sites in the Cascade addition, not previously impacted by cattle use may be impacted. Users to these particular sites may be more likely to be affected by cattle grazing because it has not previously occurred in this area.

The proposed addition is similar in proximity and features to the Cascade Creek Tract as the existing Allotment is to Leland Recreation Residence Tract and Cow Creek Recreation Residence Tract. No complaints have been received by the Forest Service regarding the occurrence of cattle in either the Leland or Cow Creek Tracts. It is not anticipated that Cascade Creek Recreation Residence Tract will be affected by the addition of this subunit.

Cattle have been frequently noted in the Herring Reservoir Campground and the meadow adjoining the upper end of Herring Reservoir. The recreation experience for users of this campground is negatively impacted by the presence of cattle within the campground. More intensive management of cattle movement to prevent entry into this campground would be needed. This may be accomplished by fencing or more intensive herding and monitoring efforts.

The Herring Creek/Hammill Canyon Loop area provides numerous dispersed camping and OHV opportunities. As previously noted dispersed users are the most likely user type to become negatively impacted by grazing activities. This is likely the result of the fact that dispersed camping sites generally occur near streams or other water features where cattle also congregate. Grazing has occurred in this area for decades. Changes that have occurred in this area are the increasing number of users to the area. The increasing popularity of OHV activities accounts for much of this increased use. As use continues to increase, it is likely that more users will encounter the results of grazing activities.

Increased education and visitor information regarding forest multiple use management and grazing activities in the area may assist in increasing visitor awareness and setting expectations for their forest visit. Users to this area are generally local and/or from the central valley where they may be more accepting of grazing activities. Common complaints by visitors would likely result from the presence of increased flies from the presence of cattle which would reduce the quality of the recreation experience. It is likely that visitors to these areas are aware that they are visiting National Forest lands and may be more accepting of grazing as a multiple use management activity.

An indirect effect of continued grazing may result in visitors recreating in areas or periods where no grazing occurs for future events. There is no net decrease in visitation anticipated as a result of the proposed action.

CUMULATIVE EFFECTS

Proposed projects in the Bell Meadow, Eagle Meadow and Herring Creek Allotment areas include the Gooseberry Ecological Restoration Project, the Niagara Fire Salvage Project, the Juniper Mine restoration project and the Strawberry Fuels Reduction Project. These projects analyzed potential impacts to recreation and visual resources. Grazing has occurred in these overlapping areas for decades. Changes in the vegetative landscape resulting from grazing activities are not anticipated to contribute significantly to the overall changes in the visual landscape qualities. It is not anticipated that recreation opportunities will be cumulatively impacted by the continued use of the area for this particular activity.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

If Alternative 2 is selected, commercial livestock grazing would be eliminated from the three Allotments and visitors would not be impacted by the presence of livestock. Under this alternative, there would be no direct effects or a positive effect to recreation opportunities in the areas encompassing the Bell Meadow, Eagle Meadow and Herring Creek Allotments. An indirect effect of removing grazing may be that visitors recreate in new areas that are less desirable when cattle are present. Visitor encounters with recreational stock, including horses, burros, and llamas, may still occur.

CUMULATIVE EFFECTS

Because there would be no direct or indirect effects on recreation, there would be no cumulative effects resulting from this alternative.

Alternative 3 (Current Management)

DIRECT AND INDIRECT EFFECTS

The effects of this alternative would be similar to those described for Alternative 1, with the exception that the addition areas would not be incorporated into the Allotments. No changes to the ROS designations would be made.

There is no net decrease in visitation anticipated as a result of Alternative 3.

CUMULATIVE EFFECTS

Cumulative effects of this alternative are similar to those described for Alternative 1. Changes in the vegetative landscape resulting from grazing activities are not anticipated to contribute significantly to the overall changes in the visual landscape qualities. It is not anticipated that recreation opportunities will be cumulatively impacted by the continued use of the area for grazing.

Alternative 4 (Resource Protection)

DIRECT AND INDIRECT EFFECTS

The effects of this alternative on recreation would likely be somewhat less than those described for Alternatives 1 and 3, because livestock numbers would be reduced. Reduced livestock numbers and reduced available grazing area may make it less likely for users to encounter grazing activity. Dispersed sites in the addition areas will not be impacted because the area would not be incorporated into the Allotments under this alternative. More intensive management of cattle movement to prevent entry into the Herring Reservoir Campground would still be needed. This may be accomplished by fencing or more intensive herding and monitoring efforts.

An indirect effect of continued grazing may result in visitors recreating in areas or periods where no grazing occurs for future events. Likewise, an indirect effect of this alternative is the potential for increased recreation use in areas, such as the Willow subunit, that would be excluded from grazing.

No changes to the ROS designations would be made. There is no net decrease in visitation anticipated as a result of this alternative.

CUMULATIVE EFFECTS

Cumulative effects of this alternative are similar to those described for Alternatives 1 and 3. Changes in the vegetative landscape resulting from grazing activities are not anticipated to contribute significantly to the overall changes in the visual landscape qualities. It is not anticipated that recreation opportunities will be cumulatively impacted by the continued use of the area for grazing.

Summary of Effects Analysis across All Alternatives

Dispersed users may be negatively impacted by grazing as a result of the coinciding locations of dispersed activities and the presence of cattle along streams. The proposed actions are not anticipated to have a negative impact on user experiences within developed recreation areas and/or recreation residence tracts based on efforts to manage cattle away from these locations either through physical barriers or “herding” strategies. Hikers are the most likely user group to be negatively affected by the presence of cattle along trails accessing wilderness destinations resulting from cow pies and increased flies. It is not anticipated that overall visitation by any one user group will decrease as a result of the proposed actions. It is possible that visitors will adjust their use patterns to areas where cattle have not yet been or to areas where grazing does not occur. The number of users changing use patterns is not anticipated to be so great as to cause new resource issues in other previously unvisited areas.

Compliance with the Forest Plan and Other Direction

Trailheads, campgrounds, and recreation residence tracts generally fall within the Developed Recreation Management Area in the Forest Plan. Forestwide direction for Allotment management within developed recreation areas excludes grazing within all developed recreation sites (USDA 2010).

Grazing activities will be managed by the permittee to avoid developed recreation sites or in some places, fences will be installed to minimize occurrences within sites like recreation residence tracts.

Dispersed recreation activities occur within Semi-primitive Non-motorized, Semi-primitive motorized, and Roaded Natural areas throughout the project areas.

- Semi-primitive Non-motorized: Manage the area so that on-site controls and restrictions are minimized and restrictions are subtle. Resource improvements will normally be limited to minimum, unobtrusive facilities.
- Semi-primitive Motorized: Manage the area so that on-site controls and restrictions are evident but not dominant. Resource improvements occur but are subordinate to the surrounding natural environment.
- Roaded Natural: Manage the area so there is only moderate evidence of the sights and sounds of man. Resource modification practices are evident. A full range of other resource activities is permitted to the extent that the general practice description is met.

No changes are proposed to the ROS classes identified within the Forest Plan. It is not anticipated that the proposed action(s) will result in a change to the existing class designations for the project areas.

The Forest Plan standards and guidelines provide that range activities follow Forest Plan Direction for Range and Recreation. Grazing activities and recreation should be monitored to identify and implement adaptive management options that may be needed to mitigate and minimize conflicts with recreation caused by livestock grazing.

Recreation use and grazing conflicts will be monitored as recreation staff and range specialists execute their duties throughout the project areas. Conflicts will be reported to range specialists. Rehabilitation and/mitigation needs may be determined through mutual efforts of resource, range and recreation specialists.

3.08 SOCIETY, CULTURE AND ECONOMY

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Multiple statues, regulations and executive orders identify the general requirement for the application of economic and social evaluation in support of Forest Service planning and decision making. These include, but are not limited to, the Multiple-Use Sustained Yield Act of 1960 (74 Stat.: 16 USC 528-531), National Environmental Policy Act of 1969 (83 Stat. 852, 42 USC 4321, 4331-4335, 4341-4347) and the Planning Act of 1974. In addition, the following guidance also applies.

Executive Order 12898 issued in 1994 orders federal agencies to identify and address any adverse human health and environmental effects of agency programs that disproportionately impact minority and low-income populations. The Order also directs agencies to consider patterns of subsistence hunting and fishing when an agency action may affect fish or wildlife.

The Civil Rights Act of 1964 provides for nondiscrimination in voting, public accommodations, public facilities, public education, federally assisted programs, and equal employment opportunity. Title VI of the Act, Nondiscrimination in Federally Assisted Programs, as amended (42 USC 2000d through 2000d-6) prohibits discrimination based on race, color, or national origin.

Effects Analysis Methodology

Assumptions Specific to Society, Culture and Economy

The Environmental Justice analysis will report what effects might occur to minority and low-income populations. Of particular concern is whether job or income discrimination might occur to these groups in the area during or resulting from the proposed project. The analysis boundary is Tuolumne County with 20 years of comparable data available.

Data Sources

- Bureau of Economic Analysis
- United States Census
- Tuolumne County Crop and Livestock Report
- Forest Service 2200 Range Management Files

Society, Culture and Economy Indicators

- Employment and income information at the county level
- Local trends and community statistics
- Commercial uses of the project area

Society, Culture and Economy Methodology

Social Effects considered are short and long term employment opportunities independent of income opportunities. Also considered are general forest values, including aesthetic value, cultural value, historical value, and recreational value.

Economic effects can be categorized as direct or indirect. Direct effects are changes directly associated with continued authorization of grazing. Indirect effects are the multiplier effects resulting from subsequent actions in the analysis area.

Affected Environment

For the Social and Economic analysis, the political boundary of Tuolumne County, California is used. This area provides a specific boundary to provide for analysis of key social and economic indicators. All three of the Allotments being analyzed are within Tuolumne County and the permittees for the

Allotments have base ranches and operations based in Tuolumne County, with some operations extending into Stanislaus County. Social and economic impacts to Stanislaus County would be negligible; therefore Stanislaus County was not included in the analysis.

Where available, up to 20 years of data is used for comparison. The Bureau of Economic Analysis, United States Census, and the Tuolumne County Crop and Livestock Report are the data sources. Key social and economic indicators used are population, real personal income per capita, and farm and nonfarm employment. These indicators provide a description of the project and surrounding area to help evaluate the possible effects to Tuolumne County, California.

Tuolumne County was settled in the 1850s, beginning with the Gold Rush. Valuable forest resources such as lumber became one of the primary industries in the early 20th century. Agriculture, such as ranching became an important part of feeding the increasing population of the emerging American west. The Sierra Nevada foothills and California valley provide almost year round grazing forage. The higher elevations also provide seasonal summer forage for grazing, typically between June and October. Most ranches established in Tuolumne County and surrounding areas, developed their business around winter grazing in the foothills and summer grazing in the mountains on Forest Service lands. Over the years the percentage of Forest Service grazing contribution has decreased in comparison with total cattle production, but the Forest Service grazing permits are still very important to the ranches that rely on those permits for summer forage.

Table 3.08-1 provides information on population, income, and employment in Tuolumne County from 1990 to 2010. Population, income per capita and employment have all increased.

Table 3.08-1 Tuolumne County Population, Personal Income, and Employment (BEA 2012)

Year	Population	Personal Income per Capita	Employment, full and part-time	Farm proprietors	Nonfarm proprietors
1990	48,845	$16,025	20,448	288	5,522
2000	54,658	$24,272	24,213	377	7,047
2010	55,221	$35,787	24,723	332	7,370

Table 3.08-2 provides number of farms and farms involved in cattle production in Tuolumne County from 1992 to 2007.

Table 3.08-2 Tuolumne County Farm and Farms with cattle production (USDA 2012)

Year	Number of Farms	Farms with cattle production
1992	249	171
2002	358	187
2007	366	195

Nonfarm employment has increased while farm employment has slightly decreased. In 2010, farming made up 1.45% of Tuolumne County's employment. In 2007 of the 366 farms in Tuolumne County 195, or 53% were involved in cattle ranching.

ENVIRONMENTAL JUSTICE

Executive order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," signed February 11, 1994 by President Clinton states (Section 1-101), "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in

the United States." For environmental justice analysis, the ethnic distribution and poverty level of Tuolumne County and the State of California are 2010 is provided in Table 3.08-3.

Table 3.08-3 Ethnic Distribution and Poverty Level for Tuolumne County, CA (US Census 2012)

Item	Tuolumne County	California
2010 population	55,365	37,253,956
White persons	87.2 %	57.6 %
Black or African American	2.1 %	6.2 %
American Indian and Alaska Native	1.9 %	1.0 %
Asian	1.0 %	13.0 %
Native Hawaiian and Other Pacific Islander	0.1 %	0.4 %
Persons reporting two or more races	3.7 %	4.9 %
Hispanic or Latino	10.7 %	37.6 %
White, not Hispanic	81.9 %	40.1 %
Persons below poverty level	11.7 %	13.7 %

Table 3.08-4 Alternative Summary Comparison

Item	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Bell Meadow				
Cow/calf pairs	80	0	80	64
Season	7/1 – 9/15	None	7/1 – 9/15	7/1 – 9/15
AUM	268	0	268	214
Total acres	13,209	0	13,209	13,209
Capable/Suitable acres	3,257	0	3,257	3,240
Miles of Fence	5	0	5	6*
Eagle Meadow				
Cow/calf pairs	150	0	150	120
Season	7/1 – 9/30	None	7/1 – 9/30	7/1 – 9/30
AUM	599	0	599	478
Total acres	25,092	0	20,239	20,239
Capable/Suitable acres	3,390	0	2,941	2,916
Miles of Fence	13.75	0	9.75	10.25*
Herring Creek				
Cow/calf pairs	156	0	156	78
Season	7/1 – 9/30	None	7/1 – 9/30	7/1 – 9/30
AUM	623	0	623	310
Total acres	18,146	0	17,263	14,733
Capable/Suitable acres	2,611	0	2,182	1,282
Miles of Fence	13.25	0	7	10*

Environmental Consequences

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Direct effects of the Proposed Action would be a temporary increase in employment due to fence and corral construction, conservation measures, and monitoring. The indirect effects may include an increase in indirect employment due to the impact of direct employment.

Social

Broad-scale social effects would be limited in the Proposed Action, as it is similar to current management in the area. Additional employment due to fence and corral construction, implementing conservation measures, and monitoring may create temporary employment opportunities.

Those individuals preferring cattle-free area would continue to be negatively affected by grazing, and the individuals that enjoy seeing cattle on rangelands as an example of working landscapes and a reminder of the historic West would be positively affected.

Economic

The economic impacts of the Proposed Action would not be greatly different than current management, and livestock grazing would continue in a similar manner. Fence and corral construction projects, implementation of conservation measures, and monitoring may increase employment in the area. The additional conservation measures and monitoring may force permittees to alter their current grazing practices, but would most likely not affect the amount of grazing.

CUMULATIVE EFFECTS

According to the list of past, present, and reasonably foreseeable future actions in the analysis or action area found in the EIS, there are fuels reduction, habitat restoration, hazard tree removal, grazing, and recreational uses to consider for cumulative effects.

Projects that need to be considered are fuels reduction, habitat restoration, hazard tree removal, grazing, and recreational uses. All of these projects would generate jobs in and/or around the project area, potentially reducing the unemployment rate. For Alternative 1, job growth would be in addition to small increases due to fence and corral construction, conservation measures, and monitoring in addition to the existing condition.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

The direct effects of this alternative would likely be a loss of jobs in farm employment and subsequent loss of indirect employment in other industries.

Social

Under the no action alternative, the discontinued grazing on federal lands on the Bell Meadow, Eagle Meadow, and Herring Creek grazing Allotments would negatively affect permittee operations and possibly ranch viability. Some operations could be shut down. The possible sale of ranch properties may invite commercial and/or residential development which would reduce the amount of open space and fragment wildlife habitat. Ranching families could experience lifestyle changes.

Those individuals preferring cattle-free areas would be positively affected, and the individuals that enjoy seeing cattle on rangelands as an example of working landscapes and a reminder of the historic West would be negatively affected.

Economic

The economic impacts of the no action alternative would be greatest for the local economy, as grazing permits would be discontinued on federal lands on the Bell Meadow, Eagle Meadow, and Herring Creek grazing Allotments. This would result in a loss of income for the permittees and a loss of jobs in the county. The loss of jobs would occur in farm employment, which is already in decline.

Because the analysis does not consider the permittees' personal business and financial information, it is difficult to assess whether a ranch would become unviable under this alternative. It could compel the permittees to rent or buy additional pasture or purchase additional feed to maintain their current livestock numbers. Although this option is unlikely due to the expense for the permittee and short

supply of pasture, it may create economic opportunity for the suppliers of these products and/or needs.

CUMULATIVE EFFECTS

Projects that need to be considered are fuels reduction, habitat restoration, hazard tree removal, grazing, and recreational uses. All of these projects would generate jobs in and/or around the project area, potentially reducing the unemployment rate. These projects could help to offset the job loss as a result of discontinued grazing under Alternative 2.

Alternative 3 (Current Management)

DIRECT AND INDIRECT EFFECTS

Alternative 3 would have no direct or indirect socioeconomic effects, as it is a continuation of current management.

Social

No broad-scale social changes are expected with Alternative 3, continuing current management with minor modifications. Those individuals preferring cattle-free area would continue to be negatively affected by grazing, and the individuals that enjoy seeing cattle on rangelands as an example of working landscapes and a reminder of the historic West would be positively affected.

Economic

Alternative 3 would not greatly affect the local area economically. Additional employment would not likely be generated.

CUMULATIVE EFFECTS

Cumulative effects for Alternative 3 would be the same as described for Alternative 1.

Alternative 4 (Resource Protection)

DIRECT AND INDIRECT EFFECTS

Direct effects from Alternative 4, could result in a temporary increase in employment due to fence and corral construction projects, implementation of conservation measures, and monitoring. Over the longer term direct effects of this alternative would likely be a loss of jobs in farm employment and subsequent loss of indirect employment in other industries. It is unknown how great of an impact Alternative 4 would have on individual ranch viability. Some operations may just be reduced, others could be shut down.

Social

Alternative 4 would affect the permittees operations as it results in reduced permitted livestock numbers on the Bell Meadow, Eagle Meadow and Herring Creek grazing Allotments. Increased attention to sensitive resources would result in additional expense to permittees' operations. Reduced acres available for grazing and reduced permitted livestock numbers could affect individual ranch viability.

Economic

The economic impact of Alternative 4 could range from the economic impact of a 20-50 percent reduction in permitted livestock (something in between current management and no grazing) to impacts as great as Alternative 2 – No Grazing, if it dramatically affects ranch viability. Fence and corral construction projects, implementation of conservation measures, and monitoring may increase employment in the area. The additional conservation measures and monitoring may force permittees to alter their current grazing practices, and would likely result in reduced opportunities for grazing.

CUMULATIVE EFFECTS

Cumulative effects for Alternative 4 would be the same as described for Alternative 1.

Summary of Effects Analysis across All Alternatives

Table 3.08-4 provides a summary comparison of the alternatives in term of infrastructure required, administration needs, acres available and AUMs authorized. This provides an indication of the grazing opportunity that would be available. Table 2.05-2 also provides a summary comparison of the basic socio-economic effects between the alternatives.

There are about 20 Ranch operations in the Tuolumne County are that have built their operation with reliance upon Forest Service grazing permits. Private land leases may be available for replacement of federal permits, but high land values have driven competition for these land and costs up. Consequently, permittee operations are quite vulnerable to changes in Federal grazing. Should any of these ranches cease operation, land values suggest that residential development would likely replace agricultural use of these private lands.

Although an assessment is not possible for this analysis, it is recognized that adjustments to federal grazing, whether in terms of Animal Use Months (AUM) reductions or cost increases to permittees, can have important consequences to individual ranch operations and ranch viability, as well as implications to families, social structure, lifestyle, local economies, and land use.

Compliance with the Forest Plan and Other Direction

Much of the Forest Plan Direction for Recreation (Appendix C) is intended to sustain high quality recreation opportunities that result in quality recreation experiences. Minimizing conflict between visitors is a primary goal. It is also a goal to make opportunities available to all types of visitors.

Environmental Justice

Executive Order (EO 12898) requires that each Federal Agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low income populations.

Potentially affected tribes have been consulted and effects have been considered on their rights and concerns within the analysis of alternatives. American Indian populations will not be disproportionately impacted under any alternative with avoidance of heritage resources, consideration of traditional values, and reasonable access allowed through agreements, permits and recognition of their sovereignty and legal rights. None of the alternatives would have a disproportionate economic impact on any minority or low-income community. The effects to jobs and income within the study area are a very small portion of the overall jobs and income (less than 1%).

At this time, no evidence suggests that actions being considered (in their entirety) have disproportionately high and adverse impact on minority and low-income populations.

3.09 SOILS

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Forest Plan Direction (USDA 2010) provides direction to maintain or improve soil quality and long-term soil productivity of meadows. Two standards and guidelines are useful for describing the desired condition of meadow soils. Soil S&Gs address the maintenance of soil organic matter and soil hydrology and water table conditions. The upper level of the saturated water zone in a meadow, or "water table," is a critical factor for meadow condition.

Soil Organic Matter - Maintain topsoil organic matter to at least 85 percent of its original total in the top 12 inches (applies to forage production areas such as meadows).

Soil Hydrologic Function - The soil moisture regime is unchanged where productivity or potential natural plant community is dependent upon specific soil drainage classes (typically associated with wet or moist meadows). Management practices will be designed and implemented to maintain or improve soil hydrologic function.

Meadows soils are known to be fragile and erodible in nature, but they are also the most productive and most utilized as a range resource. The focus of the Soil Report will be on meadows and soil hydrology of meadows for this reason. Meadows also have other functions beyond range and wildlife habitat. A network of healthy meadows will store and meter water to the watershed much beyond snowmelt.

Effects Analysis Methodology

Assumptions Specific to Soils

The Soil Organic Matter and Soil Hydrologic Function standards are not measured directly in the field. They are measured by proxy using the Meadow Hydrologic Function Rapid Assessment protocol (project record).

Data Sources

Meadow specific data collected in the field using established protocols and user guides: Meadow Hydrologic Function Rapid Assessment Protocol (project record); Assessing Proper Functioning Condition for Fen Areas in the Sierra Nevada and Southern Cascade Ranges in California (Weixelman 2009); Meadow Hydrogeomorphic Types for the Sierra Nevada and Southern Cascade Ranges in California (Weixelman et al. 2011).

Soils Indicators

The Soil Organic Matter and Soil Hydrologic Function standards are not measured directly in the field. They are measured by proxy using the Meadow Hydrologic Function Rapid Assessment protocol. The MHF protocol consists of five environmental attributes: channel form, floodplain connectivity, water table alteration, stream bank stability and herbaceous plant community. The factors are scored and the overall condition of the meadow is determined. Meadows that are scored as being in desired condition or good condition will meet the two soil standards, in general.

The attributes *water table alteration* and *abundance of deep rooted herbaceous plants* are more direct measures of soil quality. The two attributes are combined into one metric or indicator, *hydro-soil class*. This report describes the soil *existing condition* component of BEH meadows primarily in terms of the following classes defined below:

- **hydro-soil class 3** – The meadow surface has full floodplain connectivity. The natural soil drainage class (poorly drained, somewhat poorly drained, moderately well drained) has not been

altered. The water table has not been altered. Deep rooted vegetation can reach the water table. Herbaceous roots (density and length) fully occupy the natural A horizon. The functional status of the meadow is properly functioning condition.

- **hydro-soil class 2** – Transition to a drier meadow is starting to occur (increase in mid and low seral species, decrease in soil organic matter, some loss of water table noted). A water table drop of 0.25 meters can reduce deep rooted herbaceous species and result in a decline of rooting depth and topsoil quality. Herbaceous roots (density and length) do not fully occupy the natural A horizon. The functional status of the meadow is functioning at risk.
- **hydro-soil class 1** – Transition to drier meadow has already occurred. The water table is now too shallow to maintain the natural vegetation and natural soil drainage class. The critical drop in water table is generally 0.5 meters, since that is often associated with a change in plant community from deep-rooted sod forming herbaceous plants to plants that can exist in drier soils (Weixelman et al. 2011). The natural soil drainage class is shifted downward by one whole class. The functional status of the meadow is non-functioning.

Soils Methodology by Action

The existing condition of individual meadows was accessed using the MHF protocol, the indicators, and the assumptions stated above. Hydro-soil class is the metric used to judge the soil existing condition of individual meadows. As such, it defines the baseline condition for the soil resource. In addition, the meadows are classified by Meadow Hydrogeomorphic Types (Weixelman et. al. 2011). Weixelman's new classification is expected to help scientists better understand the soil hydrology component of meadows, a fundamental requirement of any meadow management system.

Affected Environment

Soils are quite varied in depth, productivity and parent materials within the high elevation landscape of Bell, Eagle and Herring watersheds. Parent materials include granitic, volcanic, glacial till and alluvial geology. In the broadest sense there are well drained upland soils growing upper montane and sub-alpine conifer vegetation and valley bottom soils with high water tables growing meadow vegetation. The high elevation meadows are geologically youthful features, a product of glacial erosion and depositional processes that have scoured and deposited sandy materials in low points and where low gradient streams naturally deposit sediment. Often rock outcrop or small glacial moraines (boulder deposits) will alter the valley floor just enough to slow runoff, hold sediment back, and create meadow soil conditions

Soil Existing Condition

Soil existing condition of BEH meadows is reported for the major meadows in the Bell, Eagle and Herring Creek Meadow Allotments (Table 3.09-1). *Hydro-soil class* 1 and 2 are considered *non-functioning* and *functioning at risk* respectively, relative to natural soil processes. Both classes are considered degraded relative to the natural soil meadow condition. Class 3 is considered at or close to desired condition.

About half the BEH meadows are functioning properly (Class 3 meadows) that is the water table is maintaining the naturally wet soil conditions and vegetation.

The other half of the BEH meadows are functioning at risk or non-functioning as a result of historic gully or channel erosion and drop in water table (Class 2 and Class 1 meadows).

Some meadows have organic soils or peatlands, also known as fens. Peatlands are rare in extent and sensitive to disturbance. Most peatlands are less than an acre in extent and may be found as a fen complex such as in Barn Meadow and Eagle – West Meadow. Peatlands are a specific wetland soil type and are given status as special aquatic features if they meet certain depth requirements (USDA 2010).

Legacy Effects

The BEH meadows have had a history of grazing and overgrazing going back to the 1890s. The past poor condition of the range resource is reflected in historic reports (project record). Current condition of meadows is strongly rooted in the past.

In 1912-1959 for the Bell Allotment use varied from 600 AUMs to 1560 AUMs. For reference, current use in the Allotment is 268 AUMs.

In 1925 for the Eagle Meadow Allotment the stocking rate was 4475 sheep. Current use is 150 cow/calf pairs are allowed. Allotment survey notes from 1925 indicated that Eagle Meadow showed past overuse by sheep which depleted the drier portions and caused stream bank cutting.

In 1924 for the Herring Creek Allotment use was 510 cattle. Current use is 156 cow/calf pairs are allowed. Records from 1925 indicate that meadows to the west and southwest of Cooper Peak are in poor shape due to heavy use and stream bank erosion.

Past stocking levels were quite high and at the peak of the 1920's were 6 to 10 times more than present levels. Stocking levels were reduced in the 70's and management and meadow conditions have improved in general as a result. Nearly all of the alteration appears to have been initiated over 40 years ago, as evidenced from range reports.

Mountain meadows are essentially long term indicators of *collective* impacts or actions over time (actions over the past 100 plus years). The current condition therefore, is largely a product of past actions, in the case of BEH meadows.

However, meadows such as Upper Bell Meadow in the Bell Meadow Allotment, Red Rock Meadow in the Eagle Meadow Allotment, and Castle and Upper Three Meadow in the Herring Creek Allotment remain in a *non-functioning* condition relative to soil and stream hydrologic function. Complete exclusion of cattle would not result in an improvement of condition. The reason is that effects of past actions (legacy grazing) are quite large and the effects of current actions are quite small in comparison.

Special Aquatic Features

Special Aquatic Features are fens (also referred to as peatlands), springs, seeps and shorelines. Proper Functioning Condition was assessed on a total of 46 such sites in the BEH landscape in 2010 (USDI 2003, Weixelman and Cooper 2009). Sixteen sites were inventoried in the Bell Meadow Allotment, 13 sites in Eagle Meadow Allotment and 17 sites in the Herring Creek Allotment. More detailed information about Special Aquatic Features in the project area can be found in the project record.

About half of the special aquatic features assessed were at proper functioning condition. The remaining sites were functional – at risk. The trend was not apparent at most of these sites, so further monitoring is needed to determine if these springs, fens, and shorelines are moving in an upward or downward trend. Adjustments in management will be made based off of these trends.

Environmental Consequences

The Forest Plan S&Gs give direction to maintain soil productivity in general by implementing practices that avoid accelerated erosion and maintain or improve soil hydrologic function and soil organic matter. The effects analysis asks the question: how will the alternatives alter the baseline or current condition of meadow soils and ultimately does this meet Forest Plan S&Gs?

Table 3.09-1 displays soil effects by major actions for BEH meadows. Actions are meadows grazed, meadows rested and meadows restored. The purpose is to display like soil effects by like actions and hydro-soil classes. The hydro-soil class reported for each meadow largely determines the potential of the meadow. Soil effects are generalized by reporting a functional status such as "remains Class 1; stays NF or *non-functional"*. Soil effects are closely tied to the *meadow class* as described below:

Class 1 Meadows: The hydro-soil class is rated 1. Meadows have lost their water table and floodplain connectivity, and have little potential for recovery (at the scale of the whole meadow). Left undisturbed or with light grazing, streams can rebuild channel form and riparian vegetation at a lower base, but a transition to drier meadow conditions (increase in low seral species, decrease in soil organic matter) has already occurred. A cumulative soil effect has already occurred and is thought irreversible without active restoration. Bell, Eagle and Red Rock Meadows are examples of larger meadows where this is the case. Complete exclusion of cattle would not result in an improvement of condition from class 1 to class 2.

Class 2 Meadows: The hydro-soil class is rated 2. These meadows have a lowered water table and have lost floodplain connectivity over parts of the meadow surface. They are presently considered as functioning at risk (FAR). Some cumulative soil effect has already occurred (increase in mid and low seral species, decrease in soil organic matter, some loss of water table) but it is thought to be largely reversible with appropriate management inputs and a continuous upward trend.

Class 3 Meadows: The hydro-soil class is rated 3. These are meadows that are considered in proper functioning condition. Deep rooted vegetation can reach the water table. Herbaceous roots (density and length) fully occupy the natural A horizon. They are at desired condition or would be with some improvement. Some meadows presently in good condition do have potential for headcut advancement.

Meadow Class verses Soil Quality Standards:

A recent study of high elevation meadows within the Stanislaus National Forest investigated soil organic matter processes and found differences in soil carbon and nitrogen storage in relation to meadow condition (Norton et.al. 2011). Soil metrics important to soil productivity declined in the degraded *non-functioning* meadows verses those considered *properly functioning* (43 percent decline). Soil organics declined about 18 percent in the *functioning at risk* meadows.

The Norton study is important because it ties PFC and MHF field data collected for BEH project to the Soil Quality Standards 13A and 13C. The significance is that 1) all the non-functioning Class 1 meadows *do not meet* the soil standard; 2) the functioning at risk Class 2 meadows *may not meet* the standard; and 3) the properly functioning condition Class 3 meadows *do meet* the soil standards.

Effects are further discussed in terms of direct, indirect and cumulative effects. Direct project effects on soils would include trampling and compaction, grazing and the reduction of cover, and hoof activity along stream banks and cattle trails. Indirect project effects on soils can be one or more of the following: erosion and gully formation; loss of productivity and reduction in soil organic matter; soil compaction; alteration of soil hydrology and water tables. The collective effect of past, present and foreseeable future action is the cumulative soil effect.

Table 3.09-1 Soils Effects Analysis for BEH Meadows

Soil Effects by Action	HSC[1]	Meadow	B	E	H	Change From Existing Condition
Active Grazing (Alts 1,3 and 4 unless noted) Status: remains Class 1; stays NF	1	Eagle-East		x		Little change expected. Legacy erosion downcut channel and lowered water table. Transition to drier mew already occurred. Active restoration required for recovery.
		Eagle-Lower		x		
		Red Rock		x		
		Hammill #1,3			x	
		Castle			x	Alt 4 rests meadow in poor condition. Minor improvement with time. Otherwise as above.
Mdw. restoration planned (all alternatives) Status: restored to Class 3; PFC likely	1	Round	x			Active restoration proposed with Gooseberry project to improve meadow conditions from NF to PFC.
	2	Crab Mdw	x			Active restoration, fencing and monitoring proposed with Gooseberry project to improve meadow conditions from FAR to PFC.
	3	Shell		x		Active restoration proposed on small headcut to maintain PFC. Alternatives continue to rest meadow.
Active Grazing (Alts 1,3 and 4 unless noted) Status: remains Class 2 with limited improvement over time; FAR likely; Stronger improvement if rested	2	Pine Valley	x			Little change expected in conifer-alluvial flat with lower water table and invading lodgepole pine following wildfire.
		Hammill #2,4,5,6			x	Must improve stream bank stability and form to slowly improve herbaceous plant community and soil organics. Active restoration needed for full recovery (lower water table and poor channel form continues as limiting factors).
		Round-lower	x			
		Long Valley-upper		x		
		Long Valley-lower		x		
		Mud Lake Mdw	x			
		Herring Ck. Res.			x	
		Willow-upper			x	Same as above for Alt 1 and 3. Alt 4 effectively rests. Stronger improvement if rested.
Meadows Rested (all alternatives) Status: passive improvement, upward trend expected	3	Three Mdw-lower			x	Active restoration in 70s raised water table. Mdw now at PFC.
	2	Three Mdw-mid			x	Legacy erosion downcut channel. Rested since 70s. Moderate but slow upward trend expected with continued rest. Active restoration required for full recovery.
Status: only minor improvement with time; remains class 1; stays NF	1	Three Mdw-upper			x	Legacy erosion downcut channel. Rested since 70s Transition to drier meadow already occurred. Active restoration required for recovery.
		Bell Mdw-upper	x			
Active Grazing (Alts 1 and 3 but not 4) Status: some improvement necessary to maintain Class 3; PFC likely	3	Ground Hog			x	*Must maintain meadow stability of small headcuts, peatlands or stream banks. Improvement possible and stronger where monitoring shows upward trend or if meadow is rested. Monitor for trend.* (Alt 4 rests meadows)
		Coyote			x	
		Bloomer Lake			x	
		Bluff			x	
		Wire Corral			x	
Active Grazing (Alts 1,3 and 4) Status: requires stable or upward trend to maintain Class 3; PFC likely		Eagle-West		x		Little change in wet meadow conditions. Hoof activity may initiate some loss of peatlands. Mdw used as gathering pasture.
		Punch Bowl lower and upper		x		Hoof activity may initiate some loss of peatlands if grazing intensity increases bare peat. Meadow PFC will be maintained if monitoring shows upward trend in peatlands.
		Bell Mdw middle	x			PF soil conditions maintained except where Bell Ck has downcut toe of mdw. Mdw has limited grazing as gathering pasture. More stream bank recovery for Alt 2.
Active Grazing (Alts 1,3,&4 unless noted) Status: requires stable trend to maintain Class 3; PFC likely	3	Hammill #7			x	Meadows at desired condition. Alt 1 and 3 continues to use Bell-lower as gathering pasture.
		Bell-Lower	x			
		Cascade 5N39Y			x	
		Willow-lower			x	At desired condition. Alt 4 rests mdw.
		Barn				Meadows at desired condition including peatlands.
		Sardine				
		Mud Lake	x			

[1] adapted from MHFRA data (project record).

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

In the Bell Meadow Allotment, changes from current management include breaking the Allotment into three subunits – Round, Crab, and Mud to implement a deferred grazing system. In the Herring Creek Allotment, the addition of the Cascade subunit would increase available forage before the cattle move into the upper portions of the Allotment, delaying their movement to the upper units. This could assist in the recovery of meadow hydrologic and soil function of some of the meadows. In the Eagle Meadow Allotment, the Niagara addition would increase forage available to cattle, potentially reducing pressures elsewhere. In addition, utilization standards in all units grazed every year would be reduced. The McCormick Pocket addition would add little forage. Relative to meadow forage only, a GIS exercise to determine change in meadow acres per AUM showed no change for the Bell Meadow Allotment, an increase of 8 percent for the Eagle Meadow Allotment and an increase of 13 percent for Herring Creek Allotment.

Generally, meadow soil conditions are not expected to change much for grazed meadows with Alternative 1. The reason for this is that stocking levels, herding and utilization will be similar to what has occurred for the last 40 years. In general, the meadows will continue on the same current trajectory.

Alternative 1 will have a small advantage over Alternative 3 (Current Management) because of the forage capacity in grazed meadows will be somewhat greater, theoretically. The difference in soil disturbance (direct effects) between action alternatives are expected to be small and similar in degree.

Table 3.09-1 summarizes soil effects by action (active grazing, meadow restored, and meadows rested) and by meadow class. Under Alternative 1, Class 3 meadows are expected to maintain proper function as long as small headcuts and peatlands remain stable. Class 2 meadows by definition are functioning at risk and need improvement. Streambank stability and form must improve to slowly improve herbaceous plant community and soil organics. These meadows are likely to see a limited upward trend over time with both Alternatives 1 and 3. Class 1 meadows have lost their water table and floodplain connectivity, and have little potential for recovery (at the scale of the whole meadow). Complete exclusion of cattle from Class 1 meadows is not likely to result in an improvement of meadow condition to Class 2.

The reduced grazing pressure anticipated under Alternative 1 may help streambanks stabilize at a faster rate, may promote deep rooted herbaceous vegetation recovery along the stream channels (but not on the meadow surface where the water table is lowered), and could help move channel form towards rejuvenation (channel stabilizes at a lower elevation). These processes are currently occurring in most meadows, but reduced grazing pressure may speed these recoveries. However, these small improvements in condition may take years to achieve.

CUMULATIVE EFFECTS

Loss of water table and decrease in soil organic matter are the primary cumulative and indirect soil effects. In fact, the footprint of past actions is still very much dominant today with current, proposed and future actions expected to shape or modify meadows to a much smaller degree.

Any change in meadow conditions will be largely dependent on the success of management requirements or design criteria built in to the alternatives. Design criteria (Standards and Guidelines, Resource Conservation Measures, and Adaptive Management) are described for each alternative in Chapter 2, Alternatives. Soil monitoring requirements emphasize monitoring of stream bank stability and headcuts in specific meadows, and this will be equally important to avoid cumulative impacts to both the stream channel and meadow soils. Monitoring of stream bank stability and headcuts would be implemented as described for Resource Conservation Measures – Meadow Hydrologic Function, and will help to avoid cumulative impacts to both the stream channel and meadow soils.

Ongoing activities other than grazing that could affect the soil meadow resource include OHV activity. The Juniper mine reclamation when completed will have a positive effect on the upper watershed contributing water and sediment to Red Rock meadow. The Leland gully repair is an example of where active restoration has not only recreated moist meadow conditions in the local riparian area but has also created wetter conditions in the two meadows immediately downstream. Repair of a small headcut in Shell Meadow is a present action that should maintain a PFC and avoid a downward trend. Foreseeable future actions could include possible road closure, and stream or meadow restoration projects.

Damage from occasional un-authorized use of meadows by OHVs would be expected to be evaluated and repaired. All stream or meadow restoration projects that raise the water table of the individual meadow will have a positive cumulative effect. Mine reclamation, possible road closures and future restoration projects would have a positive cumulative effect on the soil meadow resource.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Rested meadows will have their own trajectory of passive improvement because direct effects will be eliminated by Alternative 2, the no grazing option. Table 3.09-1 compares soil effects by actions and alternatives. Passive improvement is expected for all rested meadows. Alternative 2 would have a presumed advantage where class 3 meadows and class 2 meadows require an upward trend to maintain PFC or move towards PFC. Any advantage in class 1 meadows is less clear.

Improvement in some factors (herbaceous cover, stream bank stability) is more likely to occur with Alternative 2, but the degree and rate of recovery is uncertain, based on a review of the literature (Sarr 2002). Soil effects are likely to be different for each meadow class. Class 3 meadows would maintain their favorable stream and soil characteristics. Class 2 meadows would sustain an upward trend (increase in late and mid seral species, increase in soil organic matter, possibly a small improvement in water table over time). Class 1 meadows will see only small improvements in herbaceous cover and soil organics, but the loss of water table will remain as a critical limiting factor, unless active restoration occurs.

Hence, some areas would move fairly quickly towards PFC and some might not change very much at all, as was seen in the middle and upper Three Meadows of Herring Creek watershed after fencing in the 70s. Riparian systems did return to PFC after removal of livestock from Santa Rosa Island, California (Wagner et al. 2004). Passive improvement in the rested meadows is somewhat of an unknown because there are few long-term recovery studies of Sierra Nevada meadows and results can be difficult to interpret without appropriate scientific controls.

CUMULATIVE EFFECTS

No cumulative effects would occur since there would be no grazing under this alternative.

Alternative 3 (Current Management)

DIRECT AND INDIRECT EFFECTS

The effects of Alternative 3 would be similar to those described for Alternative 1. Soil effects are likely to vary by meadow class as described in Alternative 1 and summarized in Table 3.09-1. No additions are proposed as in Alternative 1.

Design criteria for Alternative 3 would be limited to established Standards and Guidelines. Resource conservation measures would not be implemented and adaptive management would be more limited than for Alternatives 1 and 4. Alternative 1 and 4 (with stronger adaptive management factored in) would have a presumed advantage over Alternative 3 for those meadows requiring an upward trend to maintain PFC or to move towards PFC.

CUMULATIVE EFFECTS

Cumulative effects of Alternative 3 would be similar to those described for Alternative 1.

Any change in meadow conditions will be largely dependent on the success of management requirements or design criteria built in to the alternatives. Design criteria for Alternative 3 would be limited to established Standards and Guidelines. Resource conservation measures would not be implemented and adaptive management would be more limited than for Alternatives 1 and 4. Monitoring of stream bank stability and headcuts is important to avoid cumulative impacts to the stream channel and to meadow soils; however additional monitoring is much less likely to occur under the Current Management alternative.

Alternative 4 (Resource Protection)

DIRECT AND INDIRECT EFFECTS

In the Bell Meadow Allotment, livestock numbers would be reduced by 20% under Alternative 4. In the Eagle Meadow Allotment livestock numbers would also be reduced by 20% under Alternative 4. In addition, three meadows would be excluded.

For the Bell Meadow Allotment and the Eagle Meadow Allotments the anticipated effects of Alternative 4 are similar to those described for Alternative 1. The reason for this is that stocking levels, herding and utilization may be similar (or similar enough) to what has occurred for the last 40 years. Meadow condition will likely continue on the same current trajectory.

In the Herring Creek Allotment, numerous meadows would be excluded from grazing. The Cascade addition would not be added to the Allotment. To account for reduced forage, livestock numbers would be reduced by 50%. The hydrologic and soil function of grazed meadows may be similar to that seen under Alternative 1. The hydrologic and soil function of excluded meadows would be similar to that seen under Alternative 2.

Table 3.09-1 describes how the existing conditions may change with individual meadows or actions.

Alternative 4 may have some advantage over current management because livestock numbers would be reduced on the three Allotments. But this is less clear for the Herring Creek Allotment because Alternative 4 appears to put greater grazing pressure on meadows (34 % reduction in meadow acres per AUM) by removing certain meadows from the forage base. Generally speaking, reduced livestock numbers should lessen the grazing pressure on the BEH Allotments. The reduced grazing pressure anticipated under Alternative 4 may help streambanks stabilize at a faster rate, may promote deep rooted herbaceous vegetation recovery along the stream channels, and could help move channel form towards rejuvenation. These processes are currently occurring in most meadows, but reduced grazing pressure may speed these recoveries. However, these small improvements in condition may take years to achieve.

CUMULATIVE EFFECTS

Cumulative effects are similar to those described for Alternatives 1 and 3, and are previously discussed in more detail. Loss of water table and decrease in soil organic matter are the primary cumulative and indirect soil effects.

Any change in meadow conditions will be largely dependent on the success of management requirements or design criteria built in to the alternatives. Monitoring of stream bank stability and headcuts would be implemented as described for Resource Conservation Measures – Meadow Hydrologic Function, and will help to avoid cumulative impacts to both the stream channel and meadow soils.

Summary of Effects Analysis across All Alternatives

Surveys indicate that most meadows are slowly recovering from legacy grazing effects. Most BEH meadows have more or less reached a new equilibrium in the last 40 years with reduced grazing pressures. That new equilibrium is expressed simply in terms of the 3 meadow soil condition classes described in the Environmental Consequences, soil effects section of the EIS.

That same state of equilibrium is likely to continue for Alternatives 1, 3 and 4 (stocking levels, herding and utilization is similar to recent past). In general, the meadows will continue on the same trajectory. For the most part change away from this new equilibrium is unlikely, with the exception of planned restoration or possibly the no grazing alternative.

Class 1 meadows will not meet Soil Quality Standards without active restoration. There is some uncertainty with Class 2 meadows relative to rates and degree of recovery. Some Class 1 and Class 2 meadows are candidates to be further evaluated as a soil improvement project. Fully meeting the standards may not be possible without some active restoration. On the other hand, a strong upward trend for Class 2 meadows may improve stream bank stability & form to slowly improve herbaceous plant community and soil organics. Upward trend is possible for all alternatives, but more likely for alternative 2 and those meadows rested under Alternative 4. Class 3 meadows are expected to continue meeting the soil standards, with some monitoring of headcuts and peatlands being necessary in some meadows.

Compliance with the Forest Plan and Other Direction

All Alternatives comply with Forest Plan Direction (USDA 2010).

3.10 SPECIAL AREAS

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Special Areas are identified on the Stanislaus National Forest for their special attention and management direction by the Forest Service, as designated by the Regional Forester or Chief. The U.S. Congress designates Wilderness or Wild and Scenic Rivers.

- Inventoried Roadless Areas (IRAs) are managed to protect the following characteristics(66 Federal Register 9, January 12, 2001; p. 3245): High quality or undisturbed soil, water, and air; Sources of public drinking water; Diversity of plant and animal communities; Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land; Primitive, Semi-Primitive Non- Motorized, and Semi-Primitive Motorized recreation opportunities; Reference landscapes; Natural appearing landscapes with high scenic quality; Traditional cultural properties and sacred sites; and Other locally identified unique characteristics.
- Research Natural Areas (RNAs) are managed to maintain select vegetative, aquatic, and/or geologic elements in natural conditions. Forest Service Manual (FSM) 4063.3 provides protection against any activities that directly or indirectly modify ecological processes (USDA 2010). RNAs, established for research and study purposes, are a discrete land area large enough to represent a specific natural ecosystem. RNAs are important because they provide benchmarks for comparison of present and future management of the National Forests and will prove to be an invaluable asset in the future.
- Special Interest Areas (SIAs) are managed to protect values, make educational opportunities available and preserve the integrity of the special interest feature for which the areas were established (USDA 2010).
- Proposed Wild and Scenic Rivers are managed to protect and enhance Wild and Scenic River characteristics and manage the same as designated Wild and Scenic Rivers (USDA 2010). Management of Proposed Wild and Scenic Rivers within Wilderness complies with Wilderness designations and the Wilderness Act of 1964.

Effects Analysis Methodology

Assumptions Specific to Special Areas

1. Special areas in the project area will be managed according to Forest Plan Direction specific to those areas.
2. Permitted grazing is an ongoing activity, so the effects of grazing on special areas are considered to be the existing situation.

Data Sources

- Forest Plan Direction (USDA 2010)
- GIS
- RNA Establishment Records
- Wild and Scenic River Study

Special Areas Indicators

The environmental consequences described for the alternatives below identify only the individual special areas affected by that alternative using the following indicators.

Roadless Area Characteristics: Roadless areas are often characterized by the following values or features: High quality or undisturbed soil, water, and air; sources of public drinking water; diversity of plant and animal communities; habitat for threatened, endangered, proposed, candidate, and

sensitive species and for those species dependent on large, undisturbed areas of land; Primitive, Semi-Primitive Non- Motorized, and Semi-Primitive Motorized recreation opportunities; reference landscapes; natural appearing landscapes with high scenic quality; traditional cultural properties and sacred sites; and other locally identified unique characteristics.

Research Natural Area Values: RNA values are specific to each RNA and may include selected aquatic, geologic or vegetation elements.

Special Interest Area Values: SIA values are specific to each SIA and may include unique botanic, cultural, geologic, scenic, historic and memorial features.

Wild and Scenic River Values: For a river to be eligible for Wild and Scenic River designation it must be free-flowing and, with its adjacent land area, must possess one or more outstandingly remarkable values. For the purpose of this analysis Wild and Scenic River or Outstandingly Remarkable (OR) values are interchangeable. OR values are specific to each river segment any may include cultural, ecologic, fish, geologic, historic, scenic, recreation, wildlife or other special and unique features (USDA 1991).

Special Areas Methodology

Effects analysis involved consideration of potential grazing conflicts with all applicable management direction for special areas.

Affected Environment

Special Areas located in the project area are listed in Table 3.10-1.

Table 3.10-1 Special Areas

Special Areas			Within Allotments (acres)		
Category	**Name**	**acres**	**Alternative 1** (Proposed Action)	**Alternative 3** (Current Management)	**Alternative 4** (Resource Protection)
Roadless Area	Bell	8,200	6,200	6,200	6,200
Roadless Area	Dome	11,400	4,100	4,100	4,100
Roadless Area	Eagle	16,000	14,500	9,800	9,800
Roadless Area	Waterhouse	4,400	2,100	2,100	2,100
Research Natural Area	Bell Meadow	490	490	490	490
Special Interest Area	Bull Run	230	230	230	230
Proposed Wild and Scenic River	Clavey	3,700 (12 miles)	3,700 (12 miles)	3,700 (12 miles)	3,700 (12 miles)

Inventoried Roadless Areas

There are 4 IRAs, totaling about 28,200 acres within the project area.

BELL MEADOW

The Bell Meadow IRA (8,200 acres) is located in the central part of the Forest. Elevations range from 6,300 feet at the trailhead near the west end of Bell Meadow to 7,600 feet on the upper slopes of Bell Mountain. The area receives heavy day use due to its proximity to the popular Pinecrest recreation area. Ten miles of maintained non-motorized trails exist in the area. It is a popular entry point to the Emigrant Wilderness. Moderate livestock grazing occurs. It is heavily hunted for deer in the fall. Soils between extensive rock outcrops on the uplands are generally shallow to moderately deep, stony coarse sandy loams developed from volcanic and granitic bedrock and glacial debris. Bell Meadow has deep, organic sandy loams developed from alluvium. Vegetation is true fir, mixed conifer and lodgepole pine mixed with montane shrubs such as mountain whitethorn. Large stands of aspen as well as other wet meadow and riparian vegetation are found adjacent to the stream courses. This area

contains important wildlife habitat, including several key deer fawning areas, and habitat for goshawk and fisher. Bell Meadow (110 acres) is surrounded by large groves of quaking aspen with high scenic value. Table 3.10-1 shows the project area contains 6,200 acres of the Bell Meadow roadless area.

DOME

The Dome IRA (11,400 acres) is located in the northeast part of the Forest generally between Highway 108 and Eagle Meadow Road (5N01). Elevations range from 6,200 to 8,700 feet. Recreation use within the area is low due to the steep terrain. Table 3.10-1 shows the project area contains about 4,400 acres of the Dome IRA.

EAGLE

The Eagle IRA (16,000 acres) is located in the northeast part of the Forest. Elevations range from 6,300 to 9,700 feet. The area is characterized by bare volcanic ridges and rock outcrops, scattered timberland, and small sub-alpine meadows. Hiking and backpacking occur along Eagle Meadow and Cooper Meadow trails. Soil over most of the area is generally very thin, coarse sandy loam developed mainly from volcanic rock, except for a few areas of granitic rock. Much of the area is covered by bare volcanic rock outcrop. The Three Chimneys rock formation is a recognized landmark which can be seen from many viewpoints. Two of the peaks are on the Emigrant Wilderness boundary. The area contains many key deer fawning sites. Table 3.10-1 shows the project area contains 14,500 acres of the Eagle IRA.

WATERHOUSE

The Waterhouse IRA (4,400 acres) is located in the central portion of the Forest just east of Pinecrest Lake adjacent to the Emigrant Wilderness. Elevations vary from 5,700 to 8,200 feet. The area consists of the canyon of the upper South Fork Stanislaus River. This area receives recreation use in the form of hiking, fishing, and hunting. Its proximity to the Pinecrest Lake recreation area makes it readily accessible for day use. A trail extends eastward, up the river canyon, from Pinecrest Lake to a series of attractive granite pools and falls. Vegetation is predominantly red fir forest on upper north slopes with mixed conifer forest on upper south slopes. Lower slopes and the drainage bottom, once scoured by glaciers, are characterized by large expanses of granite with small pockets of vegetation. Pockets of soil are scattered between large expanses of bare, glaciated granitic rock in the lower part of the canyon, while on the ridge to the north, near Pinecrest Peak, soils are very shallow to shallow sandy loams developed from volcanic bedrock. On the slopes between, the soils are shallow to moderately deep, developed from granitic glacial debris. Meadows located in the area are important fawning grounds. The project area contains about 3100 acres of the Waterhouse IRA (Table 3.10-1), a portion of which would be removed from the Herring Creek Allotment under all action alternatives (Alternatives 1, 3 and 4).

Research Natural Areas

BELL MEADOW RESEARCH NATURAL AREA

The Bell Meadow RNA, totaling about 490 acres on the Stanislaus National Forest, is the only RNA located in the project area. This RNA is completely within the project area and is located in the central part of the Bell Meadow Allotment. Bell Meadow RNA was designated in 1994 for aspen research. It contains 110 acres of aspen stands in Bell Meadow along with wet mountain meadow, riparian habitat and examples of the aspen-meadow complex on deep soils. Grazing is not permitted in the upper part of the Bell Meadow RNA. Livestock are excluded from Upper Bell Meadow by a permanent exclosure fence.

Special Interest Areas

BULL RUN SCENIC AND GEOLOGIC AREA

The Bull Run SIA (230 acres) consists of a rugged lava-capped ridge of horseshoe shape enclosing a forested bowl. It contains a variety of unique rock formations formed through volcanic and glacial action. The project area encompasses all 230 acres of the Bull Run SIA (Table 3.10-1).

Wild and Scenic Rivers and Proposed Wild and Scenic Rivers

Wild and Scenic Rivers and Proposed Wild and Scenic Rivers are managed to preserve their notable values or features as part of, or for eventual inclusion in, the National Wild and Scenic River System. On the Stanislaus National Forest this management applies to those National Forest lands within 1/4 mile on either side of Wild and Scenic Rivers and Proposed Wild and Scenic Rivers. The Clavey Proposed Wild and Scenic River is the only Proposed Wild and Scenic River in the Project Area. There are no designated Wild and Scenic Rivers in the project area.

The following river segments are located within the project area.

- Clavey River: portion of Segment 1, Bell Creek (6.6 miles)
- Clavey River: portion of Segment 2, Lily Creek (5.3 miles)

To date, Congress has not designated the Clavey River for inclusion in the Wild and Scenic River System; however, since the Clavey River is eligible and recommended for Wild and Scenic designation, it is managed to protect the values that resulted in its eligibility. All activities – including administration and operation and maintenance – within ¼ mile of the high water elevation for the portions determined eligible must be implemented in a manner to ensure continued eligibility. Appendix E (Wild and Scenic River Study) of the Stanislaus National Forest Land and Resource Management Plan (USDA 1991) outlines the details of the recommendations for these river segments, identifying outstandingly remarkable scenic, heritage/cultural, and ecological values for the Bell Creek segments.

Within the analysis area, Bell Creek may be accessed from Pine Valley Horse Campground, trails 41836A and 19E2, and National Forest System (NFS) roads 4N02Y and 4N26B/4N26B1. Trail 19E21 parallels Bell Meadow and is proximate to Bell Creek in some sections.

CLAVEY RIVER

The Clavey Proposed Wild and Scenic River includes a total of 28 miles of Wild and 14 miles of Scenic segments including its tributaries Bell Creek and Lily Creek. Bell Creek and Lily Creek flow through the Bell Meadow Allotment. The main stem of Bell Creek is proposed for Scenic/Wild classification under the Wild and Scenic Rivers Act. The main stem of Lily Creek is proposed for Wild classification under the Wild and Scenic Rivers Act. Forest Plan Direction requires that these streams and the ¼ mile buffer around them will be managed the same as if they were designated Wild and Scenic River segments. The Outstandingly Remarkable (OR) values of the Bell Creek Proposed Wild and Scenic River segment include Scenic, Historic/Cultural, and Ecologic. The OR value of Lily Creek is Ecologic. Maintaining the free-flowing condition of both creeks is necessary to meet the Ecologic OR value. The activities proposed under any action alternative would not affect the free-flowing condition of the proposed Wild and Scenic River. About 6.6 miles of Bell Creek and 5.3 miles of Lily Creek are within the Bell Meadow Allotment.

Environmental Consequences

The following section describes how the alternatives affect special areas using the following indicators:

- Roadless Area Characteristics
- Research Natural Area values
- Special Interest Area values
- Wild and Scenic River Values (Outstandingly Remarkable values)

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Continued grazing may have minimal localized effects on the characteristics and values of special areas (cattle presence, soil disturbance, streambank alteration/erosion, animal excrement), but effects from grazing activities are not expected to measurably alter the qualities identified for each special area. The management actions proposed for this alternative are expected to maintain or improve special area values and characteristics. Alternative 1 includes design criteria (Standards and Guidelines, Resource Conservation Measures, Adaptive Management) that would likely benefit resource conditions and enhance values and characteristics of special areas. Monitoring and adaptive management would be used to change management practices that are leading to undesirable changes in special areas. Grazing practices could be modified to ensure that effects to special areas are minimal and that ecological conditions are stable or improving. Overall, effects to special areas are expected to be minimal and possibly beneficial under this alternative.

Bell, Dome, Eagle and Waterhouse Inventoried Roadless Areas

Authorization of continued grazing is expected to maintain or improve the following roadless characteristics:

- High quality or undisturbed soil, water and air
- Sources of public drinking water
- Diversity of plant and animal communities
- Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land
- Natural appearing landscapes with high scenic quality

Where addition areas overlap with roadless areas (the Cascade, Niagara, and McCormick Pocket addition areas lie within portions of the Eagle Roadless area), roadless characteristics may be altered to some extent by grazing. However, effects to roadless characteristics are expected to be localized and would maintain or improve roadless characteristics.

Bull Run Scenic and Geologic Special Interest Area

The Forest Plan Direction allows grazing within the Bull Run Special Interest Area. Grazing management will be specified in management plans for the area and the surrounding Allotment. Management is designed to protect the areas special characteristics (USDA 2010). No direct or indirect effects are anticipated to the Bull Run Scenic and Geologic Special Interest Area values as a result of continued grazing.

Bell Meadow Research Natural Area

Continued grazing is expected to have minimal localized effects to the Bell Meadow Research Natural area. The Bell Meadow RNA and surrounding areas are used for only a limited time period during late-season gathering. Some browsing of aspen by livestock is expected where aspen regeneration is not protected by exclosure fencing. Mitigation measures (Standards and guidelines for riparian browse, and resource conservation measures for hardwood regeneration) would be applied to

protect hardwood regeneration. Grazing would be modified if it is determined that hardwood regeneration and recruitment needs are not being met. Authorization of continued grazing is not expected to interfere with aspen research or to negatively affect the value of the area as a RNA. This alternative would maintain or improve research natural area values.

Clavey Proposed Wild and Scenic River (Bell Creek and Lily Creek)

The Outstandingly Remarkable (OR) values of the Bell Creek Proposed Wild and Scenic River segment include Scenic, Historic/Cultural, and Ecologic. The OR value of Lily Creek is Ecologic. Maintaining the free-flowing condition of both creeks is necessary to meet the Ecologic OR value. The General Direction provided in the Forest Land and Resource Management Plan (LRMP) provides for grazing activities as allowed under the Wild and Scenic Rivers Act, protecting the Wild and Scenic River values. The activities proposed under this alternative would not affect the free-flowing condition of the proposed Wild and Scenic River. Natural materials would be utilized for all improvements within the Bell and Lily Creek segments of the Clavey River proposed Wild and Scenic river. It is not anticipated that project activities will result in changes that could disqualify the Bell Creek and/or the Lily Creek segment from future consideration as Wild and Scenic River. Authorization of continued grazing is expected to maintain or improve the outstandingly remarkable values of the Clavey Proposed Wild and Scenic River

CUMULATIVE EFFECTS

Past, present or reasonably foreseeable future actions do not include any actions likely to affect special areas. Therefore, the potential direct and indirect effects disclosed above are the only cumulative effects anticipated.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Under this alternative, grazing would not be authorized on the Bell Meadow, Eagle Meadow and Herring Creek Allotments. Evidence of past grazing activities would fade over time and characteristics of special areas may improve over time as grazed areas passively restore to natural conditions. There would be no direct or indirect effects to special areas as a result of this alternative.

CUMULATIVE EFFECTS

Because there would be no direct or indirect effects to special areas, there are no cumulative effects expected as a result of this alternative.

Alternative 3 (Current Management)

DIRECT AND INDIRECT EFFECTS

The effects of Alternative 3 on special areas would be similar to that described for Alternative 1. Continued grazing may have minimal localized effects on the characteristics and values of special areas (cattle presence, soil disturbance, streambank alteration/erosion, animal excrement), but effects from grazing activities are not expected to measurably alter the qualities identified for each special area. No additions are proposed for this alternative, so those portions of roadless areas that occur in addition areas (Niagara, Cascade, and McCormick Pocket additions) would not be affected under this alternative. Alternative 3 includes design criteria (Standards and Guidelines) that are designed to maintain or improve resource conditions, which would maintain or improve the values and characteristics of special areas.

CUMULATIVE EFFECTS

Past, present or reasonably foreseeable future actions do not include any actions likely to affect special areas. Therefore, the direct and indirect effects disclosed above are the only cumulative effects anticipated.

Alternative 4 (Resource Protection)

DIRECT AND INDIRECT EFFECTS

The effects of Alternative 4 on special areas would be similar to that described for Alternative 1. Continued grazing may have minimal localized effects on the characteristics and values of special areas (cattle presence, soil disturbance, streambank alteration/erosion, animal excrement), but effects from grazing activities are not expected to measurably alter the qualities identified for each special area. No additions are proposed for this alternative, so those portions of roadless areas that would be included in addition areas (Niagara, Cascade, and McCormick Pocket additions) would not be affected under this alternative. Effects to special areas from grazing would be eliminated where exclusion areas overlap with special areas, however the presence of exclosure fencing would negatively affect the values and characteristics of special areas. Alternative 4 includes design criteria (Standards and Guidelines, Resource Conservation Measures, Adaptive Management) that are designed to maintain or improve resource conditions, which would maintain or improve the values and characteristics of special areas.

CUMULATIVE EFFECTS

Past, present or reasonably foreseeable future actions do not include any actions likely to affect special areas. Therefore, the potential direct and indirect effects disclosed above are the only cumulative effects anticipated.

Summary of Effects Analysis across All Alternatives

The effects of each alternative on the characteristics and values of Special Areas are summarized in Table 3.10-2.

Compliance with the Forest Plan and Other Direction

All alternatives are consistent with Forest Plan Direction and other Federal Laws for special areas.

Table 3.10-2 Summary of Effects across All Alternatives: Special Areas

Attribute	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Roadless Area Characteristics	Effects to roadless characteristics are expected to be localized and would maintain or improve roadless characteristics.	No direct, indirect, or cumulative effects.	Effects to roadless characteristics are expected to be localized and would maintain or improve roadless characteristics.	Effects to roadless characteristics are expected to be localized and would maintain or improve roadless characteristics.
Research Natural Area	Authorization of continued grazing is not expected to interfere with aspen research or to negatively affect the value of the area as a RNA. This alternative would maintain or improve research natural area values.	No direct, indirect, or cumulative effects.	Authorization of continued grazing is not expected to interfere with aspen research or to negatively affect the value of the area as a RNA. This alternative would maintain or improve research natural area values.	Authorization of continued grazing is not expected to interfere with aspen research or to negatively affect the value of the area as a RNA. This alternative would maintain or improve research natural area values.
Special Interest Area	No direct, indirect or cumulative effects to Bull Run Scenic and Geologic SIA.	No direct, indirect or cumulative effects to Bull Run Scenic and Geologic SIA.	No direct, indirect or cumulative effects to Bull Run Scenic and Geologic SIA.	No direct, indirect or cumulative effects to Bull Run Scenic and Geologic SIA.
Proposed Wild and Scenic River	Authorization of continued grazing is expected to maintain or improve the outstandingly remarkable values of the Clavey Proposed Wild and Scenic River	No direct, indirect or cumulative effects to the outstandingly remarkable values of the Clavey Proposed Wild and Scenic River	Authorization of continued grazing is expected to maintain or improve the outstandingly remarkable values of the Clavey Proposed Wild and Scenic River	Authorization of continued grazing is expected to maintain or improve the outstandingly remarkable values of the Clavey Proposed Wild and Scenic River

3.11 WATERSHED

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Direction relevant to the proposed action as is affects water resources includes:

- Clean Water Act of 1948 (as amended in 1972 and 1987): establishes as federal policy for the control of point and non-point pollution, and assigns the states the primary responsibility for control of water pollution. Compliance with the Clean Water Act by National Forests in California is achieved under state law (listed below).
- Non-point source pollution on National Forests is managed through the Regional Water Quality Management Handbook (USDA 2011b), which relies on implementation of prescribed best management practices (BMPs), as well as national BMPs (USDA 2012b). The Water Quality Management Handbook and the national BMPs include three BMPs for range. Both the regional and national BMPs prescribe the same practices, described below.
- Regional BMP 8-1, National BMP Range-1: Rangeland Management Planning. Use the Allotment management planning process to develop measures to avoid, minimize, mitigate and/or restore adverse impacts to water and aquatic and riparian resources during rangeland management activities.
- Regional BMP 8-2, National BMP Range-2: Rangeland Permit Administration. Manage rangeland vegetation and grazing to protect water and aquatic and riparian resources through administration and monitoring of grazing permits and annual operating instructions.
- Regional BMP 8-3, National BMP Range-3: Rangeland Improvements. Implement range improvements to protect, maintain or improve water and aquatic and riparian resources and associated beneficial uses.
- The California Water Code consists of a comprehensive body of law that incorporates all state laws related to water, including water rights, water developments, and water quality. The laws related to water quality (sections 13000 to 13485) apply to waters on the National Forests and are directed at protecting the beneficial uses of water. Of particular relevance for the Proposed Action is section 13369, which deals with non-point-source pollution and best management practices.
- The Porter-Cologne Water-Quality Act, as amended in 2006, is included in the California Water Code. This act provides for the protection of water quality by the state Water Resources Control Board and the regional water quality control boards, which are authorized by the U.S. Environmental Protection Agency (EPA) to enforce the Clean Water Act in California.
- The Forest Plan Direction includes standards and guidelines for Range Management. In order to meet the intent of the Aquatic, Riparian and Meadow Ecosystems Goals and Strategy in the Forest Plan Direction, and to protect Water Quality, ensure that the following Standards and Guidelines and Resource Conservation Measures are implemented:
- Forest Plan Direction Standards and Guidelines.

The following Standards and Guidelines associated with Riparian Conservation Objectives are applicable related to protection of water quality:

- Riparian Conservation Objective #1
  - Water temperature
- Riparian Conservation Objective #2
  - Stream channel condition
  - Streambank disturbance

  - Riparian vegetation
- Riparian Conservation Objective #5
  - Meadow hydrologic function
  - Fen protection
  - Livestock gathering facilities
  - Herbaceous forage utilization
  - Woody riparian vegetation utilization

Effects Analysis Methodology

The four alternatives were reviewed in all watersheds within the project area to determine effects on water resources. This consisted of a review of meadow hydrologic function surveys, surveys of special aquatic features, and water quality data. The methodologies of each of these surveys are discussed in detail below in the Watershed Methodology section. Refer to Appendix B of the Watershed Report for details on the Cumulative Effects Analysis.

Beneficial uses of water and water quality objectives in the California Water Quality Control Plan (Basin Plan) of the Central Valley Regional Water Quality Control Board (California EPA 2011) were utilized as a regulatory benchmark regarding the existing condition and to assess the effects of the proposed action and its alternatives on water quality. The water quality parameters considered in the water resources analysis were bacteria, biostimulatory substances (nutrients), sediment, taste and odor, and water temperature. These are the pollutants with the potential of being affected by range management activities.

Assumptions Specific to Watershed

The following assumptions are specific to the watershed management analysis:

1. Water quality standards: The stream reaches sampled for fecal coliform bacteria in the Allotments are not specifically listed in the Basin Plan. Therefore, their beneficial uses are interpreted based on how the activities occurring in these waters fit the definition of REC-1 or REC-2. These activities, as well as the likelihood of ingestion, are described for each water quality sampling site in the Watershed Report. Photos and maps of sampling site locations are located in Appendix A of the Watershed Report.
2. Water quality sampling: Some of the water quality sampling conducted by the USFS/UCD occurred on the Allotments during periods of non-use or reduced use. Assumptions, such as bacteria concentrations likely being lower under reduced numbers than if there were full numbers, were made in order to assist in interpreting the data. Descriptions of these assumptions are described in detail in the Watershed report.

Data Sources

Refer to the Watershed Methodology section below.

Watershed Indicators

The following water resource indicators were used to analyze effects of the alternatives considered:

1. Channel form, floodplain connectivity, water table alteration, streambank stability, and herbaceous plant community were indicators of meadow hydrologic function.
2. Hydrology, vegetation, and erosion/deposition were indicators of spring and shoreline condition following the Proper Functioning Condition protocol for lentic features.
3. Hydrology, vegetation, and soil and erosion were indicators of fen condition following the Proper Functioning Condition protocol for fens.
4. Bacteria, nutrients, sediment, taste and odor, and water temperature were indicators of water quality.

5. Equivalent Roaded Acres (ERA) was an indicator of cumulative watershed effects.

Indicators 1-4 were most applicable to analyzing direct and indirect effects of the proposed action and alternatives. Indicator 5 was used in the analysis of cumulative watershed effects.

Watershed Methodology

MEADOW HYDROLOGIC FUNCTION

Meadow hydrologic function was assessed using two methodologies:

1. Meadow Hydrologic Function (MHF) Rapid Assessment – The MHF rapid assessment protocol consists of five environmental attributes of meadow hydrologic function (project record). These attributes are tiered to the desired conditions for Riparian Conservation Areas (RCAs) in the Forest Plan Direction (USDA 2010). The attributes are channel form, floodplain connectivity, water table alteration, streambank stability, and herbaceous plant community. For each meadow, the condition of each attribute is assessed in the field and assigned a numerical score. The score for each attribute is then summed to determine a total score which corresponds to an adjective rating of very poor, poor, fair, good, or desired condition.
2. Proper Functioning Condition – This widely accepted methodology was used as a crosswalk with the MHF protocol to make the overall meadow hydrologic function assessment more robust (USDI 1998). Though PFC is designed to assess a broader array of attributes than the MHF protocol, the results of using the two methods correlated well.

The two methods have a different number of adjective ratings. The MHF method has five (described above) and the PFC method has three (proper functioning condition, functional-at risk, and nonfunctional). The MHF Rapid Assessment method was designed to distinguish between desired and good condition, and between poor and very poor. The PFC definition of proper functioning condition includes desired condition (i.e., full potential) and the approximate equivalent of what the MHF Rapid Assessment describes as good condition. The PFC definition on functional-at risk is comparable to the fair category of the MHF Rapid Assessment. At the lower end of the condition scale, the PFC methodology's rating of non-functional includes both the poor and very poor categories in the MHF Rapid Assessment method.

Additional monitoring data collected in the Allotment meadows includes utilization and condition and trend. The Range Report describes these monitoring methodologies.

SPECIAL AQUATIC FEATURES

It is a Riparian Conservation Area desired condition in the Forest Plan Direction that "The distribution and health of biotic communities in special aquatic habitats (such as springs, seeps, vernal pools, fens, bogs, and marshes) perpetuates their unique functions and biological diversity." In addition, Standard and Guideline #117 states, "Assess the hydrologic function on meadow habitats and other special aquatic features during range management analysis. Ensure that characteristics of special features are, at a minimum, at Proper Functioning Condition, as defined in the appropriate Technical Reports (or their successor publications)" (USDA 2010).

Meadows in the Allotments were assessed as described in the previous section. Springs, fens, and shorelines were assessed using the appropriate Proper Functioning Condition protocol (USDI 2003, Weixelman and Cooper 2009).

WATER QUALITY

It is also a Riparian Conservation Area desired condition in the Forest Plan Direction that "Water quality meets the goals of the Clean Water Act and the Safe Drinking Water Act; it is fishable, swimmable, and suitable for drinking after normal treatment." This is a focus of the assessment because the Forest Service has a Management Agency Agreement with the state Water Quality

Control Board to apply Best Management Practices to maintain and protect water quality on national forest lands in California (USDA 2011b).

Methods for assessing water quality include determining beneficial uses of water in the assessment watersheds, assessing the risk and occurrence of potential pollutants, and field assessment of indicators and/or measures of pollutants.

Beneficial Uses of Water

Beneficial uses of water for the Tuolumne and Stanislaus Rivers that are applicable to this assessment are municipal and domestic, contact and non-contact recreation, cold freshwater habitat, and wildlife habitat (California EPA 2011)**.** Domestic and municipal includes local water supplies for the Sonora area that is served by the Tuolumne Flume originating at Lyons Reservoir on the South Fork Stanislaus River. Local water supplies for Strawberry originate at Herring Creek just upstream of the confluence with the South Fork Stanislaus River or, when Herring Creek dries up, at the South Fork Stanislaus River near the Herring Creek confluence. Contact and non-contact recreation includes activities such as swimming, camping, fishing, hiking, and hunting. Cold freshwater habitat includes aquatic fish and wildlife (including invertebrates), and wildlife includes amphibian and aquatic-dependent reptile species.

Risk Assessment

Water quality parameters with the most likely potential to be affected by the proposed action are sediment, bacteria and other pathogens, and nutrients. Cattle waste products are known to introduce bacteria and other pathogens into water (Suk 1983, Suk et al. 1986), and can cause increased nutrient levels. Cattle can also cause physical impacts to streambanks that can result in stream sedimentation (Marlow and Pogacnik 1985, Siekert et al. 1985). The proposed action also has the potential to affect water temperature, taste and odor. Physical impacts to streambanks can lead to channel widening and associated increases in stream water temperature. Reductions in stream shading as a result of grazing could also lead to an increase in stream temperatures (Lile et al. 1995). By defecating in or around water, cattle also have to potential to affect the odor and taste of water.

The degree to which, if at all, the above parameters affect beneficial uses of water is key to describing environmental effects of the proposed action. That is, if there is some introduction of pollutants by grazing is it to the extent that it adversely affects the beneficial uses of the water?

Methods of Assessment

The following methods are used to address the potential extent and effect of pollutants from cattle grazing:

Sediment – Field measurement of pool tail surface fine sediment is a common indicator of potential cattle impact to aquatic habitat. A threshold of about 20% fines is used to determine if habitat is adversely affected. An additional field indicator for fish bearing streams is evidence of reproduction in reaches in and downstream of concentrated grazing areas. A threshold is presence of multiple age classes of fish – adults, juveniles and young of the year – which can indicate that waters are not adversely affected.

Bacteria and other pathogens – It is well established in the literature that fecal coliform, *Giardia*, etc. can be introduced into water by cattle. Recent studies conducted by Derlet have shown that bacteria (*E. coli* and other coliform types) are present in waters on the Stanislaus National Forest as a result of cattle grazing (Derlet et al. 2004, Derlet and Carlson 2006, Derlet et al. 2008). In addition to Derlet's studies, Myers has collected and analyzed water samples on the Stanislaus National Forest during the 2009-2011 field seasons (Myers and Kane 2010, Myers and Whited 2010, Myers 2011). A joint USFS and UC Davis (UCD) cooperative study also tested for *E. coli* and fecal coliform in 2010 and 2011 (Roche et al. 2013). The results of the Myers and USFS/UCD studies will be focused on in this analysis because samples were collected in the three Allotments being assessed. While Derlet

collected samples on the Stanislaus National Forest, only one sample was within an Allotment being assessed. This was the Grouse Lake inlet stream in the Bell Meadow Allotment (Derlet and Carlson 2006). In his study, Derlet identified this sample site as a site with stock (horses and pack animals) and not a cattle grazing site. His results, therefore, are not a focus of this analysis. The threshold for this parameter is presence of an elevated level of bacteria and other pathogens such that there is an adverse effect on beneficial uses of water.

It is difficult, time-consuming, and expensive to test directly for the presence of a large variety of pathogens. Therefore, monitoring for pathogens involves testing for "indicator" species, such as fecal coliform and *E. coli*, whose presence in the water suggests that fecal contamination may have occurred. Although fecal coliform and *E. coli* are generally not harmful themselves, they indicate the possible presence of pathogenic bacteria, viruses, and protozoans (such as *Cryptosporidium parvum* and *Giardia duodenalis*) that also live in human and animal digestive systems. *E. coli* is a species of fecal coliform bacteria that is specific to fecal material from humans and other warm-blooded animals, including livestock.

The U.S. Environmental Protection Agency (EPA) recommends *E. coli* as the best indicator of health risk from water contact in recreational waters (USEPA 2012a). The EPA has developed recreational water quality criteria (RWQC) for *E. coli*. These recreational water quality criteria recommendations are "national recommendations for all waterbody types designated for swimming, bathing, surfing, or similar water contact activities", also known as "primary contact recreational use".

The 2012 RWQC offers two sets of numeric concentration thresholds, both of which are designed to protect the public from exposure to harmful levels of pathogens. The more stringent of the two thresholds is a Statistical threshold Value (STV) of 320 Colony Forming Units (CFU)/100ml or a geometric mean of 100 CFU/100ml. The less stringent threshold is STV 410 CFU/100ml or a geometric mean of 126 CFU/100ml (USEPA 2012b). For the purposes of this analysis, the more stringent standard will be compared to measured *E.coli* values. Some states have changed their standards from fecal coliform to *E. coli* to reflect these recommendations. The Central Valley Regional Water Quality Control Board uses fecal coliform as the standard indicator.

The Basin Plan states, "In waters designated for contact recreation (REC-1), the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 ml." The Basin Plan does not identify a numeric standard for non-contact recreation waters (REC-2).

The "tributary rule" in the Basin Plan states that "the beneficial uses of any specifically identified water body generally apply to its tributary stream." The Tuolumne River (source to Don Pedro) and the Stanislaus River (source to New Melones Reservoir) are identified as having both REC-1 and REC-2 waters. Its tributaries would therefore also have some combination of these designations, based on the different activities in the tributaries and the likelihood of ingestion. The Basin Plan also states, "In some cases a beneficial use may not be applicable to the entire body of water." Therefore, even if the Tuolumne River is identified as having REC-1 uses, it may have tributaries where the beneficial use is REC-2, not REC-1. Because the stream reaches sampled for fecal coliform bacteria in the Bell Creek, Herring Creek, and Eagle Creek Allotments are not specifically listed in the Basin Plan as REC-1 or REC-2, the likelihood of ingestion is described for each site as a way of analyzing risk.

Nutrients – Cattle waste products contain nitrogen and phosphorous, biostimulatory substances, which may affect the trophic status of waters. Eutrophication can result from nutrient introduction if sufficient quantities are present. A field indicator of increased nutrient loading is presence of unwanted aquatic growths –vascular plants or algae. This can be evaluated by observing the type of aquatic plants in grazing areas and/or comparing those waters with similar waters where there is no

cattle grazing. The threshold of concern (TOC) is an amount of such growths that adversely affects beneficial uses of water (i.e., aquatic life such as fish or amphibians). A second, quantitative indicator of eutrophication is nitrogen and phosphorous concentration in water via water sampling. The threshold for this parameter is presence of an elevated level of nitrogen or phosphorous such that there is an adverse effect on beneficial uses of water. Nitrogen and phosphorous sampling was conducted on the Allotments, so this quantitative indicator of eutrophication is the focus of this analysis rather than the non-quantitative observations of algal growth.

Water Temperature – A reduction in shading vegetation and an increase in stream channel width to depth ratios as a result of cattle trampling has the potential to increase stream water temperatures. Continuous field measurement of water temperature using a data logger was taken in all three Allotments. Temperature data will be assessed to determine if beneficial uses of water, particularly cold freshwater habitat, are being affected by grazing in the Allotments.

Taste and Odor – The Basin Plan states that "Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses" (California EPA 2011). Cattle defecating in or near water could have the potential of affecting the taste or odor of the water. This can be evaluated by determining if cattle have caused taste or odor issues for the downstream water distributors.

Affected Environment

The three Allotments being assessed are within portions of two of the four major rivers within the Stanislaus National Forest – the Tuolumne and the Stanislaus. The Bell Meadow Allotment is almost entirely within the Tuolumne River watershed, while the Herring Creek and Eagle Meadow Allotments are within the Stanislaus River watershed. Table 3.11-1 displays the watershed delineation for each Allotment using the Hydrologic Unit Code (HUC) system (USGS 2009).

BELL MEADOW ALLOTMENT

This Allotment lies predominately in the upper reaches of the Clavey River watershed and occupies the upper reaches of its two headwater streams – Lily Creek and Bell Creek. Segments of Bell Creek in the Allotment are proposed for Scenic or Wild classification under the Wild and Scenic Rivers Act. The main stem of Lily Creek in the Allotment is proposed for Wild classification under the Wild and Scenic Rivers Act. The remainder of the Allotment lies within the Upper South Fork Stanislaus River watershed.

Vegetation on the slopes of the watershed consists of heavily forested stands in the lower half of the Allotment. As elevation increases, mixed conifer at the lower elevations grades into Jeffrey pine, lodgepole pine, red fir and western hemlock. Some of the slopes have openings in the forest cover that provide scattered forage. However, the majority of the forage is located in the valley bottoms.

Vegetation in the valley bottoms of Lily and Bell Creeks is dominated by numerous meadow-associated plant communities. The Bell Meadow complex is the dominant meadow system in the Allotment, including three segments of Bell Meadow and two segments of Round Meadow. The three segments of Bell Meadow are comprised of a mix of herbaceous plants, woody shrubs and obligate riparian trees. The species of note is quaking aspen; these trees rim each Bell Meadow segment to combine to form the largest aspen forest in the Sierra Nevada south of Lake Tahoe. The site is an aspen Research Natural Area. Two small meadows of note exist along upper Bell Creek tributaries – Crab Meadow and Gianelli Trailhead Meadow. Along the low gradient portion of Lily Creek in the southern part of the Allotment, Pine Valley and the Mud Lake area provide additional meadow community types. Pine Valley has an herbaceous understory with a scattered overstory of lodgepole pine. Mud Lake is a large wetland area and the adjacent Mud Lake Meadow, between Mud Lake and Lily Creek, is an herbaceous dominated meadow.

Table 3.11-1 Allotment Assessment Watersheds by Alternative

Allotment Name	HUC Level*	HUC Names	% Allotment in Watershed (Alt 1)	% Allotment in Watershed (Alt 3 & 4)
Bell Meadow	4	Tuolumne River	89	89
	5	Clavey River	87	87
	6	Upper Clavey River	87	87
	4	Tuolumne River	89	89
	5	North Fork Tuolumne River	2	2
	6	Upper North Fork Tuolumne	2	2
	4	Stanislaus River	11	11
	5	South Fork Stanislaus River	11	11
	6	Upper South Fork Stanislaus	11	11
Herring Creek	4	Stanislaus River	100	100
	5	South Fork Stanislaus River	70	87
	6	Upper South Fork Stanislaus	70	87
	4	Stanislaus River	100	100
	5	Lower Middle Fork Stanislaus	29	13
	6	Cow Creek – Middle Fork Stanislaus River	12	12
	6	Mill Creek – Middle Fork Stanislaus River	17	1
Eagle Meadow	4	Stanislaus River	100	100
	5	Upper Middle Fork Stanislaus	66	70
	6	Eagle Creek	44	43
	6	Douglas Creek – Middle Fork Stanislaus River	17	21
	6	Summit Creek	5	6
	4	Stanislaus River	100	100
	5	Lower Middle Fork Stanislaus	34	30
	6	Niagara Creek – Middle Fork Stanislaus River	27	30
	6	Mill Creek – Middle Fork Stanislaus River	7	0

* HUC's applicable to this assessment are classified into levels based on the following size classes: 4th level - >250,000 acres; 5th level – 40,000 to 250,000 acres; 6th level – 10,000 to 40,000 acres.

Meadow Hydrologic Function

Historic overgrazing in the Bell Meadow Allotment has affected the hydrologic function of meadows in the Allotment. The effect of historic overgrazing in the Bell Meadow Allotment is reflected in the current hydrologic function of some of the meadows. As shown in Table 3.11-2, there is a full range of meadow hydrologic function condition at the present time. Of the 10 meadows inventoried, three are at desired condition and two are rated good (thus a total of five at proper functioning condition). Two are in fair condition, or functional-at risk by PFC methodology, and two are poor and one is very poor (thus three non-functional by PFC rating).

In summary, based on Meadow Hydrologic Function Rapid Assessment data, stream channel incision and widening is mostly over and most streams in the meadows are rejuvenating toward their pre-alteration channel form at a new base level – some close to the former stream level and some substantially lower. The extent of this recovery process varies along the degraded channels (usually more advanced in the lower section of a meadow, where incision is least), but is nonetheless evidence of natural recovery from past disturbance. In the meadows in good or desired condition, where past disturbance has been minimal, natural recovery to near-natural condition is likely to occur. The poor condition meadows will not naturally recover to pre-alteration water table level and a vigorous deep-rooted plant community but the stream channels will eventually stabilize at a lower elevation. Plant communities will remain capable to support limited forage utilization but will be unable to withstand heavier grazing.

Table 3.11-2 Meadow Hydrologic Function, Bell Meadow Allotment

Bell Meadow Allotment									
Meadow Name	Survey Year	Existing Condition							Comments
		MHF (Rapid Assessment Protocol)*						PFC**	
		CF	FC	WT	SB	PC	Rating		
Bell – Lower	2010	3	3	3	2	3	Desired	PFC	Portion of Bell Meadow that contains snow survey course.
Bell – Middle	2010	2	2	3	2	3	Good	PFC	Portion of Bell Meadow at Bell Meadow trailhead.
Bell – Upper	2010	1	1	1	1	1	Very Poor	NF	Largest portion of Bell Meadow. Meadow currently excluded from grazing.
Crab	2009	3	3	2	2	1	Fair	FAR	Barren ground exists in western part of meadow. This area proposed for restoration under Gooseberry EA.
Gianelli Trailhead	2010	3	3	3	3	3	Desired	PFC	
Mud Lake	2005, 2010	3	3	3	3	3	Desired	PFC	Meadow surrounds Mud Lake. Very wet meadow.
Mud Lake Meadow	2005, 2010	3	2	2	1	1	Fair	FAR	Meadow is adjacent to right bank of stream east of Mud Lake.
Pine Valley	2005, 2010	3	3	2	3	1	Good	PFC	Moderate lodgepole pine overstory in meadow.
Round	2010	1	1	1	2	1	Poor	NF	Meadow proposed for restoration under Gooseberry EA.
Round – Lower	2010	1	1	2	2	1	Poor	NF	

*Rapid Assessment codes: CF=channel function, FC=floodplain connectivity, WT=water table alteration, SB=streambank stability, PC=herbaceous plant community. A score of 3 is best, 1 is worst. Scores for all five attributes are added together for an overall rating.
**PFC=proper functioning condition, FAR= functional-at risk, and NF=nonfunctional

Special Aquatic Features

Proper Functioning Condition (PFC) was assessed on sixteen springs, fens, and shorelines in the Bell Meadow Allotment in 2010 (USDI 2003, Weixelman and Cooper 2009). PFC methodology assesses impacts to hydrology, vegetation, and soils/erosion. Data are summarized in Table 3.11-3. While the overall PFC determination reflects these three attributes, the focus of the following discussion is on how cattle have affected the hydrologic function of springs, fens, and shorelines.

Eight of the sixteen special aquatic features surveyed were determined to be at proper functioning condition. Although some of these sites had evidence of hoof action, it did not appear to impact the function of the feature.

Eight special aquatic features were determined to be functional – at risk. Hoof action altering flow patterns was the primary hydrologic issue at these sites. Trend was not determined for seven of the sites. This is because the original surveys were conducted in 2010 and Dave Weixelman, one of the authors of the PFC fen protocol, recommended waiting at least 3 years and then resurveying the site in order to accurately determine the trend (Weixelman, personal communication 2010). Photos were taken at each of the special aquatic features in 2010 and will be used when assessing trend. Trend was assessed at one site, Bear Lake. The impacts to this shoreline were a result of the dam. Since the dam is collapsing and over time natural flows will resume, an upward trend was determined.

Table 3.11-3 Special Aquatic Features, Bell Meadow Allotment

Site Location	Site Type	PFC Determination	Comments
Gianelli #1	Fen (Sloping)	Functional – At Risk	Evidence of hoof action and a little bit of a channel.
Gianelli #2	Spring	Proper	ID Team observed hoof action, but this did not appear to be altering the flow pattern at the spring.
Gianelli #3	Near fen (Mound)	Functional – At Risk	This site had a fen-like feature, but O horizon was only 4 inches. Some soil movement upslope, possibly as a result of the road, which is depositing mineral soil along periphery. There is evidence of trailing along perimeter of feature – there is potential for dewatering but this has not occurred.
Crab Meadow Fen Complex #1 (lower fen complex)	Fen (Mound)	Functional – At Risk	A nearby road, sheet erosion, conifer encroachment, and previous logging may have affected sediment and water movements. Flow patterns have been altered by hoof action. Site proposed for exclusion under Gooseberry EA.
Crab Meadow Fen Complex #2 (upper fen complex)	Fen (Mound)	Functional – At Risk	Channeling of water is occurring in the wet area adjacent to the fen. Channeling above the fen is going around the fen. There is considerable chiseling along the perimeter of the fen due to livestock hoof action. Flow patterns are altered. Site proposed for exclusion under Gooseberry EA.
Crab Meadow Spring	Spring	Proper	Some evidence of hoof action near the spring, but this is currently not causing any issues.
Crab Meadow Seep	Seep	Functional – At Risk	Two areas of hoof action could form drainage downslope.
West of Crab Meadow (Permittee Spring)	Spring	Functional – At Risk	Surface flow patterns are altered by hoof action.
West of Crab Meadow (spring above fen)	Spring	Functional – At Risk	Trampling/chiseling/hoof action is starting to widen channel.
Lily Lake Shoreline	Shoreline	Proper	Some hoof action near the inlet, but this is not altering flow patterns.
Lower Round Meadow Spring	Spring	Proper	Hoof action was observed along spring and channel, but did not appear to alter flow patterns.
Mud Lake Shoreline	Shoreline	Proper	
Mud Lake Island Fen	Fen (Basin)	Proper	Basin fen surrounded by water; cattle do not reach it often (only after a few dry years)
Mud Lake Trail Spring	Spring	Proper	No evidence of grazing, such as hoof action or cow pats. Drainage within 20 yards of spring is downcut, but this does not appear to be a threat to the spring.
Bear Lake	Shoreline	Functional – At Risk	Natural flow patterns were altered by the dam (not cattle). The dam is collapsing. As dam continues to degrade the natural surface flow patterns will be restored and site will move towards PFC.
Above Camp Lake	Fen (Basin)	Proper	

Water Quality

Sediment – Pool sediment and fish reproduction in streams in this Allotment show that sediment is below the TOC. Pool tail surface fine sediment is below 20% and a good distribution of age classes of fish is present on fish bearing streams (Bell and Lily Creeks) (USDA 2006b).

Bacteria and Other Pathogens – Water sampling for fecal coliform and *E. coli* was conducted in the Bell Meadow Allotment in 2009 and 2011 by Myers (Myers and Kane 2010, Myers 2011) and in

2010 and 2011 by the USFS/UC Davis (Roche et al. 2013). The Watershed Report includes discussion on EPA and Basin Plan standards for *E. coli* and fecal coliform, descriptions of water quality sample sites, water quality monitoring results, and for photos and maps of sampling site locations.

Non-cattle sources of indicator bacteria may include humans and other mammals, including wildlife and pack stock (University of California 2000). If elevated concentrations of indicator bacteria were found, the USFS/UCD study was designed to pinpoint the potential source of contamination. This was done by selecting sample points above and below areas such as gathering pastures, trailheads, and horse camps.

Results of the 2010 and 2011 USFS/UCD sampling in the Bell Meadow Allotment indicate that fecal coliform and *E. coli* concentrations in the waters generally increased in areas where cattle use is concentrated (i.e. meadows and gathering pastures). These increased concentrations decreased shortly after removing cattle from the Allotment. The largest increase was seen in 2010 at BM8, Bell Creek below Middle Bell gathering pasture (fecal coliform = 580 CFU/100ml and *E. coli* = 459 CFU/100ml). This spike occurred when the cattle were being gathered adjacent to the stream. Site BM3 is about 1 mile downstream of BM8. Concentrations of fecal coliform at this site were only 1 CFU/100ml. Because no samples were taken later in the year, it is unclear if the bacteria were filtered out/diluted between BM8 and BM3 or if the bacteria had not moved downstream yet. In 2011, fecal coliform concentrations at BM8 reduced about 30 percent between the 9/13/11 sample (during gathering) and the 10/11/11 sample (11 days after cattle off Allotment). Fecal coliform concentrations downstream at BM3 were reduced by a similar amount during the same timeframe.

Despite the increased bacteria concentrations in cattle high use areas, fecal coliform bacteria concentrations remained below that required for REC-1 standards (200 CFU/100ml) at the sample site where ingestion was likely (BM1). The USEPA recommendation for *E. coli* samples, applicable at primary contact recreation sites, was also not exceeded at BM1.

In 2009 and 2011, Myers et al. collected bacteria samples in Lower Round Meadow both before and after cattle came on the Allotment (Myers and Kane 2010, Myers 2011). Concentrations of fecal coliform and *E. coli* increased following cattle coming onto the Allotment during both years. Both the fecal coliform and *E. coli* results reported by Myers in 2011 were considerably higher than the results at the USFS/UCD sample site BM2, which was established at about the same location. The reason for the differences is unknown.

The Tuolumne Utilities District (TUD) distributes water to the Sonora area. They have seen increased concentrations of *Cryptosporidium* at isolated locations. This is leading them to make changes to treatment plants to address the issue. TUD has not done any testing on USFS lands and do not intend to do so (Scesa personal communication 2012). However, there are additional treatment plants between the Stanislaus National Forest and the “problem” treatment plants. These additional treatment plants have not seen the elevated concentrations of *Cryptosporidium* that were seen at the “problem” treatment plants further downstream. Therefore, the increase in *Cryptosporidium* does not appear to be a result of forest activities, including cattle grazing on the Bell Meadow Allotment.

In summary, both the Myers et al. sampling and the USFS/UCD sampling indicated that concentrations of indicator bacteria in the Allotment increased as a result of cattle grazing. USFS/UCD sampling was not frequent enough to be considered compliance monitoring. However, when comparing test results to the REC-1 standards for fecal coliform at the sample site where ingestion of water was likely, sampling results were below the standard. *E. coli* also remained below the recommended maximum concentration at the primary contact recreation sample site (max of 3 CFU/100ml in 2010 and max of 40 CFU/100ml in 2011). There is no record of *Cryptosporidium* causing impacts to drinking water supplies as a result of grazing on the Bell Meadow Allotment.

Nutrients – There is the potential for increased nutrient introduction as a result of cattle grazing. The USFS/UCD monitored total nitrogen (TN), nitrate-nitrogen (NO_3-N), ammonium-nitrogen (NH_4-N), total phosphorous (TP), and phosphate phosphorous (PO_4-P) in 2010 and 2011. Nineteen samples were collected in 2010 and 45 samples were collected in 2011. Overall, monitoring indicated low concentrations of nitrogen and phosphorous. The Watershed Report shows monitoring results, including percentages of samples below detection limits (dl) and EPA levels of concern.

In 2010, the only site which approached or exceeded the EPA levels of concern was BM2 (Lower Round Meadow). This is a very small stream (wetted width = 10 inches, and average depth = 1.75 inches on 8/18/10) and water can often be stagnant. BM4 is about 300 feet downstream of BM2 and is located on the main stem of Bell Creek. Concentrations of all parameters described above were well within the EPA levels of concern at BM4, indicating that the slightly elevated nutrients at BM2 are quickly diluted by the higher flows in Bell Creek and pose no risk further downstream. In 2011, EPA levels of concern were not exceeded at any site.

Water Temperature – Continuous water temperature data was collected in 2010 with data loggers at six sites in the Bell Meadow Allotment. Data was collected from 8/18-9/15 and thus represent peak summer temperatures. The average daily minimum temperature was 49°F, the average daily maximum temperature was 59°F, and the overall average daily temperature was 53°F. Continuous water temperature data was collected in 2011 with a data logger at one site in the Bell Meadow Allotment. Data was collected from 7/19-10/10. The average daily minimum temperature was 50°F, the average daily maximum temperature was 62°F, and the overall average daily temperature was 55°F. These temperatures support the beneficial use of the stream as a cold water fishery.

Taste and Odor – The Basin Plan states that "Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses" (California EPA 2011). There are no known complaints of taste or odor on fish flesh reported to the Forest Aquatic Biologist (Holdeman personal communication 2012). The Tuolumne Utilities District (TUD) has received complaints about the taste and odor (T/O) of the local water supply. They attribute this issue primarily to decomposing organics (leaves, limbs, needles, etc.) in the water and have stated that "current levels of grazing do not have an impact on T/O" (Scesa 2012).

EAGLE MEADOW ALLOTMENT

This Allotment lies principally within two 6th level HUC watersheds – Niagara and Eagle Creeks. Both are tributaries to the Middle Fork Stanislaus River. Eagle Creek has a tributary called Long Valley Creek that lies entirely within the Allotment. The addition of the McCormick Pocket, proposed under Alternative 1, would add the headwaters of Eagle Creek to the Allotment (about 2,400 acres).

The eastern portion of the Allotment contains several smaller streams that drain easterly into the Middle Fork Stanislaus River in the Relief Reservoir area. These small drainages are within the Summit Creek and Douglas Creek watersheds. The Niagara addition, proposed in Alternative 1, would add an additional 2,400 acres to the Allotment, most of which are in the headwaters of Mill Creek.

Elevations within the Allotment range from about 6,550 to 9,900 feet. This elevation range would expand under Alternative 1 with the Niagara addition to about 6,400 to 9,900 feet. Geology consists of a mix of granitic bedrock and volcanic mudflows overlying the granite on slopes and ridges. The entire Allotment was glaciated and, as a result, has a substantial amount of glacial till on slopes and glacial fill in valley bottoms. Precipitation in the Allotment ranges from about 50 to 65 inches per year, dominated by a deep snowpack.

Vegetation on the slopes in this Allotment is similar to the Bell Meadow Allotment, although there is less mixed conifer since the lowest elevations here are higher than in that Allotment. There are numerous meadows in the Allotment, and several notable ones along the valley bottoms. Barn Meadow lies along the headwaters of Niagara Creek, with segments in contact with the stream. Shell Meadow and an unnamed meadow to the southeast of Shell Meadow (Meadow at T1N, R6E, Section 35) are smaller meadows in the Niagara Creek watershed. Eagle Creek runs through Eagle Meadow just upstream of road 5N01 and Lower Eagle Meadow about one mile downstream. The upper portion of Long Valley Creek drains through a long, narrow meadow. In the northeastern portion of the Allotment, Sardine and Red Rock meadows lie close to one another. These are both within the Douglas Creek watershed and drain east towards the Middle Fork Stanislaus River. There are small unnamed stringer meadows in the headwaters of Mill Creek in the Niagara Creek addition. There is also one mapped meadow in the headwaters of Eagle Creek in the McCormick Pocket addition.

Meadow Hydrologic Function

Historic overgrazing in the Eagle Meadow Allotment has affected the hydrologic function of meadows in the Allotment. In 1925 the season of use for the Eagle Meadow Allotment was from June 1-October 15 and the stocking rate was 4475 sheep. Current season of use is July 1-September 30 and 150 cow/calf pairs are allowed. Allotment survey notes from 1925 indicated that Eagle Meadow and Relief Meadow showed past overuse by sheep which depleted the drier portions and caused streambank cutting (USDA 1925b). In addition, the Mono-Sonora Road (now Highway 108) was used as a sheep and cattle driveway, causing overgrazing along the route. This “driveway” went through the proposed Niagara addition (USDA 1925c). The effect of historic overgrazing in the Eagle Meadow Allotment is reflected in the current hydrologic function of some of the meadows, as displayed in Table 3.11-4.

Table 3.11-4 Meadow Hydrologic Function, Eagle Meadow Allotment

Eagle Meadow Allotment									
Meadow Name	Survey Year	Existing Condition							Comments
		MHF (Rapid Assessment Protocol)*						PFC**	
		CF	FC	WT	SB	PC	Rating		
Barn	2010	3	3	3	3	3	Desired	PFC	
Eagle Meadow -East	2010	1	1	1	1	1	Very Poor	NF	Along main channel of Eagle Creek
Lower Eagle Meadow	2006	1	1	1	1	1	Very Poor	NF	Along main channel of Eagle Creek
Eagle Meadow -West	2010	3	3	3	3	3	Desired	PFC	Along tributary to Eagle Creek
Long Valley - Lower	2010	2	2	2	2	2	Fair	FAR	Small meadow at Long Valley key area
Long Valley - Upper	2010	1	1	3	2	2	Fair	FAR	
Red Rock	2010	1	1	1	2	1	Poor	NF	
Sardine	2010	3	3	3	3	2	Desired	PFC	
Shell	2010	3	3	3	3	3	Desired	PFC	Currently excluded from grazing
Meadow at T6N, R19E, Section 35	2010	3	3	3	3	2	Desired	PFC	Unnamed meadow southeast of Shell Meadow

*Rapid Assessment codes: CF=channel function, FC=floodplain connectivity, WT=water table alteration, SB=streambank stability, PC=herbaceous plant community. A score of 3 is best, 1 is worst. Scores for all five attributes are added together for an overall rating.
**PFC=proper functioning condition, FAR= functional-at risk, and NF=nonfunctional

Special Aquatic Features

Proper Functioning Condition was assessed on thirteen sites in the Eagle Meadow Allotment in 2010 (USDI 2003, Weixelman and Cooper 2009). This included springs and fens. PFC determinations involved assessing impacts to hydrology, vegetation, and soils/erosion. While the overall PFC determination reflects these three attributes, the focus of the following discussion is on how cattle have affected the hydrologic function of springs and fens. These sites were not grazed in 2010 as the Allotment was in non-use, so any evidence of hoof action was from the 2009 season. Table 3.11-5 describes the sites surveyed.

Six of the thirteen special aquatic features surveyed were determined to be at proper functioning condition. Although some of these sites had evidence of hoof action, it did not appear to impact the function of the feature.

Seven special aquatic features were determined to be functional – at risk. Hoof action altering flow patterns was the primary hydrologic issue at these sites. Trend was not determined for these sites. This is because the original surveys were conducted in 2010 and Dave Weixelman, one of the authors of the PFC fen protocol, recommended waiting at least 3 years and then resurveying the site in order to accurately determine the trend (Weixelman 2010). Photos were taken at each of the special aquatic features in 2010 and will be used when assessing trend.

Table 3.11-5 Special Aquatic Features, Eagle Meadow Allotment

Site Location	Site Type	PFC Determination	Comments
Barn Meadow Fen Complex #1	Fen (Mound)	Proper	
Barn Meadow Fen/Spring Complex	Fen (Mound)	Proper	Evidence of trailing in fen has the potential to channel some water.
Barn Meadow Fen #3	Fen (Mound)	Functional – At Risk	Small channel flows out of fen – it is unknown if this has been influenced by cattle trailing or is natural.
Long Valley Seep Complex	Seep	Functional – At Risk	Pocking/hoof action is evident. There is a cattle trail immediately above the seep, but it does not appear to be affecting the seep.
Eagle Meadow Gathering Spring #1	Spring	Proper	Spring source is located immediately below trail.
Eagle Meadow Gathering Spring #2	Spring	Proper	No evidence of hoof action from previous season
Eagle Meadow Gathering Fen #1	Fen (Sloping)	Functional – At Risk	There is a depression in the center of fen which may have been created by hoof action.
Eagle Meadow Gathering Fen #2	Fen (Mound)	Proper	
Eagle Meadow Gathering Fen #3	Fen (Mound)	Functional – At Risk	There is a channel on one side of fen which is more incised than most.
Eagle Meadow Gathering Fen #4	Fen (Mound)	Functional – At Risk	There is a depressional feature in the fen which may have been caused by hoof action.
Eagle Meadow Gathering Fen #5	Fen (Mound)	Functional – At Risk	Flow patterns are altered, but not to a large extent. Where hoof marks are there is water emanating out of them. Also, some hoof action on the lower edge and along one side of the mound fen.
Allotment NW - 5N09 Fen	Fen (Mound)	Proper	Small gully from road ends before reaching fen
Allotment NW - 5N09B Fen	Fen	Functional – At Risk	Lots of pocking. Scattered areas of bare ground. Channels around both sides of the fen are draining the fen.

Water Quality

Sediment – Observations of pool sediment and fish reproduction on fish bearing streams show that sediment is below the TOC in this Allotment. Pool tail surface fine sediment is below 20% in all stream reaches with pools, and a good distribution of age classes of fish is present on fish bearing streams.

Bacteria and Other Pathogens – Water sampling for fecal coliform and *E. coli* was conducted in the Herring Creek Allotment in 2009 and 2011 by Myers (Myers and Kane 2010, Myers 2011) and in 2010 and 2011 by the USFS/UC Davis (Roche et al. 2013). The Allotment was in non-use in 2010 and 2011, so results represent the non-grazing condition. The Watershed Report shows water quality sample sites in the Eagle Meadow Allotment, water quality monitoring results, and photos and maps of sampling site locations.

In 2009 and 2011, Myers and others collected bacteria samples in Barn Meadow (Myers and Kane 2010, Myers 2011). Fecal coliform concentrations at three sample sites ranged from <2 to >1600 CFU/100ml and *E. coli* ranged from <2 to 500 CFU/100ml after livestock were brought onto the Allotment. Both fecal coliform and E. coli concentrations were lower prior to livestock entry. However, the variability seen in the duplicate sampling results at BM1 exceeded the precision goals identified in the Quality Assurance Project Plan (QAPP). Despite the fact that precision goals were not met, the 2009 Myers data still indicates that concentrations of fecal coliform and *E. coli* increased during the grazing season as a result of cattle use on the Allotment. The data is also useful because it was the only water quality sampling on the Allotment conducted when there were full numbers of cattle and a full season of use. However, all the samples were collected on small tributaries where ingestion of water is unlikely. This is particularly apparent since the first sample site dried up by July 9th and had to be moved downstream. No samples were collected further downstream where ingestion of waters was “reasonably possible”.

Results of the 2010 and 2011 USFS/UCD sampling in the Eagle Meadow Allotment indicate that fecal coliform and *E. coli* concentrations in the water are generally low when the Allotment is in non-use. Despite the non-use status of the Allotment, there was an elevated concentration of fecal coliform and *E. coli* in 2011 at a site downstream of a horse pasture and camp. The site upstream of the horse pasture and camp did not have elevated concentrations of indicator bacteria. Therefore, the elevated concentrations seen at this site were likely a result of recreational stock use or were a result of the road crossing (ford) across Eagle Creek which may have stirred up bacteria in the sediments if a vehicle passed right before sampling, or a combination of both the road and horse camp. Concentrations were lower at the next site downstream. The Tuolumne Utilities District (TUD) has seen increased concentrations of *Cryptosporidium* at isolated locations. However, the increase in *Cryptosporidium* is not a result of forest activities, including cattle grazing on the Eagle Meadow Allotment (Scesa, 2012).

To summarize the results of water quality testing on this Allotment, concentrations of bacteria in the Allotment increased as a result of cattle grazing in 2009. Cattle were not on the Allotment in 2010 or 2011, so data where ingestion is “reasonably possible” was not available. By looking at the results seen in the nearby Bell Meadow Allotment where concentrations of indicator bacteria were low at the site where ingestion of water was likely, it can be assumed that elevated concentrations of bacteria would be diluted before reaching areas where ingestion of water was “reasonably possible.” In addition, there is no record of *Cryptosporidium* causing impacts to drinking water supplies as a result of grazing on the Eagle Meadow Allotment.

Nutrients – There is the potential for increased nutrient introduction as a result of cattle grazing. The USFS/UCD monitored total nitrogen (TN), nitrate-nitrogen (NO_3-N), ammonium-nitrogen (NH_4-N), total phosphorous (TP), and phosphate phosphorous (PO_4-P) in 2010 and 2011. Twenty-six samples were collected in 2010 and 18 samples were collected in 2011. Overall, monitoring indicated low

concentrations of nitrogen and phosphorous. The Watershed Report shows monitoring results, including percentages of samples below detection limits (dl) and EPA levels of concern.

The USFS/UCD monitoring indicated low concentrations overall of nitrogen and phosphorous in 2010 and 2011, both seasons of non-use. Overall, mean concentrations of nutrients in the Eagle Creek Allotment were similar to those seen in the Bell Meadow and Herring Creek Allotments. However, both Bell Meadow and Herring Creek had isolated sampling locations where nutrient concentrations were elevated above the EPA level of concern. It is assumed that if Eagle Meadow had cattle on the Allotment in 2010 that there may also be isolated increases in nutrients. It is also likely that any elevated nutrient concentrations would no longer be elevated at the next downstream sampling site, as was the case in the other two Allotments.

Water Temperature – Continuous water temperature data was collected in 2010 with data loggers at eleven sites in the Eagle Meadow Allotment. Data was collected from 8/18-9/15 and thus represent peak summer temperatures. Although cattle were not on the Allotment during this time, increased width to depth ratios from disturbance during the 2009 season would not likely have recovered by the 2010 season, so elevated temperatures as a result of cattle trampling was still potentially represented in the temperature data. Possible reductions in shade from the 2009 season likely would have recovered by the 2010 season and thus would not be represented with the recorded data. The average daily minimum temperature was 48°F, the average daily maximum temperature was 59°F, and the overall average daily temperature was 52°F. These temperatures support the beneficial use of the stream as a cold water fishery. They are also similar to temperatures measured in 2010 in the Bell Meadow and Herring Creek Allotments, where grazing did occur.

Taste and Odor – The Basin Plan states that “Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses” (California EPA 2011). There are no known complaints of taste or odor on fish flesh reported to the Forest Aquatic Biologist (Holdeman 2012). The Tuolumne Utilities District (TUD) has received complaints about the taste and odor (T/O) of the local water supply. They attribute this issue primarily to decomposing organics (leaves, limbs, needles, etc.) in the water and have stated that “current levels of grazing do not have an impact on T/O” (Scesa 2012).

HERRING CREEK ALLOTMENT

This Allotment is nearly all within the Upper South Fork Stanislaus River watershed. The watershed has two headwater streams, Herring Creek and Willow Creek, as well as the upper South Fork Stanislaus River. Herring Creek and Willow Creek join just above Herring Creek Reservoir, a small impoundment of about 30 acre feet. The reservoir’s dam, a concrete structure built in the 1930’s, no longer has a functional outlet valve. Thus, the reservoir is essentially a shallow lake rather than a storage facility with regulated outflow. The South Fork Stanislaus River and Herring Creek join downstream of Pinecrest Lake at the watershed boundary.

The remainder of the Allotment lies within Cow Creek, a tributary of the Lower Middle Fork Stanislaus River. However, under Alternative 1, the addition of the Cascade unit would add about 3,400 acres to the Allotment, most of which would be in the Mill Creek watershed. Alternatives 1, 3 and 4 would eliminate about 2,500 acres from the southern part of the Allotment (Upper South Fork Stanislaus River watershed) because livestock are not currently utilizing this area.

Elevations within the Allotment range from about 5,700 to 9,500 feet. Geology consists of a mix of granitic bedrock and volcanic mudflows overlying the granite on slopes and ridges. The entire Allotment was glaciated and, as a result, has a substantial amount of glacial till on slopes and glacial fill in valley bottoms. Precipitation in the Allotment ranges from about 50 to 60 inches per year, dominated by a deep snowpack above about 7,000 feet.

Vegetation on the slopes in the Allotment is similar to the situation in the Bell Meadow Allotment. The valley bottoms in Herring Creek and Willow Creek have numerous meadows, principally Willow Meadow, one relatively large and several smaller ones in Hammill Canyon along Herring Creek, and one at the upper end of Herring Creek Reservoir (the reservoir impounds the bulk of this meadow). In addition, numerous meadows exist on the upper tributaries of Willow and Herrings Creeks, notably Groundhog Meadow, Castle Meadow, Coyote Meadow, Three Meadows, Bluff Meadow, Bloomer Lake, and Wire Corral Meadow. Three meadow areas exist in the Cow Creek portion of this Allotment – Bull Run, Burt Reed, and the Punch Bowl. Another meadow, often referred to as Big Basin, lies at the southern border of the Allotment along the South Fork Stanislaus River. It has rarely been grazed, largely due to difficult access. This meadow would no longer be included in the Herring Creek Allotment under any of the action alternatives. There is one main meadow in the proposed Cascade addition (Alternative 1). This unnamed meadow is adjacent to 5N39Y.

Meadow Hydrologic Function

Historic overgrazing in the Herring Creek Allotment has affected the hydrologic function of meadows in the Allotment. In 1924 the season of use for the Herring Creek Allotment was from June 1-October 15 and the stocking rate was 510 cattle. Current season of use is July 1-September 30 and 156 cow/calf pairs are allowed. The boundaries of the Herring Creek Allotment have changed slightly since 1924, but the acreage is roughly the same. Records from 1925 indicate that meadows to the west and southwest of Cooper Peak are in poor shape due to heavy use and streambank erosion (USDA 1925a). Range inspection notes from 1953 indicated active erosion along creeks in Hammill Canyon and that Castle, Coyote, and Wire Corral have been “fed to the bone. Absolutely nothing remains.” (USDA 1953).

The effect of historic overgrazing in the Herring Creek Allotment is reflected in the current hydrologic function of some of the meadows, as displayed in Table 3.11-6.

Thirteen of the meadows in this Allotment are either in good condition or at desired condition (or at proper functioning condition using the PFC methodology). Floodplain connectivity and channel morphology are normal or near normal, the water table and related plant communities are near potential, and streambank stability is very good.

The four meadows that are rated as fair, or functional at-risk (FAR), have some alteration of the attributes used in rating meadow hydrologic function. That is, floodplain connectivity and channel morphology may be altered in some portions of the meadows, and the water table may be slightly lowered but not enough to cause a major change in plant community composition. These four FAR meadows, all located along Herring Creek in Hammill Canyon, are currently maintaining a functional condition but remain at risk of further degradation.

Six meadows are in poor or very poor (non-functional) condition. Willow Creek is incised and widened throughout nearly all of Castle Meadow. With the exception of the few isolated spots with upwelling groundwater, the water table has lowered substantially and there is virtually no floodplain connectivity. Bank stability is poor and there are few deep rooted herbaceous plants in the meadow.

Table 3.11-6 Meadow Hydrologic Function, Herring Creek Allotment

Herring Creek Allotment									
Meadow Name	Survey Year	Existing Condition							Comments
		MHF (Rapid Assessment Protocol)*						PFC**	
		CF	FC	WT	SB	PC	Rating		
Bloomer Lake	2010	2	3	3	3	3	Desired	PFC	
Bluff	2010	2	2	3	3	3	Good	PFC	Used as a gathering pasture.
Bull Run	2010	3	3	3	2	3	Desired	PFC	
Burt Reed	2010	3	3	3	3	3	Desired	PFC	Small headcuts in channel have not yet affected hydrology. Restoration planned completed in fall 2012 to stabilize headcuts.
Castle	2006	1	1	1	1	1	Very Poor	NF	
Coyote	2006	3	3	3	3	3	Desired	PFC	
Groundhog	2006, 2010	3	3	3	3	3	Desired	PFC	
Hammill Canyon 1	2010	2	2	1	2	1	Poor	NF	Location of R5 Condition and Trend plot, greenline plot, and utilization.
Hammill Canyon 2	2010	2	2	2	2	2	Fair	FAR	
Hammill Canyon 3	2010	2	2	1	2	1	Poor	NF	
Hammill Canyon 4	2010	2	2	2	2	2	Fair	FAR	
Hammill Canyon 5	2010	3	2	2	3	1	Fair	FAR	
Hammill Canyon 6	2010	2	2	2	3	2	Fair	FAR	
Hammill Canyon 7	2010	3	3	3	3	3	Desired	PFC	Headcut restoration completed in 2011.
Herring Creek Reservoir	2010	1	1	2	2	1	Poor	NF	
Lower Punch Bowl	2010	3	3	3	2	3	Desired	PFC	
Upper Punch Bowl	2010	3	3	3	2	3	Desired	PFC	
Lower Three Meadows	2010	3	3	3	3	2	Desired	PFC	Excluded from grazing.
Middle Three Meadows	2010	2	2	3	2	3	Good	PFC	Excluded from grazing.
Upper Three Meadows	2010	1	1	1	2	1	Poor	NF	Excluded from grazing.
Lower Willow Meadow	2010	3	3	3	3	3	Desired	PFC	Identified on USFS maps as Willow Meadow
Upper Willow Meadow	2010	1	1	2	2	2	Poor	NF	
Wire Corral	2010	3	3	3	3	3	Desired	PFC	

*Rapid Assessment codes: CF=channel function, FC=floodplain connectivity, WT=water table alteration, SB=streambank stability, PC=herbaceous plant community. A score of 3 is best, 1 is worst. Scores for all five attributes are added together for an overall rating.
**PFC=proper functioning condition, FAR= functional-at risk, and NF=nonfunctional

Special Aquatic Features

Proper Functioning Condition was assessed on seventeen sites in the Herring Creek Allotment in 2010 (USDI 2003, Weixelman and Cooper 2009). This included springs, fens, and shorelines. PFC determinations involved assessing impacts to hydrology, vegetation, and soils/erosion. While the overall PFC determination reflects these three attributes, the focus of the following discussion is on

how cattle have affected the hydrologic function of springs, fens, and shorelines. Table 3.11-7 describes the sites surveyed.

Table 3.11-7 Special Aquatic Features, Herring Creek Allotment

Site Location	Site Type	PFC Determination	Comments
Herring Creek Reservoir	Shoreline	Functional – At Risk	Surface flow patterns altered by dam.
Bloomer Lake Shoreline	Shoreline	Proper	Hoof action may alter surface flows in some isolated areas, but overall shoreline is still functioning properly.
Bloomer Lake Fen	Fen (Sloping)	Functional – At Risk	Rills in meadow and in and around fen. It is unknown if these were caused by cattle or other outside factors.
Wire Corral Spring 1	Spring	Proper	
Wire Corral Spring 2	Spring	Proper	Ephemeral snowmelt channels in meadow near spring sources. Minor hoof action in places in and around channels.
Pinecrest Peak Spring	Spring	Proper	
Bluff Meadow Fen	Fen (Mound)	Functional – At Risk	Hoof action has created a small channel toward the lower end of the fen.
Herring Creek NW - 5N74 Spring	Spring	Proper	Spring located in the proposed Cascade addition
Herring Creek NW - 5N74 Fen	Fen	Proper	Fen located in the proposed Cascade addition
Herring Creek NW - 5N11Y Spring Complex	Spring	Proper	Spring complex located in the proposed Cascade addition. Low width to depth channels with vertical sides; some undercutting. Surface water is well covered by canopy – water is cold. Road may be adding more water to the stream channel, but it is fairly stable due to large channel substrate.
Herring Creek NW – Ridge Spring 1	Spring	Proper	
Herring Creek NW – Ridge Spring 2	Spring	Proper	Part of spring site has a mound fen shape, but this location does not have organic soil below about 20 cm.
Willow Meadow	Spring	Proper	Some hoof action at spring. However, not enough to alter flow patterns.
Lower Punch Bowl Fen 1	Fen (Mound)	Functional – At Risk	Hoof action altered flow patterns.
Lower Punch Bowl Fen 2	Fen (Mound)	Functional – At Risk	Hoof action is readily present and has altered flow patterns.
Upper Punch Bowl Fen	Fen (Mound)	Proper	
Bull Run Spring	Spring	Functional – At Risk	Old road/skid provides some sedimentation.

Eleven of the seventeen special aquatic features surveyed were determined to be at proper functioning condition. Although some of these sites had evidence of hoof action, it did not appear to impact the function of the feature.

Six special aquatic features were determined to be functional – at risk. Hoof action altering flow patterns was the primary hydrologic issue at these sites. Trend was not determined for these sites. This is because the original surveys were conducted in 2010 and Dave Weixelman, one of the authors of the PFC fen protocol, recommended waiting at least 3 years and then resurveying the site in order

to accurately determine the trend (Weixelman 2010). Photos were taken at each of the special aquatic features in 2010 and will be used when assessing trend.

Water Quality

Sediment – Observations of pool sediment and fish reproduction on fish bearing streams show that sediment is below the TOC in this Allotment. Pool tail surface fine sediment is below 20% in all stream reaches with pools, and a good distribution of age classes of fish is present on fish bearing streams.

Bacteria and Other Pathogens – Water sampling for fecal coliform and *E. coli* was conducted in the Herring Creek Allotment in 2009 and 2011 by Myers (Myers and Kane 2010, Myers 2011) and in 2010 and 2011 by the USFS/UC Davis (Roche et al. 2013). The Watershed Report includes a discussion on EPA and Basin Plan standards for *E. coli* and fecal coliform, for a description of sample sites in the Herring Creek Allotment, indicator bacteria monitoring results, or for photos and maps of sampling site locations.

Results of the 2010 USFS/UCD sampling in the Herring Creek Allotment indicate that fecal coliform and *E. coli* concentrations in the waters were generally low, even in areas where cattle use is concentrated (i.e. meadows and gathering pastures). However, only 1/3 of typical cattle numbers were on the Allotment during the season and it is assumed that these bacteria concentrations would have been higher had there been full numbers on the Allotment. There were three sites in the Allotment (HC2, HC3, and HC9) where ingestion of water was determined to be “likely” or “possible”. At these sites, the highest fecal coliform concentration was 19 CFU/100ml and the highest *E. coli* concentration was 2 CFU/100ml. Sites HC3 and HC4 are the two locations where water is diverted/pumped to provide water to the community of Strawberry. Both sites had low concentrations of *E. coli* and fecal coliform bacteria. Concentrations at the sites where ingestion of water is “reasonably possible” would have to increase by more than an order of magnitude for standards to be exceeded. It is unlikely that tripling the number of cattle on the Allotment (from the 55 cow/calf pairs on the Allotment in 2010 to full numbers of 156) would increase indicator bacteria concentrations enough that Basin Plan standards and EPA recommendations would be exceeded.

Results of the 2011 USFS/UCD sampling in the Herring Creek Allotment indicate that fecal coliform and *E. coli* concentrations in the waters are generally low when the Allotment is in non-use. However, the two sites around Bloomer Lake (HC14 and HC15) had higher concentrations in 2011 than in 2010, when there were cattle on the Allotment. This may be attributed to recreation use, pack stock, wildlife, or other sources of bacteria.

In 2009 and 2011, Myers and others collected bacteria samples in Upper Fiddlers Green Meadow (Myers and Kane 2010, Myers 2011). In 2009, variable concentrations of fecal coliform were reported. “Low” and “Very low” flow was reported for many sample sites after livestock arrival, so it is likely that the increased flow from Herring Creek, about 1 mile downstream of the sample site, would greatly reduce the concentration of bacteria by dilution. In addition, some variability was seen in the duplicate sampling results at this site. Precision goals identified in the Quality Assurance Project Plan (Myers 2009) were exceeded. An explanation as to why this variability may have occurred was not provided in the document. Samples collected in 2011 represent the “no grazing” condition because no cattle were on the Allotment. These samples had low concentrations of indicator bacteria.

Despite the fact that the Relative Percent Difference (RPD) was higher than desired, the 2009 Myers data still indicates that concentrations of fecal coliform and *E. coli* increased during the grazing season as a result of cattle on the Allotment. The data is also useful because it was the only water quality sampling on the Allotment conducted when there were full numbers of cattle and a full season of use. However, all the samples were collected on small tributaries where ingestion of water is

unlikely. No samples were collected further downstream where ingestion of waters was “reasonably possible”.

Water samples taken in August 2000 in the South Fork Stanislaus River downstream of the Herring Creek Allotment for a hydropower relicensing project showed <.1 organism per liter for both *Giardia* and *Cryptosporidium* (Pacific Gas and Electric Co. 2002).

The Tuolumne Utilities District (TUD) distributes water to the Sonora area. They have seen increased concentrations of *Cryptosporidium* at isolated locations. However, the increase in *Cryptosporidium* is not a result of forest activities, including cattle grazing on the Herring Creek Allotment (Scesa 2012).

In summary, concentrations of bacteria in the Allotment increased as a result of cattle grazing. USFS/UCD sampling was not frequent enough to be considered compliance monitoring. However, when comparing 2010 monitoring results to the REC-1 standard for fecal coliform at the sample sites where ingestion of water was “reasonably possible”, sampling results were below the standard. *E. coli* also remained below the recommended maximum concentration at the primary contact recreation sample sites (max of 8 CFU/100ml in 2010). It is acknowledged that this sampling was conducted with reduced numbers of cattle on the Allotment and during a shortened season of use. However, by looking at the results seen in the adjacent Bell Meadow Allotment, as well as by assessing how far below standards the Herring Creek Allotment “likely” or “possible” ingestion sites were, it can be deduced that standards were likely not exceeded in the Herring Creek Allotment during years with full numbers of livestock. In addition, there is no record of *Cryptosporidium* causing impacts to drinking water supplies as a result of grazing on the Herring Creek Allotment.

Nutrients – There is the potential for increased nutrient introduction as a result of cattle grazing. The USFS/UCD monitored total nitrogen (TN), nitrate-nitrogen (NO_3-N), ammonium-nitrogen (NH_4-N), total phosphorous (TP), and phosphate phosphorous (PO_4-P) in 2010 and 2011. Thirty-one samples were collected in 2010 and 24 samples were collected in 2011. Overall, monitoring indicated low concentrations of nitrogen and phosphorous. The Watershed Report shows a detailed discussion of monitoring results, including percentages of samples below detection limits (dl) and EPA levels of concern.

In 2010, concentrations of NO_3-N were not elevated at any sample sites. Concentrations of phosphorous were elevated at a total of four of sixteen sample sites in 2010. However, all concentrations at the next sample point downstream were well below EPA levels of concern, so elevated concentrations appear to be isolated. Phosphorous concentrations were all within EPA levels of concern for 2011.

Water Temperature – Continuous water temperature data was collected in 2010 with data loggers at ten sites in the Herring Creek Allotment. Data was collected from 8/18-9/15 and thus represent peak summer temperatures. The average daily minimum temperature was 48°F, the average daily maximum temperature was 56°F, and the overall average daily temperature was 51°F. These temperatures support the beneficial use of the stream as a cold water fishery.

Taste and Odor – The Basin Plan states that “Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses” (California EPA 2011). There are no known complaints of taste or odor on fish flesh reported to the Forest Aquatic Biologist (Holdeman 2012). The Tuolumne Utilities District (TUD) has received complaints about the taste and odor (T/O) of the local water supply. They attribute this issue primarily to decomposing organics (leaves, limbs, needles, etc.) in the water and have stated that “current levels of grazing do not have an impact on T/O” (Scesa 2012).

Environmental Consequences

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

Meadow Hydrologic Function

In the Bell Meadow Allotment, changes from current management include breaking the Allotment into three subunits – Round, Crab, and Mud to implement a deferred grazing system. This grazing system should help relieve pressure in the Round subunit by limiting drift back into this unit until the end of the grazing season. This could result in improved recovery in the meadows in the Round subunit. Reductions in grazing pressure are not anticipated in the Crab or Mud subunits, so recovery would be similar to current management (Alternative 3).

In the Herring Creek Allotment, the addition of the Cascade subunit should relieve grazing pressure throughout the Allotment. This additional acreage would increase available forage before the cattle move into the upper portions of the Allotment, delaying their movement to the upper units. This could assist in the recovery of meadow hydrologic function of some of the meadows.

In the Eagle Meadow Allotment, the Niagara addition would increase forage available to cattle, potentially reducing pressures elsewhere. In addition, utilization standards in all units grazed every year would be reduced. This could assist in the recovery of meadow hydrologic function of some of the meadows. There is only minimal forage available in the McCormick Pocket. The addition of this area would likely have no discernible impact on improving the current condition of meadows throughout the Allotment.

Many meadows in the Allotments have been impacted by historic overgrazing, leading to lowered water tables and channels being disconnected from floodplains. PFC cannot be achieved in these meadows without active restoration projects. The reduced grazing pressure anticipated under Alternative 1 may help streambanks stabilize at a faster rate, may promote herbaceous vegetation recovery along the stream channels (but not on the meadow surface since the water table is lowered), and could help move channel form towards rejuvenation (channel stabilizes at a lower elevation). These processes are currently occurring in most meadows, but reduced grazing pressure may speed these recoveries. However, these small improvements in condition may take years to achieve.

Meadow research conducted in the Sierra Nevada has indicated that meadow restoration projects result in raised water table levels and increased volume of subsurface water storage (Hammersmark et al. 2008, Tague et al. 2008). This is because raised channel beds increase water table elevations and facilitate the sponge-like characteristics of meadow ecosystems, storing water that is released slowly, providing for a late-season water supply. Incised channels, on the other hand, typically exhibit lower water table elevations and drain water quickly from meadow ecosystems. Therefore, meadows that are currently hydrologically functional are believed to have high water tables and subsurface water storage as described by Hammersmark et al. and Tague et al. Meadow restoration at sites that are not hydrologically functional should result in improvements in these conditions.

As described in the management requirements, monitoring is needed in meadows not currently at PFC to ensure that conditions do not worsen prior to implementation of restoration projects. Utilization is often not the best indicator for meadow hydrologic function, so monitoring will focus on bank stability, herbaceous vegetation, or deep rooted vegetation. Forest Plan Standards and Guidelines limit streambank disturbance to 20% of stream reach. Meeting these requirements would help prevent/minimize permanent damage to streambanks. The Watershed Report describes how Alternative 1 varies from the existing condition and monitoring recommendations for each meadow.

In summary, under Alternative 1 the meadows in good or desired condition will continue to maintain their status. The meadows in fair condition will either maintain their condition or slightly improve.

The meadows in poor or very poor condition may see minor channel improvements in the long run but will not likely reach desired condition without a substantial investment in active restoration where intervention is technically and economically feasible.

The addition of the Cascade unit to the Herring Creek Allotment would add one large meadow and numerous small stringer meadows to the Allotment. The large meadow, located off of 5N39Y, does not have a stream channel flowing through it, so it is less susceptible to channel incision than meadows with a stream channel. If the Cascade addition is added to the Allotment the meadows would be monitored to ensure that management requirements for meadow hydrologic function are met.

The addition of the Niagara unit to the Eagle Meadow Allotment would add small stringer meadows in the headwaters of Mill Creek to the Allotment. Most of the stream length along Mill Creek is forested and is less susceptible to grazing impacts than meadow areas. If the addition is added to the Allotment, the small acreage of meadows would be monitored to ensure that the conditions are meeting the requirements outlined in the management requirements.

The addition of the McCormick Pocket unit to the Eagle Meadow Allotment would add a small amount of meadow acreage to the Allotment. These meadows are dominated by willows and have little herbaceous vegetation. Because of the overall lack of vegetation in this unit, these meadows are susceptible to over browse and would need to be closely monitored to ensure compliance with management requirements.

Indirect effects of livestock impacts to meadow hydrologic function are related to aquatic habitat in meadows. Aquatic habitat in meadows has been altered to varying degrees as a result of change in meadow hydrologic function initiated in the past. However, fish bearing streams (even in poor condition meadows) presently have adequate populations, and reproduction is occurring at a rate that appears to be maintaining population viability. Current management is not adversely affecting this indicator of habitat suitability. Therefore, management proposed under Alternative 1 is not anticipated to adversely affect this indicator.

Special Aquatic Features

In the Bell Meadow Allotment, changes from current management include breaking the Allotment into three subunits – Round, Crab, and Mud to implement a deferred grazing system. This grazing system should help relieve pressure in the Round subunit by limiting drift back into this unit until the end of the grazing season. Lily Lake Shoreline and Lower Round Meadow Spring were the two special aquatic features assessed in the Round subunit. Both sites were at PFC, so a reduction in grazing pressure is anticipated to help maintain PFC. Reductions in grazing pressure are not anticipated in the Crab or Mud subunits, so special aquatic feature condition would be similar to current management (Alternative 3). All three sites in the Mud subunit were at PFC. In the Crab subunit there are three sites currently at PFC. There are an additional eight sites that are functional – at risk (FAR). One of the eight sites, Bear Lake, was FAR due to the effects of the dam, not cattle grazing, and was already determined to have an upward trend. The other seven sites in the Crab subunit that are functional – at risk do not have an apparent trend. To meet management requirements, these sites will be re-surveyed to determine trend. If the trend is upwards then grazing would continue and the site would be monitored. If the trend is downwards or the site becomes non-functional then grazing would be excluded.

In the Eagle Meadow Allotment, the Niagara addition would increase forage available to cattle, potentially reducing pressures elsewhere. In addition, utilization standards in all units grazed every year would be reduced. This could assist in maintaining PFC at special aquatic features that are currently at PFC and could help move sites which are FAR towards PFC. No trend was determined at the seven special aquatic features in the Allotment that were FAR. To meet management requirements, these sites will be re-surveyed to determine trend. If the trend is upwards then grazing

would continue and the site would be monitored. If the trend is downwards or the site becomes non-functional then grazing would be excluded. There is little forage available in the McCormick Pocket. The addition of this area would likely have no impact on improving the current condition of special aquatic features throughout the Allotment.

One potential fen (not verified due to frozen ground) and three springs were identified in the Niagara addition by the district botanist. These sites have not yet been surveyed following the PFC protocol. If this area is added to the Allotment, then PFC surveys will be conducted prior to cattle being allowed in the area in order to establish a baseline condition from which to monitor future use. One potential fen was identified in McCormick Pocket by the district botanist. If this area is added to the Eagle Meadow Allotment then PFC surveys will be conducted on this or any other springs/fens found.

In the Herring Creek Allotment, the addition of the Cascade subunit should relieve grazing pressure throughout the Allotment. This additional acreage would increase available forage before the cattle move into the upper portions of the Allotment, delaying their movement to the upper units. This could assist in maintaining PFC at special aquatic features that are currently at PFC and could help move sites which are FAR towards PFC. No trend was determined at the six special aquatic features in the Allotment that were FAR. To meet management requirements, these sites will be re-surveyed to determine trend. If the trend is upwards then grazing would continue and the site would be monitored. If the trend is downwards or the site becomes non-functional then grazing would be excluded.

Three special aquatic features were assessed following PFC protocols in the proposed Cascade addition. All three were at PFC. If the Cascade addition is added to the Herring Creek Allotment then these special aquatic features will be monitored to ensure that PFC is maintained. If additional special aquatic features are found in the Allotment they would be monitored as well.

Water Quality

Sediment – A deferred grazing system implemented in the Bell Meadow Allotment is expected to reduce grazing pressure in the Round subunit. The Niagara Creek and Cascade Creek additions to the Eagle Meadow and Herring Creek Allotments should also reduce grazing pressure. As such, sediment deposition and accumulation in meadow streams is expected to be less than under current management. Currently, fine sediment in pool tails is minimal, usually 10% or less on a stream reach basis. All age classes of fish are present in fish bearing streams, indicating reproduction frequency that supports a viable population. This is expected to continue under Alternative 1. Slight increases in stream sediment may occur in the additions, but these increases are not expected to be of the extent to affect beneficial uses of water. This conclusion is made because use in the additions is not expected to be heavier than what is currently seen in the existing Allotment, and beneficial uses with regards to sediment are currently being met.

Bacteria and Other Pathogens – Based on monitoring conducted by the USFS/UCD and Myers (Myers and Kane 2010, Myers 2011), concentrations of indicator bacteria in the Allotments increased as a result of current cattle grazing on the Allotments. However, concentrations were below REC-1 standards at all sites where ingestion of water was “reasonably possible”. In addition, *E. coli* concentrations remained below the recommended maximum concentration at the primary contact recreation sample sites. Reduced grazing pressure in the Allotments under Alternative 1 is expected to result in indicator bacteria concentrations that are less than those seen under current management.

Cattle are one factor in the contribution to water-borne pathogens, as other mammals also introduce these contaminants (Derlet and Carlson 2006, University of California 2000). *Giardia*, particularly, is well established in waters throughout the Sierra Nevada including non-grazed areas such as national parks. Elevated *Cryptosporidium* observed downstream of the Stanislaus National Forest does not appear to be originating on the Forest. Reduced grazing pressure in the Allotments under Alternative 1 should result in decreased levels of pathogens when compared to current management, as cattle should be better spread throughout the Allotments.

It has been a common practice for decades to address the concern about consuming raw water in wildland streams by treating it in the field prior to drinking. Water filter technology is such that bacteria and other pathogens can be effectively filtered out of raw water, and boiling is a safe alternative as are other treatment methods such as chemical tablets (Recreational Equipment Incorporated 2007). Public education about this issue is long-standing and widespread. For example, the Stanislaus National Forest routinely informs the public to filter, boil or use other treatment methods before drinking water (USDA 2003, USDA 2006). This information is also on the forest website and numerous other websites. In addition, the California Central Valley Water Quality Control Board recommends treating raw water before drinking (California EPA Correspondence, project record). Mitigating the concern over drinking raw water by field-treatment has become an effective method of dealing with water-borne contaminants that may affect human health. The risk is essentially eliminated by treatment. The risk of contracting pathogenic disorders while washing with raw water or swimming in streams or lakes is, with prudent care, very low. That is, washing with filtered or boiled water and attempting to avoid ingesting water while swimming.

Nutrients – Overall, concentrations of nitrogen and phosphorous on the Allotments were low. There were some instances of nutrients exceeding the EPA recommended level of concern, but these seemed to be isolated events. All concentrations at the next sample point downstream of the elevated nutrient concentration site were well below EPA levels of concern. Nutrient concentrations are expected to be lower under Alternative 1 than seen under current management, as cattle should be better spread throughout the Allotments.

Water Temperature – Water temperatures in all three Allotments were generally cool and supported the beneficial use of the streams as cold water fisheries. This is expected to continue under Alternative 1 as cattle numbers are not increasing and anticipated reduced grazing pressures should prevent channel widening and reductions in shading.

Taste and Odor – Current levels of grazing does not appear to have an effect on taste and odor of water. Therefore, the beneficial use of the water should be maintained under the reduced grazing pressure under Alternative 1.

Indirect water quality effects related to sedimentation on aquatic habitat are the same as described under meadow hydrologic function.

The potential for introduction of bacteria or other pathogens by cattle would continue under Alternative 1. This could affect waters downstream of the concentrated grazing areas and could last longer than the term of the permit. These contaminants are not expected to pose a risk to human health since normal treatment of wildland waters can effectively mitigate the hazard.

No indirect effects of nutrient loading by cattle are expected. That would include elevated levels of undesirable plant growths downstream that, in addition to presence, may last longer than the term of the permit. Since increased nutrient concentrations occurred only at isolated locations under current management, off-site or later effects are not expected under Alternative 1.

CUMULATIVE EFFECTS

Meadow Hydrologic Function

Ground disturbance from grazing that may affect meadow hydrologic function occupies an extremely small portion of all of the 6th level HUCs in this analysis. It occurs primarily at areas of cattle concentration; that is, meadows with streams. Cattle forage in other capable/suitable areas, but the ground disturbance is generally dispersed and not hydrologically connected to streams. Cattle rarely concentrate along streambanks outside of meadows because of higher stream and slope gradients, difficult footing and limited forage.

Meadows with streams occupy less than 1% of the stream length in the assessed Allotments. While ground disturbance from cattle grazing in meadows is usually present to some degree (i.e., watering access, streamside trailing, stream crossings) it is essentially a site rather than watershed scale issue. Field surveys have not suggested the need of upgrading the risk of cumulative watershed effects in the affected watersheds, as meadow condition is generally stable or improving (with some noted exceptions). Cumulative downstream effects of stream sedimentation are negligible and largely undetectable. Any effect would be masked by other weather-related erosion events or management activities in the watershed. Minimization/mitigation of site specific effects, such as an effect at a specific meadow, would be implemented on a site specific basis following the Adaptive Management Strategy.

Even though physical disturbance by cattle is extremely low at the watershed scale, the Equivalent Roaded Acre (ERA) methodology used to evaluate cumulative watershed effects (CWE) on vegetation management projects was completed to verify this. Appendix B of the Watershed Report describes the Cumulative Watershed Effects analysis, methodology, and results. The individual watershed ERA spreadsheets describe activities in each watershed, including, but not limited to, timber harvest, meadow restoration, prescribed fire, grazing in nearby Allotments, and recreation.

Results of the ERA analysis confirmed that effects of cattle grazing at the watershed scale were low. ERA values for Alternative 1 ranged from a low of 0.02% in the Mill Creek – Middle Fork Stanislaus River watershed to a high of 0.47% in the Eagle Creek watershed. When the proposed action was combined with other current and future activities, previous activities, and constant features, the total ERA for the Eagle Creek watershed in 2013 was only 1.22%, compared to a TOC of 12-14%. The highest total ERA in the analysis watersheds in 2013 was in the Upper South Fork Stanislaus River watershed, with a value of 2.39%. This was also well below the 12-14% TOC. Overall, the cumulative amount of intensive land use in these watersheds, including grazing, is negligible to minimal.

In summary of consequences of Alternative 1, although numerous meadows in the assessed Allotments are not at desired condition, the effects of the proposed action on meadow hydrologic function remains minimal. Historic grazing practices have deteriorated the conditions of many meadows to the point that complete exclusion of cattle would not result in an improvement of condition (Alternative 2, Meadow Hydrologic Function Direct Effects). Surveys indicate that most meadows are recovering from these more intense practices. This would continue under Alternative 1. Meadows in fair, poor, or very poor condition may reach desired condition with intervention where restoration is technically and economically feasible. These meadows would not likely reach desired condition without restoration.

Special Aquatic Features

Cumulative effects of grazing on special aquatic features are similar to that described for meadow hydrologic function. Springs and fens make up such a small amount of the analysis watershed acreage that ground disturbance is essentially a site rather than a watershed scale issue. Trend has not been determined at most of the functional-at-risk special aquatic features. Once trend is determined, mitigations described in the Resource Conservation Measures for special aquatic features will be employed where needed to minimize effects.

Water Quality

Sediment – Cumulative effects of sedimentation from grazing have been described under meadow hydrologic function.

Bacteria and Other Pathogens – Although cattle have been documented to contribute to fecal coliform, *Giardia*, etc., in streams, some other mammals are also contributors (Derlet and Carlson 2006). Derlet and Carlson documented that while cattle contributed *E. coli* at all 15 sites sampled,

pack stock contributed the same approximate amount of *E. coli* to streams as cattle at 12 of 15 sample sites. Other mammals known to contribute pathogenic materials to wildland waters include squirrels, coyotes, deer, skunks and humans (Atwill et al. 2002). Water quality monitoring in the Bell Meadow, Eagle Meadow, and Herring Creek Allotments indicated that although cattle caused an increase in fecal coliform and *E. coli* concentrations, these concentrations were low in waters where ingestion of water was "reasonably possible".

Pathogens can move off-site, or downstream, and persist in the water environment. However, there are limits on accumulative effects of cattle waste products. Tate et al. (2006) found that about 95% of *E. coli* loads were retained within 0.1 meter of manure deposition sites in grassland settings. Water samples taken in August 2000 in the South Fork Stanislaus River downstream of the Herring Creek Allotment for a hydropower relicensing project showed <.1 organism per liter for both *Giardia* and *Cryptosporidium* (Pacific Gas and Electric Co. 2002). On-site attenuation of pathogens prior to reaching water plus annual snowmelt flushing and other factors such as very cold temperatures have the ability to moderate the amount of pathogens.

Under Alternative 1, although cattle in the Allotments assessed are likely to continue to be part of the cumulative effect of pathogen introduction to waters in and downstream of the Allotments analyzed, there is expected to be a very low cumulative risk to human health due to attenuation factors and normal preventive care regarding use of wildland water.

Nutrients – No cumulative effects are anticipated under Alternative 1, as nutrient concentrations were generally low throughout the watersheds under current management.

Water Temperature – No cumulative effects are anticipated under Alternative 1, as water temperatures were generally low throughout the watersheds under current management and no future activities in the watersheds (such as timber harvest) are anticipated to cause measureable increases in temperature.

Taste and Odor - No cumulative effects are anticipated under Alternative 1, as cattle did not appear to affect taste and odor for downstream water users under current management.

In summary, beneficial uses of water under Alternative 1 are expected to be maintained. The desired condition for water quality in the Forest Plan Direction (USDA 2010) would also be maintained.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

Meadow Hydrologic Function

Many meadows in the Allotments have been impacted by historic overgrazing, leading to lowered water tables and channels being disconnected from floodplains. PFC cannot be achieved in these meadows without active restoration projects. The no grazing alternative may help streambanks stabilize at a faster rate, may promote herbaceous vegetation recovery along the stream channels (but not on the meadow surface since the water table is lowered), and could help move channel form towards rejuvenation (channel stabilizes at a lower elevation). These processes are currently occurring in most meadows, but excluding all grazing may speed these recoveries. However, these small improvements in condition may take years to achieve.

The Watershed Report describes how meadow hydrologic function under Alternative 2 varies from the existing condition.

Aquatic habitat in meadows that have been altered by past degradation should improve gradually as natural recovery progresses.

Special Aquatic Features

In the Bell Meadow Allotment, eight special aquatic features were determined to be functional – at risk (FAR). One of these sites, Bear Lake, was FAR because of the effects of the dam. This site would not be affected by this alternative – it would continue to move in an upward trend as the dam collapses and natural flow patterns are restored. Trend has not yet been determined at the other seven FAR sites. However, all of these sites have flow patterns that have been altered by hoof action. It is likely that removal of cattle from the Allotment would result in an upward trend. Sites already at PFC would likely maintain that condition.

In the Herring Creek Allotment, six special aquatic features were determined to be FAR. One of these sites, Herring Creek Reservoir shoreline, was FAR because of the effects of the dam (altered surface flow patterns). This site would not be affected by this alternative. It will have an upward trend only if the dam is removed and the area is restored, in which case there will no longer be a shoreline to assess. Trend has not yet been determined at the other five FAR sites. It is unknown if the rills seen in Bloomer Lake Fen can be attributed to cattle activity. Therefore, it is also unknown the extent to which removal of cattle would benefit the site. The other four sites have flow patterns that have been altered by hoof action. It is likely that removal of cattle from the Allotment would result in an upward trend at these locations. Sites already at PFC would likely maintain that condition.

In the Eagle Meadow Allotment, seven special aquatic features were determined to be functional – at risk (FAR). Two fens in Eagle Meadow were identified as having depressions that may have been caused by cattle. An additional fen in Barn Meadow has a small channel that is likely natural and it is unknown if and to what extent cattle trailing is affecting this channel. Because the extent of cattle influence is not yet known at these sites, it is unknown the extent to which the removal of cattle would benefit these sites. The other four special aquatic features which are FAR have flow patterns that have been altered by hoof action. It is likely that removal of cattle from the Allotment would result in an upward trend at these locations. Sites already at PFC would likely maintain that condition.

Water Quality

Sediment – There would be no sedimentation from streambank disturbance by cattle once previously disturbed locations have healed over with vegetative cover. The period of recovery to suitable cover is variable depending on site specific current conditions within each meadow.

Bacteria and Other Pathogens – The contribution of bacteria and pathogens from cattle would cease. Some level of these contaminants would remain in the streams from other sources such as horses and other native mammals (Derlet and Carlson 2006, Atwill et al. 2002).

Nutrients – The contribution of cattle to nutrient loading would cease. Only a minimal change from present condition is expected as there have been only isolated areas with increased nutrient concentrations as a result of current management.

Water Temperature – No change from present condition is expected as cattle do not appear to have caused increases in water temperature under current management.

Taste and Odor – No change from present condition is expected as cattle do not appear to have caused taste and odor issues under current management.

CUMULATIVE EFFECTS

No adverse cumulative effects would occur since there would be no grazing.

Alternative 3 (Current Management)

DIRECT AND INDIRECT EFFECTS

Meadow Hydrologic Function

Table 3.11-2 describes the hydrologic function of meadows under current management.

Meadows in Good or Desired Condition – The meadows rated as good or at desired condition appear to be maintaining their condition under current management. That is, floodplain connectivity is functioning properly and channel form is at or near potential for the stream type. The water table remains in close enough proximity to the meadow surface over nearly all of the meadow to support a widespread herbaceous plant community of stable, deep rooted plants. Streambank stability is high. No degradation of meadow hydrologic function is expected under current management.

Meadows in Fair Condition – The meadows rated as fair are either maintaining their condition or are slightly improving under current management. They have floodplain connectivity in most of the meadow and the channel form is approaching potential. The water table remains high enough to support a suitable plant community in most of the meadow. Streambank stability ranges from good to high. These meadows are functioning hydrologically as they should but are not yet at suitable conditions through all or nearly all of the meadow. Current management is not causing adverse effects as long as management practices are followed. Many of these sites would require restoration to move to good or desired condition.

Meadows in Poor or Very Poor Condition – The meadows rated as poor or very poor are disconnected from their meadow surface floodplain and the channel morphology is altered from potential (i.e., largely gullied compared to a relatively small, narrow surface stream). The water table has lowered and the herbaceous plant community has been altered from deep-rooted plants to a mix of deep and shallower rooted ones, or dominated by the latter. Streambank stability is usually poor. However, the existing condition of the plants can usually withstand the present limited grazing and current management does not appear to be further degrading meadow hydrologic function, and stream channel condition will likely improve in the long term. There are two exceptions to this, one of which is at Hammill Canyon #1. There is some natural recovery potential at Hammill Canyon #1, particularly the establishment of vegetation along the point bars which would also improve bank stability. However, photo monitoring shows no indication of improvement under current management. The other exception is at Upper Willow Meadow, where photos taken in 2006 indicated no improvement in condition between 2006 and 2010.

In summary, under current management the meadows in good or desired condition are maintaining their status. The meadows in fair condition will continue to maintain their condition or move toward desired condition unless some unforeseen disturbances or management problems occur. With two notable exceptions, the meadows in poor or very poor condition will see channel improvements in the long run but will not likely reach desired condition without a substantial investment in active restoration where intervention is technically and economically feasible. Forest Plan Standards and Guidelines limit streambank disturbance to 20% of stream reach. Meeting these requirements would help prevent/minimize permanent damage to streambanks and help maintain conditions in meadows that are at PFC and prevent conditions from worsening in meadows not at PFC.

Indirect effects of livestock impacts to meadow hydrologic function are related to aquatic habitat in meadows. Aquatic habitat in meadows has been altered to varying degrees as a result of change in meadow hydrologic function initiated in the past. However, fish bearing streams (even in poor condition meadows) presently have adequate populations, and reproduction is occurring at a rate that appears to be maintaining population viability. Current management is not adversely affecting this indicator of habitat suitability.

Special Aquatic Features

In the Bell Meadow Allotment, current management has resulted in eight special aquatic features which are at PFC and eight special aquatic features which are functional – at risk (FAR). Seven of the eight sites which are FAR are in this condition due to the effects of current grazing practices (the exception is Bear Lake which is affected by the dam). Trend has not been determined at these sites. To meet Forest Plan Direction requirements, these sites would be re-surveyed to determine trend. If the trend is upwards then grazing would continue and the site would be monitored to ensure that the site is moving towards PFC. If the trend is downwards or the site becomes non-functional then grazing would need to be excluded or otherwise modified so that the site moves towards PFC. Fence was installed around the two fen complexes at Crab Meadow as part of the Gooseberry EA. Sites that are currently at PFC would likely maintain this condition under current management.

In the Eagle Meadow Allotment, current management has resulted in six special aquatic features which are at PFC and seven special aquatic features which are FAR. Trend has not been determined at the sites which are FAR. To meet Forest Plan Direction requirements, these sites would be re-surveyed to determine trend. If the trend is upwards then grazing would continue and the site would be monitored to ensure that the site is moving towards PFC. If the trend is downwards or the site becomes non-functional then grazing would need to be excluded or otherwise modified so that the site moves towards PFC. Sites that are currently at PFC would likely maintain this condition under current management.

In the Herring Creek Allotment, current management has resulted in eleven special aquatic features which are at PFC and six special aquatic features which are FAR. Four of the six sites which are FAR are in this condition due to the effects of current grazing practices (the exceptions are at Herring Creek Reservoir shoreline which is affected by the dam and Bloomer Lake Fen where the cause of rilling was uncertain). Trend has not been determined at these sites. To meet Forest Plan Direction requirements, these sites would be re-surveyed to determine trend. If the trend is upwards then grazing would continue and the site would be monitored to ensure that the site is moving towards PFC. If the trend is downwards or the site becomes non-functional then grazing would need to be excluded or otherwise modified so that the site moves towards PFC. Sites that are currently at PFC would likely maintain this condition under current management.

Water Quality

Sediment – Sediment deposition and accumulation in meadow streams is expected to remain low under current management as evidenced by suitable existing condition. Fine sediment in pool tails is minimal, usually 10% or less on a stream reach basis. All age classes of fish are present in fish bearing streams, indicating reproduction frequency that supports a viable population.

Bacteria and Other Pathogens – Based on monitoring conducted by the USFS/UCD and Myers (Myers and Kane 2010, Myers 2011), concentrations of indicator bacteria in the Allotments increased as a result of current management. However, concentrations were below REC-1 standards at all sites where ingestion of water was “reasonably possible”. In addition, *E. coli* concentrations remained below the recommended maximum concentration at the primary contact recreation sample sites.

Cattle are one factor in the contribution to water-borne pathogens, as other mammals also introduce these contaminants (Derlet and Carlson 2006, University of California 2000). *Giardia*, particularly, is well established in waters throughout the Sierra Nevada including non-grazed areas such as national parks. According to the District Engineer at the Tuolumne Utilities District, the local water supply is not being infected with *Cryptosporidium* originating on the Stanislaus National Forest (Scesa 2012).

It has been a common practice for decades to address the concern about consuming raw water in wildland streams by treating it in the field prior to drinking. Water filter technology is such that bacteria and other pathogens can be effectively filtered out of raw water, and boiling is a safe

alternative as are other treatment methods such as chemical tablets (Recreation Eqiupment Incorporated 2007). Public education about this issue is long-standing and widespread. For example, the Stanislaus National Forest routinely informs the public to filter, boil or use other treatment methods before drinking water (USDA 2003, USDA 2006). This information is also on the forest website and numerous other websites. In addition, the California Central Valley Water Quality Control Board recommends treating raw water before drinking (California EPA Correspondence, project record). Mitigating the concern over drinking raw water by field-treatment has become an effective method of dealing with water-borne contaminants that may affect human health. The risk is essentially eliminated by treatment. The risk of contracting pathogenic disorders while washing with raw water or swimming in streams or lakes is, with prudent care, very low. That is, washing with filtered or boiled water and attempting to avoid ingesting water while swimming.

Nutrients – Overall, concentrations of nitrogen and phosphorous on the Allotments were low. There were some instances of nutrients exceeding the EPA recommended level of concern, but these seemed to be isolated events. All concentrations at the next sample point downstream of the elevated nutrient concentration site were well below EPA levels of concern.

Water Temperature – Water temperatures in all three Allotments were generally cool and supported the beneficial use of the streams as cold water fisheries. This is expected to continue under Alternative 3.

Taste and Odor – Current levels of grazing does not appear to have an effect on taste and odor of water. Therefore, continuation of current management is not anticipated to create a taste and odor issue.

Indirect water quality effects related to sedimentation on aquatic habitat are the same as described under meadow hydrologic function.

The potential for introduction of bacteria or other pathogens by cattle would continue under current management. This could affect waters downstream of the concentrated grazing areas and could last longer than the term of the permit. These contaminants are not expected to pose a risk to human health since normal treatment of wildland waters can effectively mitigate the hazard.

No indirect effects of nutrient loading by cattle are expected. That would include elevated levels of undesirable plant growths downstream that, in addition to presence, may last longer than the term of the permit. Since increased nutrient concentrations occurred only at isolated locations, off-site or later effects are not expected under current management.

CUMULATIVE EFFECTS

Meadow Hydrologic Function

Cumulative effects of grazing on meadow hydrologic function are similar to those described under Alternative 1.

Results of the ERA analysis confirmed that effects of cattle grazing at the watershed scale were low. ERA values for Alternative 3 ranged from a low of 0.00% in the Mill Creek – Middle Fork Stanislaus River watershed (no activities in this watershed because there would be no Cascade addition) to a high of 0.45% in the Eagle Creek watershed. When the proposed action was combined with other current and future activities, previous activities, and constant features, the total ERA for the Eagle Creek watershed in 2013 was only 1.20%, compared to a TOC of 12-14%. The highest total ERA in the analysis watersheds in 2013 was in the Upper South Fork Stanislaus River watershed, with a value of 2.38%. This was also well below the 12-14% TOC. Overall, the cumulative amount of intensive land use in these watersheds, including grazing, is negligible to minimal.

In summary of consequences of current management, although numerous meadows in the assessed Allotments are not at desired condition, the effects of current management on meadow hydrologic

function remains minimal. Historic grazing practices have deteriorated the conditions of many meadows to the point that complete exclusion of cattle would not result in an improvement of condition (Alternative 2, Meadow Hydrologic Function Direct Effects). Surveys indicate that most meadows are recovering from these more intense practices. This would continue under Alternative 3. Meadows in fair, poor, or very poor condition may reach desired condition with intervention where restoration is technically and economically feasible. These meadows would not likely reach desired condition without restoration.

Special Aquatic Features

Cumulative effects of grazing on special aquatic features under current management are similar to that described under Alternative 1. Springs and fens make up such a small amount of the analysis watershed areas that ground disturbance is essentially a site rather than a watershed scale issue. Trend has not been determined at most of the functional-at-risk special aquatic features. Once trend is determined, mitigations described in the Resource Conservation Measures for special aquatic features will be employed where needed to minimize effects and meet Forest Plan Direction requirements.

Water Quality

Cumulative effects of current management on sediment, nutrients, bacteria and pathogens, water temperature, and taste and odor are similar to that described under Alternative 1.

Beneficial uses of water under Alternative 3 are expected to be maintained. The desired condition for water quality in the Forest Plan Direction (USDA 2010) would also be maintained.

Alternative 4 (Resource Protection)

DIRECT AND INDIRECT EFFECTS

Meadow Hydrologic Function

In the Bell Meadow Allotment, the hydrologic function of meadows under Alternative 4 would be similar to that seen under Alternative 1. The primary difference between these alternatives is that livestock numbers would be reduced by 20% under Alternative 4.

In the Eagle Meadow Allotment, the hydrologic function of meadows under Alternative 4 would be similar to that seen under Alternative 1. The primary difference between these alternatives is that livestock numbers would be reduced by 20% under Alternative 4 to account for not adding McCormick Pocket and the Niagara addition to the Allotment. In addition, three meadows would have exclusions.

In the Herring Creek Allotment, numerous meadows would be excluded from grazing. The Cascade addition would not be added to the Allotment. To account for this reduced forage, livestock numbers would be reduced by 50%. The hydrologic function of grazed meadows would be similar to that seen under Alternative 1. The hydrologic function of excluded meadows would be similar to that seen under Alternative 2.

The Watershed Report describes how Alternative 4 varies from the existing condition and monitoring recommendations for each meadow.

In summary, under Alternative 4 the meadows in good or desired condition will continue to maintain their status. The meadows in fair condition will either maintain their condition or slightly improve. The meadows in poor or very poor condition may see minor channel improvements in the long run but will not likely reach desired condition without a substantial investment in active restoration where intervention is technically and economically feasible. Forest Plan Standards and Guidelines limit streambank disturbance to 20% of stream reach. Meeting these requirements would help prevent/minimize permanent damage to streambanks and help maintain conditions in meadows that are at PFC and prevent conditions from worsening in meadows not at PFC.

Indirect effects of livestock impacts to meadow hydrologic function are related to aquatic habitat in meadows. Aquatic habitat in meadows has been altered to varying degrees as a result of change in meadow hydrologic function initiated in the past. However, fish bearing streams (even in poor condition meadows) presently have adequate populations, and reproduction is occurring at a rate that appears to be maintaining population viability. Current management is not adversely affecting this indicator of habitat suitability. Therefore, management proposed under Alternative 4 is not anticipated to adversely affect this indicator.

SPECIAL AQUATIC FEATURES

In the Bell Meadow Allotment, five special aquatic features which are most at risk to grazing impacts would be excluded from grazing. This includes Gianelli #3, Crab Meadow Fen Complex #1, Crab Meadow Fen Complex #2, and two springs west of Crab meadow. In addition, livestock numbers on the Allotment would be reduced by 20%. This may help Gianelli #1 and Crab Meadow Seep, both FAR, move towards PFC. To meet management requirements, these sites will be re-surveyed to determine trend. If the trend is upwards then grazing would continue and the sites would be monitored. If the trend is downwards or the sites become non-functional then grazing would be excluded. Bear Lake shoreline is already moving towards PFC as the dam collapses. The reduction in grazing pressure as a result of decreasing numbers on the Allotment is anticipated to help maintain PFC at sites which are currently already at PFC.

In the Eagle Meadow Allotment, none of the thirteen special aquatic features surveyed would be excluded from grazing. The condition of these special aquatic features would be similar to that described under Alternative 1. The primary difference between these alternatives is that livestock numbers would be reduced by 20% under Alternative 4 to account for not adding McCormick Pocket and the Niagara addition to the Allotment. As described under Alternative 1, no trend was determined at the seven special aquatic features in the Allotment that were FAR. To meet management requirements, these sites will be re-surveyed to determine trend. If the trend is upwards then grazing would continue and the site would be monitored. If the trend is downwards or the site becomes non-functional then grazing would be excluded.

In the Herring Creek Allotment, ten of seventeen surveyed special aquatic features would be excluded from grazing. This includes Bloomer Lake shoreline and fen, both springs at Wire Corral, Bluff Meadow fen, Willow Meadow spring, and Bull Run spring. It also includes two springs and one fen in the Cascade addition, which would not be added to the Allotment under Alternative 4. Of the seven special aquatic features which would not be excluded from grazing under Alternative 4, four are currently at PFC. This condition would likely be maintained because livestock numbers would be reduced by 50% to account for reduced forage due to not adding the Cascade addition and excluding a large portion of the upper Allotment. Three sites which are FAR would not be excluded from grazing. Herring Creek Reservoir has surface flow patterns which are altered by the dam. Cattle are not currently affecting this site, nor are they anticipated to affect the site under Alternative 4. The two fens in Lower Punch Bowl have evidence of hoof action which has altered flow patterns. Reduced numbers in the Allotment could help move these sites from FAR towards PFC. No trend has yet been determined at these sites. However, to meet management requirements, these sites will be re-surveyed to determine trend. If the trend is upwards then grazing would continue and the site would be monitored. If the trend is downwards or the site becomes non-functional then grazing would be excluded.

Water Quality

The direct and indirect effects of this alternative on water quality are similar to that described under Alternative 1. Both Alternative 4 and Alternative 1 would result in reduced grazing pressures and resultant improvements in water quality over the current condition. However, there is one primary difference between the two alternatives. Less acreage is available for grazing under Alternative 4. As

such, these ungrazed areas would likely have lower concentrations of sediment, bacteria and pathogens, and nutrients than if they were grazed.

CUMULATIVE EFFECTS

Meadow Hydrologic Function

Cumulative effects of grazing on meadow hydrologic function are similar to those described under Alternative 1.

Results of the ERA analysis confirmed that effects of cattle grazing at the watershed scale were low. ERA values for Alternative 4 ranged from a low of 0.00% in the Mill Creek – Middle Fork Stanislaus River watershed (no activities in this watershed because there would be no Cascade addition) to a high of 0.44% in the Eagle Creek watershed. When the proposed action was combined with other current and future activities, previous activities, and constant features, the total ERA for the Eagle Creek watershed in 2013 was only 1.19%, compared to a TOC of 12-14%. The highest total ERA in the analysis watersheds in 2013 was in the Upper South Fork Stanislaus River watershed, with a value of 2.15%. This was also well below the 12-14% TOC. Overall, the cumulative amount of intensive land use in these watersheds, including grazing, is negligible to minimal.

In summary of consequences of Alternative 4, although numerous meadows in the assessed Allotments are not at desired condition, the effects of current management on meadow hydrologic function remain minimal. Historic grazing practices have deteriorated the conditions of many meadows to the point that complete exclusion of cattle would not result in an improvement of condition. Surveys indicate that most meadows are recovering from these more intense practices. This would continue under Alternative 4. Meadows in fair, poor, or very poor condition may reach desired condition with intervention where restoration is technically and economically feasible. These meadows would not likely reach desired condition without restoration.

Special Aquatic Features

Cumulative effects of grazing on special aquatic features under Alternative 4 are similar to that described under Alternative 1. Springs and fens make up such a small amount of the analysis watershed areas that ground disturbance is essentially a site rather than a watershed scale issue. Trend has not been determined at most of the functional-at-risk special aquatic features. Once trend is determined, mitigations in the adaptive management strategy will be employed to minimize effects.

Water Quality

Cumulative effects of Alternative 4 on sediment, nutrients, bacteria and pathogens, water temperature, and taste and odor are similar to that described under Alternative 1.

Beneficial uses of water under Alternative 4 are expected to be maintained. The desired condition for water quality in the Forest Plan Direction (USDA 2010) would also be maintained.

Summary of Effects Analysis across All Alternatives

Under Alternatives 1, the meadows in good or desired condition will continue to maintain their status. The meadows in fair condition will either maintain their condition or slightly improve. The meadows in poor or very poor condition may see minor channel improvements in the long run but will not likely reach desired condition without a substantial investment in active restoration where intervention is technically and economically feasible.

Under Alternative 2, the exclusion of grazing may help streambanks stabilize at a faster rate, may promote herbaceous vegetation recovery along the stream channels, and could help the channel move towards rejuvenation. However, these improvements may take years to achieve and active restoration projects would be required in many meadows to achieve PFC.

Under Alternative 3, the meadows in good or desired condition will maintain their status. The meadows in fair condition will continue to maintain their condition or move toward desired condition unless some unforeseen disturbances or management problems occur. With two notable exceptions (Hammill Canyon Meadow #1 and Upper Willow Meadow), the meadows in poor or very poor condition will see channel improvements in the long run but will not likely reach desired condition without a substantial investment in active restoration where intervention is technically and economically feasible.

Under Alternative 4, the meadows excluded from grazing would achieve the same conditions described under Alternative 2. The meadows not excluded from grazing would achieve conditions similar to those described under Alternative 1.

SPECIAL AQUATIC FEATURES

Under Alternative 1, addition areas should relieve grazing pressure in Eagle Meadow and Herring Creek Allotments, which could assist in maintaining PFC at special aquatic features that are currently at PFC and could help move sites which are FAR towards PFC. In Bell Meadow, improvements may be seen in the Round subunit but no change is anticipated in the other units.

Under Alternative 2, no grazing-related impacts to special aquatic features would occur. FAR special aquatic features would likely result in an upward trend. Sites already at PFC would likely maintain that condition.

Under Alternative 3, sites that are currently at PFC would likely maintain this condition. With few exceptions, sites which are FAR are in this condition due to the effects of current grazing practices. Existing trends (to be determined) would likely continue.

Under Alternative 4, the reduction in grazing pressure as a result of decreasing numbers is anticipated to help maintain PFC at sites which are currently at PFC and could help move FAR sites towards PFC.

Under Alternatives 1 and 4, resource conservation measures and Standards and Guidelines would exclude or otherwise modify sites with a downward trend or that become non-functional. Under Alternative 3, sites that are not meeting desired conditions may still be excluded or modified if it is determined that the trend is downward or the site becomes non-functional.

WATER QUALITY

Under Alternative 1, sediment deposition and accumulation in meadow streams, indicator bacteria and pathogen concentrations, and nutrient concentrations are expected to be less than under current management. No change in water temperature or taste and odor are anticipated.

Under Alternative 2, no livestock caused impacts to water quality would occur. Water quality may still be impacted by other activities in the project area.

Under Alternative 3, sediment deposition and accumulation in meadow streams is expected to remain low. Indicator bacteria and pathogen concentrations should remain below the recommended maximum concentration. Nutrient concentrations are expected to remain below EPA levels of concern. No change in water temperature or taste and odor are anticipated.

Under Alternative 4, sediment deposition and accumulation in meadow streams, indicator bacteria and pathogen concentrations, and nutrient concentrations are expected to be less than under current management. Ungrazed (excluded) areas would likely have lower concentrations of sediment, bacteria and pathogens, and nutrients. No change in water temperature or taste and odor are anticipated.

Compliance with the Forest Plan and Other Direction

FOREST PLAN DIRECTION STANDARDS AND GUIDELINES

The following Standards and Guidelines associated with Riparian Conservation Objectives are applicable related to protection of water quality:

- Water temperature. The action alternatives will not adversely affect water temperature.
- Stream channel condition. Resource conservation measures, monitoring, and/or site-specific restoration actions are described for meadow streams that are not at PFC.
- Streambank disturbance. BMP monitoring will continue to be conducted under any action alternative to ensure that the 20% streambank disturbance standard is not exceeded. If exceedances occur, corrective actions will be taken.
- Riparian vegetation. Riparian vegetation condition was assessed using the meadow hydrologic function protocol. Resource conservation measures, monitoring, and/or site-specific restoration actions are described for each meadow.
- Meadow hydrologic function. The hydrologic function f meadows were assessed for this project. Recommendations to move sites towards PFC were made.
- Fen protection. During project analysis, fens were surveyed and mapped and protective measures were developed. For sites where fens were FAR and trend was not yet determined, resource conservation measures were developed that will be applied as needed once trend is known.
- Livestock gathering facilities. Livestock gathering facilities were analyzed to determine if sites could be relocated outside of meadows and riparian areas.
- Herbaceous forage utilization. BMP monitoring will continue to be conducted under any action alternative to ensure that utilization standards are not exceeded. If exceedances occur, corrective actions will be taken.
- Woody riparian vegetation utilization. BMP monitoring will continue to be conducted under any action alternative to ensure that woody riparian utilization standards are not exceeded. If exceedances occur, corrective actions will be taken.

BENEFICIAL USES OF WATER

All alternatives are expected to result in maintenance of the applicable beneficial uses of water in the Water Quality Control Plan (Basin Plan) for the California Central Valley Water Quality Control Board (California EPA 2011). Bacteria, biostimulatory substances, sediment, taste and odor, and water temperature are not expected to be adversely altered. Domestic and municipal water supplies are not adversely affected by the proposed action or alternatives. Recreational contact and non-contact waters are suitable for human use. Cold freshwater habitat and wildlife habitat are not adversely affected by the proposed action or alternatives.

WATER QUALITY BEST MANAGEMENT PRACTICES (BMPS)

Alternatives 1, 3 and 4 comply with the intent and procedural requirements of BMPs (USDA 2011b, USDA 2012b). If any of those alternatives is implemented, or a combination thereof, applicable BMPs would be followed. BMPs applicable to livestock grazing would not be implemented under Alternative 2 (No Action), as grazing would not occur under this alternative.

3.12 WILDERNESS

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

The Wilderness Act (Public Law 88-577) defines the concept of wilderness and the unique values that wilderness areas should preserve. The Act states that designated wilderness shall be administered "...for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness and so as to provide for the protection of those areas, [and] the preservation of their wilderness character..." (Sec. 2(a)). The Act further requires that, "except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for other purposes for which it may have been established so as to preserve its wilderness character" (Sec. 4(b)).

Forest Plan Direction (USDA 2010) directs forest staff to "manage livestock grazing to preserve the characteristics and values of wilderness". The Forest Plan Direction further requires that range managers "strongly discourage the use of cowbells on commercial grazing Allotments. [And] explore methods for reducing or eliminating the use of cowbells in cooperation with the permittees during development of annual operating plans." Forest Plan Direction also sets range management objectives by Opportunity Class within the Emigrant Wilderness. The popular destination lakes within the Emigrant are in Opportunity Class IV areas which have the following objectives:

- Ecosystems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces. Localized human uses may have limited effects in few areas.
- Human influences on aquatic life hydrologic processes, soils (and) vegetation are minimal.
- The opportunity for solitude is low to outstanding.
- The imprint of human influences is substantially unnoticeable.

Effects Analysis Methodology

Assumptions Specific to Wilderness

Section 4(d)(4)(2) of the Wilderness Act states: "the grazing of livestock, where established prior to September 3, 1964, shall be permitted to continue subject to such reasonable regulations as are deemed necessary by the Secretary of Agriculture."

For the purposes of this analysis, it is assumed that the presence of cattle will degrade the natural quality of wilderness character to an extent proportional to the number of cows present and acres grazed.

Data Sources

1. Forest Plan
2. Wilderness Act (Public Law 88-577)
3. GIS
4. Forest Service Manual 2300 Recreation (USDA 2008)

Wilderness Indicators

The four qualities that represent wilderness character are untrammeled, undeveloped, natural and, outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Wilderness Methodology by Action

For the purpose of this analysis the qualities listed above serve as the four analysis elements for evaluating the effects to wilderness.

Affected Environment

Four range Allotments cover 31,930 acres (28%) of the 112,911 acre Emigrant Wilderness, including 8,976 acres of primary and secondary range. The alternatives under consideration in this EIS include 2,318 acres of the Bell Meadow Allotment and 1,453 acres of the Herring Creek Allotment within the Emigrant Wilderness.

Livestock grazing in the wilderness portions of the Bell Meadow and Herring Creek Allotments was established prior to wilderness designation. The popularity of wilderness recreation destinations within these Allotments developed in the context of existing grazing use.

Most of the wilderness recreation use in both of the Allotments occurs from early July through early September. Recreation use does occur outside of the peak times, but visitation is considerably lower due to weather, access, school schedules, and the start of deer season.

BELL MEADOW ALLOTMENT

The eastern portion of the Bell Meadow Allotment includes a portion of the western Emigrant Wilderness. Three Wilderness trailheads are located within this Allotment; Crabtree, Gianelli and Bell Meadow. Crabtree Trailhead is the largest, most highly developed and most heavily used of all wilderness trailheads on the Stanislaus National Forest. Gianelli is the fourth most heavily used trailhead. The Aspen Meadow Pack Station, under an Outfitter and Guide Special Use Permit, provides horseback riding on a network of trails that are within this Allotment as well as pack and saddle service to Wilderness visitors. Currently cattle are trucked to and off loaded at temporary corrals just to the east of the Aspen Meadow Pack Station.

Recreation within the Emigrant Wilderness is concentrated at Camp, Bear and Grouse Lakes, all of which lie within the eastern portion of the Allotment. These easily accessible wilderness destinations are among the most heavily visited in the Emigrant Wilderness. Access to these popular areas is via trails which are all heavily used by both hikers and equestrian riders, including pack station clients. Wilderness visitors often complain about cattle. The most common complaints are about the manure, biophysical effects such as post holing in wet ground both on and off trail and the noise of cowbells.

EAGLE MEADOW ALLOTMENT

Eagle Meadow Trailhead serves a small number of Emigrant Wilderness visitors heading south about 2½ miles to the wilderness boundary at Eagle Pass and down into Cooper Meadow. None of the Allotment lies within the Emigrant Wilderness.

HERRING CREEK ALLOTMENT

Two undeveloped Wilderness trailheads are located within this Allotment; Waterhouse Lake and Coyote Meadows. Both provide access to destinations in the Emigrant Wilderness. Waterhouse Lake, accessible via a primitive route, is a popular wilderness destination. Adele Lake, a small lake just east of Waterhouse Lake, receives fewer visitors.

Environmental Consequences

Four qualities of wilderness character were used to analyze the effects of the alternatives on wilderness. These qualities were selected as the most appropriate elements for analysis of effects of the alternatives, based on the Wilderness Act as described below.

WILDERNESS CHARACTER

The Wilderness Act (Public Law 88-577) defines the concept of wilderness and the unique values that wilderness areas should preserve. The Act states that designated wilderness shall be administered "...for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness and so as to provide for the protection of those areas, [and] the preservation of their wilderness character..." (Sec. 2(a)). The Act further requires that, "except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for other purposes for which it may have been established so as to preserve its wilderness character" (Sec. 4(b)).

In 2005, a multidisciplinary team of scientists and managers led by the interagency Aldo Leopold Wilderness Research Institute noted that preservation of wilderness character is the primary responsibility mandated by the Act, but that neither the Act itself, legislative history, nor any subsequent legislation has clearly defined it (Landres et al., 2005). The Wilderness Act does, however, refer to the unique values of Wilderness when it defines Wilderness in Section 2(c):

> A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness if further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent human improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic or historical value.

From this definition, Landres et al. (2005) identified four qualities that represent wilderness character. These qualities, also serve as the four analysis elements for evaluating the effects to wilderness of the four alternatives under consideration in this EIS:

- Untrammeled: Wilderness is essentially unhindered and free from modern human control or manipulation.
- Undeveloped: Wilderness is essentially without permanent human improvements or modern civilization.
- Natural: Wilderness ecological systems are substantially free from the effects of modern civilization.

Outstanding Opportunities for Solitude or a Primitive and Unconfined Type of Recreation: Wilderness provides outstanding opportunities for people to experience solitude or primitive and unconfined type of recreation, including the values of inspiration and physical and mental challenge.

In general, wilderness character is degraded when any of these four qualities is reduced without a corresponding improvement in another quality. For example, building a fence inside of wilderness to separate cows from Yosemite toad habitat may improve the natural character by protecting habitat, but it will also degrade the undeveloped quality of wilderness by creating another human improvement. Wilderness specialists are responsible for evaluating the balance of positive and negative changes to wilderness character to determine the net effect.

For the purposes of this analysis, it is assumed that the presence of cattle will degrade the natural quality of wilderness character to an extent proportional to the number of cows present and acres grazed. As Landres et al note in their interagency technical guide to monitoring wilderness character:

> "Grazing Allotments introduce large nonindigenous herbivores such as domestic cattle, horses, and sheep in a wilderness. By their grazing and trampling activities, these nonindigenous herbivores may significantly diminish the natural quality of wilderness character by directly altering habitat for wildlife, reducing populations of rare or at-risk plants, introducing disease and other pathogens, increasing soil erosion, and altering hydrologic flow regimes (Belsky and Blumenthal 1997, Belsky and others 1999, Fleischner 1994). A decrease over time in the number of acres of grazing Allotments with authorized use in a wilderness would indicate an increase in the natural quality. Conversely, an increase over time of the number of acres of grazing Allotments with authorized use would indicate a decrease in the natural quality." (Landres et al, 2009)

Alternative 1 (Proposed Action)

DIRECT AND INDIRECT EFFECTS

In general, this alternative is likely to have negative effects on the natural and outstanding opportunities for solitude qualities of wilderness character. Naturalness may be degraded through the continued effects of grazing on the various natural systems that comprise the wilderness resource even if these effects do not exceed range management standards. Outstanding opportunities for solitude could be degraded through the continued presence of cattle and cow bells in locations that are also commonly used by wilderness visitors for hiking and camping.

The untrammeled and undeveloped qualities will probably not be further impacted because no new range developments or ecological manipulations are proposed within the wilderness portions of the Allotments.

Bell Meadow Allotment

The proposed action will make minor adjustments to the Bell Meadow Allotment boundary resulting in a small net decrease (about 200 acres) to the portion of the Allotment within the Emigrant Wilderness. This change is not expected to significantly alter the effect of grazing on wilderness character. While the boundary adjustments should help simplify prevention of cattle drift further into the wilderness, grazing will still continue to degrade the natural character of wilderness.

The outstanding opportunities for solitude quality of wilderness character will also continue to be degraded due to the ongoing presence of cattle and the sound of cowbells in the areas of the western Emigrant Wilderness. Destinations, such as Camp Lake, Bear Lake, and Grouse Lake are some of the most heavily visited portions of the Emigrant. The drift of cattle outside of the Allotment boundary into the vicinity of Powell Lake and Lake Valley that was reported on three occasions in 2009 is also likely to continue unless the entire Allotment boundary is located on easily identifiable terrain features such as ridgelines.

The untrammeled and undeveloped qualities will probably not be further impacted because no new range developments or ecological manipulations are proposed within the wilderness portions of the Allotments.

Eagle Meadow Allotment

No effects. No portion of the Allotment is within the Emigrant Wilderness.

Herring Creek Allotment

The proposed action alternative will adjust the Herring Creek Allotment boundary to remove most of the portion that is currently within the Emigrant Wilderness. However, the portion that will be removed is not used by cows due to the inaccessibility of the terrain and lack of forage, so no change in effect to wilderness character is expected. The only area of the Allotment that will remain inside wilderness is the about 100-acre portion that cows may actually graze. As a result, some degradation of natural character is possible, as is the likely drifting of cows further into the Emigrant Wilderness toward Horse and Cow Meadow.

Effects to naturalness could be reduced by aligning the Allotment boundary with the ridgeline that separates the Emigrant Wilderness from the general forest. Aligning the Allotment boundary with the terrain is an effective method of reducing livestock drift.

The area of the Allotment that would remain inside wilderness is lightly used by wilderness visitors, with the possible exception of hunters. Effects on solitude and primitive or unconfined recreation are likely low.

The untrammeled and undeveloped qualities will probably not be further impacted because no new range developments or ecological manipulations are proposed within the wilderness portions of the Allotments.

CUMULATIVE EFFECTS

Naturalness and outstanding opportunities for solitude will continue to be degraded as they have been each summer that grazing has occurred in the wilderness portions of the Allotments. There are no other reasonably foreseeable projects within wilderness that would affect wilderness character.

Alternative 2 (No Action)

DIRECT AND INDIRECT EFFECTS

This alternative would improve the undeveloped, natural, and outstanding opportunities elements of wilderness character. Ending cattle grazing would allow the removal of all range improvements including fencing. Cattle would no longer impact natural systems and processes, and wilderness visitors would no longer encounter cows on the trail or in camp. Visitors also would not hear cowbells while in the wilderness.

Bell Meadow Allotment

This alternative would significantly improve the undeveloped, natural, and outstanding opportunities elements of wilderness character. Cattle would no longer be present within the Emigrant Wilderness, including the popular public destinations of Camp, Bear, and Grouse Lakes. As a result, the outstanding opportunities for solitude quality of wilderness character would improve substantially. The undeveloped quality would improve due to the removal of range fencing and gates within the wilderness. Naturalness would also improve over time as the local ecology recovered from previous grazing effects.

Eagle Meadow Allotment

The no action alternative would yield a small positive effect to the undeveloped quality of wilderness by allowing the removal of fencing on the wilderness boundary on the Eagle Pass trail. The natural, untrammeled, and solitude/primitive and unconfined recreation elements of wilderness character would not be substantially altered since grazing in the Allotment does not occur within the Emigrant Wilderness.

Herring Creek Allotment

This alternative would result in minor improvements to the undeveloped, natural, and outstanding opportunities elements of wilderness character. Grazing in this Allotment only occurs in a small portion (about 100 acres) of the Emigrant Wilderness. Removal of cows from this area would permit the elimination of any range structures such as fencing, allow the gradual improvement of natural conditions, and reduce the potential for the interaction between wilderness visitors and cows or cowbells.

CUMULATIVE EFFECTS

There would be no negative cumulative effects to wilderness character from the removal of cows from the Allotments since the source of impacts would no longer be present. There are no other reasonably foreseeable projects within wilderness that would affect wilderness character.

Alternative 3 (Current Management)

DIRECT AND INDIRECT EFFECTS

Like Alternative 1, the current management alternative is likely to have negative effects on the natural and outstanding opportunities for solitude qualities of wilderness character. Naturalness may be degraded through the continued effects of grazing on the various natural systems that comprise the wilderness resource even if these effects do not exceed range management standards. Outstanding opportunities for solitude could be degraded through the continued presence of cattle and cowbells in locations that are also commonly used by wilderness visitors for hiking and camping.

The untrammeled and undeveloped qualities will probably not be further impacted because no new range developments or ecological manipulations are proposed within the wilderness portions of the Allotments.

Bell Meadow Allotment

The natural quality of wilderness character may be degraded through the continued effects of grazing on the various natural systems that comprise the wilderness resource even if these effects do not exceed range management standards. The drift of cattle outside of the Allotment boundary into the vicinity of Powell Lake and Lake Valley that was reported on three occasions in 2009 is also likely to continue unless the entire Allotment boundary is located on easily identifiable terrain features such as ridgelines.

The outstanding opportunities for solitude quality of wilderness character will also continue to be degraded due to the ongoing presence of cattle and the sound of cowbells in the areas of the western Emigrant Wilderness. Destinations, such as Camp Lake, Bear Lake, and Grouse Lake are some of the most heavily visited portions of the Emigrant. Solitude will also likely continue to be degraded in the vicinity of Chewing Gum and Powell Lakes due to cows straying outside of the Allotment.

The untrammeled and undeveloped qualities will probably not be further impacted because no new range developments or ecological manipulations are proposed within the wilderness portions of the Allotments.

Eagle Meadow Allotment

No effects. No portion of the Allotment is within the Emigrant Wilderness.

Herring Creek Allotment

The current management alternative is likely to have minor negative effects on the natural quality of wilderness character. Naturalness may be degraded through the continued effects of grazing on the various natural systems that comprise the wilderness resource even if these effects do not exceed range management standards. Effects will probably be minimal due to the small portion (about 100 acres) of the Allotment within the Emigrant Wilderness that is actually grazed.

The Waterhouse Lake area of the Allotment is heavily used by wilderness visitors. However, cattle do not graze near the lake due to inaccessible terrain and little forage. With the possible exception of early hunters, effects on solitude and primitive or unconfined recreation are likely low.

The untrammeled and undeveloped qualities will probably not be further impacted because no new range developments or ecological manipulations are proposed within the wilderness portions of the Allotments.

CUMULATIVE EFFECTS

Naturalness and outstanding opportunities for solitude will continue to be degraded as they have been each summer that grazing has occurred in the wilderness portions of the Allotments. There are no other reasonably foreseeable projects within wilderness that would affect wilderness character.

Alternative 4 (Resource Protection)

DIRECT AND INDIRECT EFFECTS

Emphasizing resource protection through the reduction of the number of cows on the Allotments would improve the natural and outstanding opportunities for solitude qualities of wilderness character due to the removal of a portion of the source of the effects.

Bell Meadow Allotment

Alternative 4 would make minor adjustments to the Bell Meadow Allotment boundary resulting in a small net decrease (about 200 acres) to the portion of the Allotment within the Emigrant Wilderness. This change is not expected to significantly alter the effect of grazing on wilderness character. While the boundary adjustments should help simplify prevention of cattle drift further into the wilderness, grazing will still continue to degrade the natural character of wilderness.

Like Alternative 3 (Current Management), the natural quality of wilderness character may be degraded through the continued effects of grazing on the various natural systems that comprise the wilderness resource even if these effects do not exceed range management standards. The drift of cattle outside of the Allotment boundary into the vicinity of Powell Lake and Lake Valley that was reported on three occasions in 2009 is also likely to continue unless the entire Allotment boundary is located on easily identifiable terrain features such as ridgelines. Effects may be reduced commensurate with the removal of a portion of the currently authorized number of cattle.

The outstanding opportunities for solitude quality of wilderness character will also continue to be degraded due to the ongoing presence of cattle and the sound of cowbells in the areas of the western Emigrant Wilderness. Destinations, such as Camp Lake, Bear Lake, and Grouse Lake are some of the most heavily visited portions of the Emigrant. Solitude will also likely continue to be degraded in the vicinity of Chewing Gum and Powell Lakes due to cows straying outside of the Allotment. However, the intensity of the negative effect to solitude may be reduced due to the presence of fewer cows in the Allotment.

The untrammeled and undeveloped qualities will probably not be further impacted because no new range developments or ecological manipulations are proposed within the wilderness portions of the Allotments.

Eagle Meadow Allotment

No effects. No portion of the Allotment is within the Emigrant Wilderness.

Herring Creek Allotment

Alternative 4 will adjust the Herring Creek Allotment boundary to remove most of the portion that is currently within the Emigrant Wilderness. However, the portion that will be removed is not used by cows due to the inaccessibility of the terrain and lack of forage, so no change in effect to wilderness character is expected. The only area of the Allotment that will remain inside wilderness is the about 100- acre portion that cows may actually graze. As a result, some degradation of natural character is possible, as is the likely drifting of cows further into the Emigrant Wilderness toward Horse and Cow Meadow. Drift outside the Allotment is less likely with this alternative because a majority of the Allotment area adjacent to wilderness would be excluded (Willow Unit).

Effects to naturalness could be reduced by aligning the Allotment boundary with the ridgeline that separates the Emigrant Wilderness from the general forest. Aligning the Allotment boundary with the terrain is an effective method of reducing livestock drift.

The area of the Allotment that would remain inside wilderness is lightly used by wilderness visitors, with the possible exception of hunters. Effects on solitude and primitive or unconfined recreation are likely low.

CUMULATIVE EFFECTS

There would be reduced negative cumulative effects to wilderness character from the removal of some cows from the Allotments since the source of impacts would be diminished. There are no other reasonably foreseeable projects within wilderness that would affect wilderness character.

Summary of Effects Analysis across All Alternatives

Table 3.12-1 summarizes the effects of all four alternatives on wilderness character in the wilderness portions of the Bell Meadow and Herring Creek Allotments. In general, Alternative 1 (Preferred Alternative) will degrade the natural and solitude elements of wilderness character while having no new effect on the untrammeled and undeveloped qualities. Alternative 2 (No Action) would result in the greatest improvement to wilderness character by reducing development, increasing naturalness, and expanding outstanding opportunities for solitude. The untrammeled quality of wilderness character would not change. Alternative 3 (Current Management) would have essentially the same effects to wilderness character as Alternative 1. Alternative 4 (Resource Protection) would improve naturalness and solitude while the untrammeled and undeveloped qualities would remain unchanged.

Table 3.12-1 Effects of Alternatives on Wilderness Character

Wilderness Quality	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Untrammeled	stable	stable	stable	stable
Undeveloped	stable	improving	stable	stable
Natural	degrading	improving	degrading	improving
Solitude/Primitive and Unconfined Recreation	degrading	improving	degrading	improving
Net Effect	degrading	improving+	degrading	improving

Compliance with the Forest Plan and Other Direction

Wilderness Act

The central mandate for wilderness stewardship is the Wilderness Act of 1964's assertion that "each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area" (Sec. 4(b)).

Section 4(d)(4)(2) of the Wilderness Act states: "the grazing of livestock, where established prior to September 3, 1964, shall be permitted to continue subject to such reasonable regulations as are deemed necessary by the Secretary of Agriculture."

These two provisions of the Wilderness Act are in conflict and have not yet been resolved through litigation. While Alternatives 1 and 3 will likely degrade wilderness character, "reasonable regulations," such as streambank stability and aspen browse standards, are in place to attempt to mitigate negative effects.

Agency Policy

Forest Service policy, as outlined in the Forest Service Manual, states: "Where there are alternatives amongst management decisions, wilderness values shall dominate over all other considerations except where limited by the Wilderness Act, subsequent legislation, or regulations." (FSM 2320.3.1)

The 1982 Congressional Grazing Guidelines (FSM 2323.22, Exhibit 01) clarifies the above policy direction by noting that "livestock grazing and activities and the necessary facilities to support a livestock grazing program, will be permitted to continue in National Forest Wilderness, when such grazing was established prior to classification of an area as Wilderness" (USDA 2007).

The three action alternatives under consideration in this EIS propose the continuation of grazing in wilderness subject to adjustments for the purposes of resource protection and Allotment administration as directed by the Wilderness Act, agency policy, and the Forest Plan. Consideration of the no action alternative is mandated by NEPA.

Forest Plan Direction

Forest Plan Direction (USDA 2010) directs forest staff to "manage livestock grazing to preserve the characteristics and values of wilderness". The alternatives under consideration attempt to manage effects to the natural qualities of wilderness character through monitoring of site-specific resource conditions, minor boundary adjustments, reduction of stocking numbers, exclusion areas, and/or adjustments in herding. The untrammeled and undeveloped qualities of wilderness character are not expected to be substantially altered by any of the alternatives. The outstanding opportunities for solitude element of wilderness character is not specifically addressed by any of the alternatives, but this is likely consistent with agency policy which generally directs that range be managed the same both inside and outside of wilderness, with some limited exceptions.

The Forest Plan Direction further requires that range managers "strongly discourage the use of cowbells on commercial grazing Allotments. [And] explore methods for reducing or eliminating the use of cowbells in cooperation with the permittees during development of annual operating plans." Although methods may have been "explored" for reducing cowbells during the development of the preferred alternative, no alternatives indicate that the use of cowbells has been "strongly discouraged."

Forest Plan Direction also sets range management objectives by Opportunity Class within the Emigrant Wilderness. The popular destination lakes within the Emigrant are in Opportunity Class IV areas which have the following objectives:

- Ecosystems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces. Localized human uses may have limited effects in few areas.
- Human influences on aquatic life hydrologic processes, soils (and) vegetation are minimal.
- The opportunity for solitude is low to outstanding.
- The imprint of human influences is substantially unnoticeable. (LRMP p.79-80)

Objectives 1 and 2 are addressed in Chapters 3.02 Aquatic Species, 3.03 Botany, 3.09 Soils, 3.11 Watershed and 3.12 Wildlife. Objective 3 is met by all alternatives as described above. Objective 4 is likely met by Alternative 2 and improved in Alternative 4 due to the removal of all or some cows. Meeting objective 4 is subject to debate for Alternatives 1 and 3 since the imprint of grazing activity in heavily visited areas is likely to be noticeable.

3.13 WILDLIFE

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Direction relevant to the proposed action as it affects terrestrial wildlife includes the following:

Endangered Species Act (ESA): The Endangered Species Act of 1973 (16 USC 1531 et seq.) requires that any action authorized by a federal agency not be likely to jeopardize the continued existence of a Threatened or Endangered (TE) species, or result in the destruction or adverse modification of habitat of such species that is determined to be critical. Section 7 of the ESA, as amended, requires the responsible federal agency to consult the United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service concerning TE species under their jurisdiction. It is Forest Service policy to analyze impacts to TE species to ensure management activities are not be likely to jeopardize the continued existence of a TE species, or result in the destruction or adverse modification of habitat of such species that is determined to be critical. A Wildlife BE was written to determine if a Biological Assessment (BA) needs to be prepared.

Forest Service Manual and Handbooks (FSM/H 2670): Forest Service Sensitive species are species identified by the Regional Forester for which population viability is a concern. The Forest Service develops and implements management practices to ensure that rare plants and animals do not become threatened or endangered and to ensure their continued viability on National Forests. It is Forest Service policy to analyze impacts to sensitive species to ensure management activities do not create a significant trend toward federal listing or loss of viability. This assessment is documented in the Wildlife BE.

Forest Plan: The Forest Plan provides the following standards and guidelines applicable to livestock grazing and wildlife, which will be considered in the analysis process.

- Detection of a wolverine or Sierra Nevada red fox will be validated by a forest carnivore specialist. When verified sightings occur, conduct an analysis to determine if activities within 5 miles of the detection have a potential to affect the species. If necessary, apply a limited operating period from January 1 to June 30 to avoid adverse impacts to potential breeding. Evaluate activities for a 2-year period for detections not associated with a den site.
- Conduct additional surveys to established protocols to follow up reliable sightings of Great Gray Owls.
- In meadows with occupied willow flycatcher sites, allow only late-season grazing (after August 15) in the entire meadow.
- Standard and guideline #57 above may be waived if an interdisciplinary team has developed a site-specific meadow management strategy. This strategy is to be developed and implemented in partnership with the affected grazing permittee. The strategy objectives must focus on protecting the nest site and associated habitat during the breeding season and the long-term sustainability of suitable habitat at breeding sites. It may use a mix of management tools, including grazing systems, structural improvements, and other exclusion by management techniques to protect willow flycatcher habitat.
- For historically occupied willow flycatcher sites, assess willow flycatcher habitat suitability within the meadow. If habitat is degraded, develop restoration objectives and take appropriate actions (such as physical restoration of hydrological components, limiting or re-directing grazing activity, and so forth) to move the meadow toward desired conditions.
- In meadow areas of Great Gray Owl Protected Activity Centers (PACs), maintain herbaceous vegetation at a height commensurate with site capability and habitat needs of prey species. Follow regional guidance to determine potential prey species and associated habitat requirements at the project level.

- Prevent disturbance to streambanks and natural lake and pond shorelines caused by resource activities (for example, livestock, off-highway vehicles, and dispersed recreation) from exceeding 20 percent of stream reach or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots.
- Under season-long grazing:
  - For meadows in early seral status: limit livestock utilization of grass and grass-like plants to 30 percent (or minimum 6-inch stubble height).
  - For meadows in late seral status: limit livestock utilization of grass and grass-like plants to a maximum of 40 percent (or minimum 4-inch stubble height).
  - Determine ecological status on all key areas monitored for grazing utilization prior to establishing utilization levels. Use Regional ecological scorecards and range plant list in regional range handbooks to determine ecological status. Analyze meadow ecological status every 3 to 5 years. If meadow ecological status is determined to be moving in a downward trend, modify or suspend grazing. Include ecological status data in a spatially explicit Geographical Information System database. Under intensive grazing systems (such as rest-rotation and deferred rotation) where meadows are receiving a period of rest, utilization levels can be higher than the levels described above if the meadow is maintained in late seral status and meadow-associated species are not being impacted. Degraded meadows (such as those in early seral status with greater than 10 percent of the meadow area in bare soil and active erosion) require total rest from grazing until they have recovered and have moved to mid or late seral status.
- Limit browsing to no more than 20 percent of the annual leader growth of mature riparian shrubs and no more than 20 percent of individual seedlings. Remove livestock from any area of an Allotment when browsing indicates a change in livestock preference from grazing herbaceous vegetation to browsing woody riparian vegetation.
- Stanislaus National Forest Land and Resource Management Plan IV-114. Mule deer – Protect habitat needs on identified critical summer and winter range, especially where fawning areas are located.

Effects Analysis Methodology

Assumptions Specific to Wildlife

As long as a risk factor is present to the wildlife resource, a probability of impact exists. In this case, the relevant risk factor is livestock grazing. When no risk factor to wildlife is present as in Alternative 2, it is obviously the best choice for the wildlife resource. With the risk factor present, the primary question is “how does the potential impact differ by each action alternative?”

A general discussion of the direct, indirect, and cumulative effects applying to livestock grazing in the Sierra Nevada can be found in USDA (1999) which is incorporated by reference here. Further discussions on life history, habitat associations, and potential direct, indirect, and cumulative effects applying to livestock grazing for specific species can be found in USDA (2001, 2004, 2013), also incorporated by reference.

Data Sources

- GIS databases.
- California Natural Diversity Database (CNDDB)
- Natural Resource Information System (NRIS) Wildlife database.

Wildlife Indicators

- The potential for death, injury, or disturbance to the species of concern.
- The potential for habitat loss or reduction in habitat quality.

Wildlife Methodology

Effects analysis methodology for wildlife involved comparison of wildlife indicators by action alternative. As it is determined that Alternative 2 would be wholly beneficial to wildlife and there would be no negative impact to any wildlife species, the analysis below details the comparison among the action alternatives.

Affected Environment

The Bell Meadow, Eagle Meadow, and Herring Creek Allotments lie within the geographical and elevation range of the following terrestrial species: Sierra Nevada Red Fox, Great Gray Owl, and Willow Flycatcher. A detailed effects analysis for these species is included in the BE and is incorporated below. The Bell Meadow, Eagle Meadow, and Herring Creek Allotments also lie within the geographical and elevation range of critical summer deer range.

Several other species are briefly addressed in the BE. These include the following: , Townsend's big-eared bat, pallid bat, fringed myotis, American marten, Pacific fisher, California wolverine, bald eagle, Northern Goshawk, and California spotted owl. A detailed analysis for these species is not included in the BE for one of the following reasons:

1. Action area is not within the species' elevation range.
2. Livestock grazing is not identified as a current risk factor to the species.

Following is a summary of what is known about the species of concern relative to the analysis area. In addition, all the elements of each species' habitat which are potentially affected by the proposed project are identified and quantified as much as possible. Recovery plans (for listed species), conservation plans (for sensitive species), regional aquatic conservation strategies, or available habitat capability models were used to help determine habitat elements of importance to each species or special habitat. Habitat elements can exist at a variety of scales and scale was considered in the definition of action area above. Habitat capability models and the best available information were used to determine: 1) for each species, which habitat elements are potentially affected; and 2) the appropriate area of analysis. The affected environment is described relative to the areas of analysis and habitat elements potentially affected for each species of concern.

Sierra Nevada red fox

SPECIES ACCOUNT

1. *Historical information.* The Sierra Nevada red fox is the rarest of three subspecies of red fox inhabiting montane areas of the western United States; a southern Sierra Nevada population, largely thought to be extirpated, was re-discovered in August 2010 in the area of Sonora Pass (Rich et al. 2011). The Sonora Pass area borders the BEH action area. The Sierra Nevada red fox was petitioned for listing under the Endangered Species Act (CBD 2011). The 12-month finding status review by the US Fish & Wildlife Service concluded that listing is warranted but precluded for the Sierra Nevada Distinct Population Segment (Federal Register 2015). The current shortest straight-line distance from the project area to a confirmed occurrence record is about 10 miles.
2. *Recent survey efforts.* Survey efforts have been concentrated in the Sonora Pass area; a "creeping survey from known presence" strategy is currently being employed to better determine the extent of this recently re-discovered population in the southern Sierra Nevada. Sample units have extended to border areas of the BEH action area (Rich, unpubl data).
3. *Occurrence of species relative to land allocations or special management areas that may have been established for them:* Currently there are no land allocations or special management areas established for Sierra Nevada red fox.
4. *The project area relative to the distribution of the desired species:* The action area is approximately ten miles distant from the nearest confirmed occurrence of the recently re-

discovered southern Sierra Nevada population of red fox. Suitable habitat is contiguous between the action area and the Sonora Pass population so it is reasonable to predict that Sierra Nevada red fox may occur in suitable habitat within the BEH action area. Only two small isolated populations of Sierra Nevada red fox are currently known, one in the vicinity of Sonora Pass and the other in the vicinity of Lassen Peak (Federal Register 2012, Statham et al. 2012; Federal Register 2015; USFWS 2015). Given the vulnerabilities inherent in small isolated populations (Federal Register 2012), and that the project area contains suitable high-elevation habitat for Sierra Nevada red fox contiguous with known occupied habitat, the location of the project area is very likely of key importance to the species.

HABITAT STATUS

Suitable habitat for Sierra Nevada red fox and risk factors to that habitat are defined in USFS 2001, 2004, Biological Evaluation, and supporting references, Perrine et al. 2010, and the USFWS 12-month finding (Federal Register 2012; USFWS 2015); this section is tiered to those documents and incorporates them here by reference. Suitable habitat consists primarily of alpine and subalpine open areas with interspersed stands of trees (USDA 2001, Perrine et al. 2010). In the southern Sierra Nevada, suitable subalpine and alpine habitats as well as confirmed occurrences of Sierra Nevada red fox occur primarily above 8,000 feet (Rich et al. 2011, Statham et al. 2012). In addition, the 8,000 foot level appears to be the upper elevation band for the regular occurrence of coyote (*Canis latrans*) in winter (Rich et al. 2011, Sacks et al. 2012). Interspecific competition with coyote is believed to represent a significant risk factor to Sierra Nevada red fox and likely plays a role in the distribution of Sierra Nevada red fox (Federal Register 2015). The project area with high elevation habitat above 8,000 feet overlaid with known occurrences of Sierra Nevada red fox shows that potential habitat in the area of analysis is contiguous with known occupied habitat. Estimated acreage of potential habitat in the analysis area is as follows:

Table 3.13-1 Estimated suitable habitat for Sierra Nevada Red Fox

Area	Acres of suitable SNRF habitat
Bell Meadow Allotment	2,411
Eagle Meadow Allotment	8,653
Proposed McCormick addition	2,085
Proposed Niagara addition	321
Herring Creek Allotment	6,847
Proposed Cascade addition	20
Total	20,337

Site visits indicate that overall habitat status in the proposed additions is in good condition with adequate food and cover for Sierra Nevada red fox prey. However, some areas of localized impact from trespass or stray cattle have been observed. Habitat status within current Allotment boundaries is largely unassessed as it relates to Sierra Nevada red fox due to time and budget constraints but is probably highly variable depending on livestock movements and vulnerability of high-elevation soils and supported vegetation.

Great Gray Owl

SPECIES ACCOUNT

1. Historical information. Great Gray Owl reproduction was documented at Lower Eagle Meadow in 1992. In that year, two Great Gray Owl young and one adult were observed and described by qualified personnel. The Great Gray Owls were first detected that year incidental to a Spotted Owl survey. A stand search was conducted for the nest tree in 1992; the nest stand was determined but the actual nest tree could not be confirmed. Additional scattered Great Gray Owl

sightings have been recorded periodically in all three Allotments but have not been confirmed to date.

2. Recent survey efforts. Survey efforts have been made, particularly at Lower Eagle Meadow, but none have met Regional protocol (USDA 2000b) owing to the time and expense needed to overcome logistical difficulties of accessing high elevation meadows during early spring when protocol site visits are required (e.g. requiring the use of snowmobiles, etc.). In the future, a protocol revision by Pacific Southwest (PSW) Research and/or the use of Automated Recording Units (ARUs) may help overcome logistical challenges in the current protocol and better determine presence/absence of Great Gray Owl (Rognan 2007). Seven meadows in the action area were surveyed for Great Gray Owl prey as part of a management study to better determine potential prey species and associated habitat requirements (Powers et al., 2011, Kalinowski et al. 2014).
3. Occurrence of species relative to land allocations or special management areas that may have been established for them: There is one Great Gray Owl Protected Activity Center (PAC) established in the analysis area at Lower Eagle Meadow based on the 1992 detection. The PAC consists of 50 acres of the highest quality nesting habitat and the meadow complex that supports the prey base for nesting owls.
4. The project area relative to the distribution of the desired species. The project area is on the northern fringe of what is known as the southern Sierra Nevada population. The southern Sierra Nevada population is thought to consist of fewer than 100 pairs and is centered on Yosemite National Park and immediately adjacent National Forest. The southern Sierra Nevada population appears to be an isolated metapopulation and disjunct from the rest of this species' breeding range and a distinct subspecies (Hull et al. 2010).

HABITAT STATUS

Suitable habitat for Great Gray Owl is defined in CDFG 2005 and USDA 2001, USDA 2004, biological evaluation, and supporting references; this analysis tiers to those documents and incorporates them here by reference. Habitat requirements of Great Gray Owls in the Sierra Nevada were summarized nicely by Beck and Winter (2000), studied specifically by Greene (1995) and Sears (2006), and are recently investigated by a local management study (Powers et al. *2011*, Kalinowski et al. 2014). Basically, suitable habitat for Great Gray Owls in the Sierra Nevada consists of conifer-woodland habitats near montane meadows. Meadows or meadow complexes at least 25 acres in size appear to be necessary for persistent occupancy and reproduction but meadows as small as 10 acres will support infrequent breeding (Beck and Winter 2000). Reproductive sites are associated with high vole abundance and high vole abundance is associated with meadow vegetation height (Beck 1985; Greene 1995; Kalinowski et al. 2014). Potential Great Gray Owl habitat in the analysis area was estimated based on meadow complex groupings meeting minimum size requirements.

The status of the habitat in the area of analysis overall is mostly in moderate to high ecological condition with stable to improving trends (Range Report, project record). Range condition of Lower Eagle Meadow is poor and the trend is unknown (Range Report, project record). Within Lower Eagle Meadow there is a three acre inclusion of meadow vegetation in high ecological status; this inclusion has been excluded from livestock use by electric fence since 2004. The historical nest stand in the Lower Eagle PAC is dominated by lodgepole pine and has an herbaceous understory likely to support *Microtus* spp. prey.

Great Gray Owl prey populations were assessed at 7 sites in the action area in 2010 and 2011. Sample sites were selected randomly as part of a larger management study; maximum abundance results follow (Kalinowski 2012).

Vole numbers were exceptionally high in the proposed Cascade addition. This indicates the Cascade addition has high potential for a reproductive Great Gray Owl site. Vole numbers were surprisingly

low overall although Barn Meadow in Eagle Meadow Allotment appears to support habitat needs for both prey species.

Table 3.13-2 Estimated suitable meadow habitat and potential territory for Great Gray Owl

Area	Acres of suitable meadow habitat	Potential territory estimate
Bell Meadow Allotment	177	2
Eagle Meadow Allotment	538	4
Proposed McCormick addition	0	0
Proposed Niagara addition	0	0
Herring Creek Allotment	458	8
Proposed Cascade addition	16	1

Table 3.13-3 Great Gray Owl prey abundance

Site	Gophers / acre	Voles / acre
Bell Meadow Allotment		
Upper Bell Meadow	31	1
Lower Bell Meadow	19	1
Round Meadow	16	1
Crab Meadow	13	0
Eagle Meadow Allotment		
Barn Meadow	3	4
Herring Creek Allotment		
Bull Run	4	0
Pike's (Proposed Cascade addition)	6	16

Willow Flycatcher

SPECIES ACCOUNT

1. *Historical information.* There are four Willow Flycatcher sites in the action area, designated as "occupied" by the 2004 FSEIS Appendix D but are now designated as "historically occupied". The current designations follow results of a completed 10-year survey cycle to protocol: Willow Meadow of Herring Creek Allotment; Long Valley Creek 2 and Eagle Meadow of the Eagle Meadow Allotment; and Upper Bell Meadows of Bell Meadow Allotment. There was a Willow Flycatcher sighting at Lily Lake in the Bell Meadow Allotment in late summer of 2012. Follow-up surveys conducted to determine breeding status were inconclusive. The 2012 sighting is therefore best classified as a presumed migrant (USDA 2003).
2. *Recent survey efforts.* Surveys have been conducted to Regional protocol at all sites classified as occupied by the SNFPA. A ten year survey cycle was completed to protocol at all sites shifting their classification from occupied to historically occupied as per USDA 2004 (ROD p. 57). A site classified as "conditional" in the 2004 ROD (Long Valley 1) was surveyed with negative results and that site was subsequently removed from the conservation network as per USDA 2004 (ROD p. 58). The SNFPA defined emphasis habitat as suitable habitat within five miles of occupied Willow Flycatcher sites. Emphasis habitat was surveyed as required by the 2001 ROD with negative results (USDA 2012c).
3. *Discuss the occurrence of species relative to land allocations or special management areas that may have been established for them*: There are four occurrences in the action area and they are designated as "historically occupied": Willow Meadow of Herring Creek Allotment; Long Valley

Creek 2 and Eagle Meadow of Eagle Meadow Allotment; and Upper Bell Meadows of Bell Meadow Allotment.

4. *Discuss the project area relative to the distribution of the desired species.* For sites within the analysis area, most records are from the early 1990s. Based on survey results since then, it appears that all Willow Flycatcher sites on the Stanislaus National Forest have "blinked out" from the metapopulation network (USDA 2012c). In 1999, the last Willow Flycatcher on the Stanislaus National Forest was recorded at Ackerson Meadow (outside of the analysis area). As in Yosemite National Park, it is not known why this species has apparently been extirpated from the greater Yosemite area (Siegel et al. 2008). However, reoccupation of sites on other National Forests has been documented (Loffland [Bombay], pers.comm.).

HABITAT STATUS

Suitable habitat for this species is defined in USDA 2001, USDA 2004, biological evaluation, and supporting references. Habitat requirements for Willow Flycatcher in the Sierra Nevada are discussed thoroughly by USDA 2003 and Green et al. 2003. Suitable habitat for Willow Flycatcher essentially consists of meadows larger than 15 acres that have standing water on June 1 and a riparian deciduous shrub component.

The status of the habitat in the area of analysis overall is mostly in moderate to high ecological condition with stable to improving trends (Range Report, project record). Willow Meadow has a fair to good range condition. Long Valley has a moderate vegetation score and the 5 year trend is up. Eagle Meadow is rated overall as fair condition. Upper Bell Meadow is in poor ecological condition but cattle are excluded and other parts of the meadow are in good ecological condition. Habitat assessments conducted as part of the 10-year survey cycle show that all of the sites classified as historically occupied on the Stanislaus still represent highly suitable habitat and have the capability of being re-occupied by Willow Flycatcher.

Mule Deer

SPECIES ACCOUNT

1. *Historical information*. The mule deer (*Odocoileus hemionus*) is widespread across the project area at varying densities largely depending on habitat conditions. All three Allotments encompass critical summer deer range for the Stanislaus and Tuolumne deer herds. Critical summer deer range consists of a mix of forage and cover necessary for fawn recruitment and survival. Fawn recruitment and survival is a major factor that determines deer herd population trends. The population trend has been steadily downward since 1980 (CDFW unpublished data). Based on a 20 percent adult doe mortality rate of collared does during 1987-1996 (CDFW unpublished data), the spring fawn ratio must be at 35 fawns per 100 does to maintain the population. Prior to the summer of 1980, over 80% of the years had spring fawn ratios at or above herd maintenance levels (30-40 fawns per 100 does). After 1980, 52% of the years were at or above herd maintenance levels. Composition counts have shown a spring fawn ratio averaging 29 fawns per 100 does for the Stanislaus herd and 33 fawns per 100 does for the Tuolumne herd between 1994 and 2006 (CDFW, unpublished data). The relative contributions of potential factors resulting in the low spring fawn ratio for these herds are currently being studied by CDFW (Gerstenberg and Graveline, pers.comm.).
2. *Recent survey efforts*. Herd composition counts are conducted annually by the California Department of Fish and Wildlife (CDFW) in cooperation with the US Forest Service. A multi-year telemetry study by CDFW is in progress that is examining low fawn recruitment and other deer population issues (Graveline, pers.comm.).
3. *Discuss the occurrence of species relative to land allocations or special management areas that may have been established for them*. The 1991 Forest Plan identifies deer summer concentration

areas and critical summer deer range in Appendix 1, Map 2. There is broad overlap of deer summer range with the project area across all three livestock Allotments.

4. *Discuss the project area relative to the distribution of the desired species*. Mule deer in the project area are migratory, spending summers in the project area and wintering at lower elevations. Deer population status and distribution in the project area is thought to be highly dependent on fawning habitat condition (Graveline, pers.comm.). CDFW has concerns about the health of the migratory deer herd in the project area because the population level and trend has not been increasing and is below herd management goals.

HABITAT STATUS

Suitable habitat for this species is defined in USDA 2001, USDA 2004, biological evaluation, and supporting references; this analysis tiers to those documents and incorporates them here by reference. Habitat requirements for mule deer specific to the project area discussed thoroughly by Leopold et al. (1951) and Kucera and Mayer (1999). In particular, meadow and aspen cover types are of critical importance given the low fawn recruitment levels observed in the local deer population. More fawns are born in meadow than in any other habitat (Leopold et al. 1951) and aspen habitats are important to mule deer as foraging sites and areas where fawns are born and reared (Kucera and Mayer 1999).

The status of the habitat in the area of analysis overall is mostly in moderate to high ecological condition with stable to improving trends, with localized areas not meeting range management goals (Range Report, project record). In proposed Allotment additions, deer habitat was judged to be highly suitable based on site visits conducted by the local CDFW deer biologist (Graveline, pers. comm.). Habitat mainly consisted of multi-aged timber providing a variety of openings intermixed with thermal cover. Additionally, some wet meadow areas and aspen stands were observed and found to be in very good condition. Diverse species of browse important to deer were noted including service berry, *Ceanothus* spp., *Ribes* spp., *Salix* spp., mountain maple and other high-value forage plants.

Environmental Consequences

Sierra Nevada red fox

DIRECT AND IND/RECT EFFECTS

Death, injury, and disturbance

Death, injury, and disturbance from livestock grazing are probably not an issue for Sierra Nevada red fox (SNRF). The SNRF is fully protected by the State and has been since 1974 (Statham et al. 2012). In the past, activities associated with livestock operations such as the use of rodenticides, predator-baits, and direct shooting may have resulted in death, injury, and disturbance (USFWS 2015) but those activities have not been permitted in the action area for decades. Direct effects are not an issue given that the protective measures that have been place for many years appear to be effective and adequate.

Potential reduction in habitat quality

It is unclear to what degree livestock grazing may be a risk factor to Sierra Nevada red fox. The Sierra Nevada red fox conservation assessment (Perrine et al. 2010) as well as the US Fish & Wildlife Service's 12-month finding materials (Federal Register 2015, USFWS 2015) disclose considerable uncertainty when evaluating the potential impacts livestock grazing may have on SNRF habitat. For example, the conservation assessment describes how Grinnell et al. (1937) considered overgrazing of alpine meadows a significant impact to fox productivity due to the reduction of forage available for prey species but then notes that current livestock grazing does not occur at the intensity of the past and that some rodent populations may actually increase due to grazing practices (Perrine et al. 2010). Likewise, the USFWS 12-month finding describes how the petition to list SNRF provides some evidence that livestock grazing may alter the availability of some prey species for SNRF, but then

notes that there is also evidence grazing may not reduce prey availability overall, but rather cause a shift in prey species (Federal Register 2015). In its finding, the USFWS concluded that there is insufficient existing information to support the contention that domestic livestock grazing, as it relates to reduced prey, may be a threat to the subspecies (Federal Register 2015). Clearly, more research is needed to provide additional information on this important management question. For this analysis, acres of suitable SNRF habitat potentially affected was used as the primary evaluation criterion and permit compliance was assumed in making comparisons.

The acres of suitable SNRF habitat potentially affected varies by action alternative (Table 3.13-4).

Table 3.13-4 Suitable Sierra Nevada Red Fox potentially affected by Alternatives 1, 3 and 4

Allotment	**Alternative 1** (Proposed Action)	**Alternative 3** (Current Management)	**Alternative 4** (Resource Protection)
Bell Meadow	2,411	2,411	2,411
Eagle Meadow	11,059	8,653	8,653
Herring Creek	6,867	6,847	2,874

Proposed additions have varying amounts of suitable SNRF habitat potentially affected:

Table 3.13-5 Suitable Sierra Nevada Red Fox habitat potentially affected by proposed additions

Proposed Addition	**Acres of suitable SNRF habitat**	**Percent of the addition**
Eagle Meadow Allotment		
Proposed McCormick addition	2,085	85
Proposed Niagara addition	321	13
Herring Creek Allotment		
Proposed Cascade addition	20	1

Under Alternative 4, the least amount of suitable SNRF habitat is potentially affected (13,938 acres) while Alternative 1 has the most (20,337 acres) and Alternative 3 totals 17,911 acres. Of the proposed additions, the amount of suitable SNRF habitat potentially affected is small for the Niagara addition and minimal for the Cascade addition (321 acres and 20 acres respectively). The amount of suitable SNRF habitat potentially affected is substantial for the McCormick addition which totals 2,085 acres representing a large proportion of the addition at 85%.

While habitat condition in proposed additions is good overall (based on site visits), there are signs of impact in areas where trespass from stray cattle has occurred in localized spots of the proposed McCormick addition. This indicates that livestock grazing may contribute to downward trends and degrade habitat for some fox prey species such as *Microtus* spp. while shifting prey abundance to other species such as *Thomomys* spp. Thus, grazing may not reduce prey availability overall, but instead result in a shift in prey species (Federal Register 2012; 2015). The extent to which prey shifts may impact Sierra Nevada red fox is completely unknown (Perrine et al. 2010) and is an important research question that needs to be investigated in order to inform management decisions. In conclusion, the potential for SNRF prey habitat changes would be greatest under Alternative 1 and least under Alternative 4 (Tables 3.13-4 and 3.13-5) but there is a great deal of uncertainty as to how any changes may impact Sierra Nevada red fox.

CUMULATIVE EFFECTS

For the site-specific analysis of cumulative effects for this species the spatial scale of potential suitable habitat that overlaps the action area was used. For past action considerations relied on current environmental conditions as a proxy for the impacts of past actions because the existing condition

reflects the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. There are some private inholdings in the Eagle Meadow Allotment boundaries; most of these parcels have summer cabins. Livestock are not permitted to use private inholdings. No State lands occur in the action area. State activities include authorization of hunting and fishing and maintenance of a livestock exclosure on a 30 acre parcel in the Long Valley unit for deer habitat improvement. Other activities that are presently occurring and that are reasonably foreseeable to continue in the action area are recreational trail use and camping. Domestic dogs are associated with recreation use and the potential for domestic dog predation and disease may be a threat to Sierra Nevada red fox (Federal Register 2012; 2015). However, it is noted the action alternatives do not add to or promote recreation uses. Exposure of Sierra Nevada red fox to Salmon Poisoning Disease (SPD) from infected fish is a concern in some areas. However, the Sierra Nevada red fox population in the Sonora Pass area is not located in an SPD endemic area (Federal Register 2012; 2015).

Great Gray Owl

DIRECT AND INDIRECT EFFECTS

Death, injury, and disturbance

Death, injury, and disturbance from livestock grazing is not a factor for Great Gray Owl. The Great Gray Owl is a highly mobile tree-nesting species.

Potential reduction in habitat quality

Livestock grazing can influence habitat conditions for Great Gray Owl prey. Vegetation height has been used as a key indicator of habitat capability for Great Gray Owl prey-- specifically, habitat for *Microtus* which is associated with successful owl reproduction (Winter 1981, 1982; Greene 1995; USDA 2001, 2004). In meadow areas of Great Gray Owl Protected Activity Centers (PAC), herbaceous vegetation height must be maintained at a height commensurate with site capability and habitat needs of prey species by Forest Plan Direction (USDA 2010). At the Lower Eagle PAC, site capability was determined using small utilization cages in 2003. The cage results demonstrated that herbaceous vegetation at the site was capable of attaining a 10 -12 inch height. For determining the habitat needs of prey species, we undertook a management study in cooperation with Humboldt State University (Powers et al., 2011; Kalinowski et al. 2014). Study results indicate that vole occupancy was predicted best by a positive relationship with sward height and presence of ungrazed plants such as corn lily (*Veratrum californicum*) providing cover. Sward height is a measure of vegetation height and density obtained from a sward stick. A sward stick consists of a 170 gram plate with a meter stick placed through a slit in the middle. The plate is dropped from 80 cm and the height at which the plate rests is recorded as sward height. Average sward height on vole-occupied sites was 5.6 inches while average sward height on unoccupied sites was 3.29 inches. Statistical models indicated that a sward height of 5.9 inches was needed for a predicted probability of vole occurrence greater than 50 percent and that a sward height of 11.4 inches was needed for a predicted probability of vole occurrence greater than 90 percent (Kalinowski, in prep). These results indicate that a sward height of 5 to 6 inches is commensurate with habitat needs of Microtus spp. and correspond well to guidelines found in Beck (1985) as well as findings in Greene (1995). The Beck (1985) guidelines required a minimum standard of five inches of ungrazed herbaceous vegetation for Great Gray Owl meadows with 10 inches preferred. The Beck model was used on the Stanislaus National Forest at Ackerson Meadows and was shown to be compatible with successful owl reproduction over multiple years. Greene (1995) associated a 12 inch herbaceous vegetation height with vole abundance.

Pocket gophers (*Thomomys* spp.) may serve as an alternate prey species for Great Gray Owls when vole densities are low and in the Stanislaus management study, grazed meadows had higher gopher density and gophers were associated with lower vegetation cover, density, height, and thatch thickness (Powers et al., 2011). The differences found between vole and gopher habitat relationships

may be used to inform grazing management options (Kalinowski et al. 2014) by managing the spatial arrangement of grazed and ungrazed sites to optimize Great Gray Owl foraging opportunities for both primary and alternate prey species (Powers et al. 2011).

In the Lower Eagle PAC, vegetation height for voles would be maintained by a fenced exclusion area. Within the fenced exclusion area, foraging habitat quality would be maximized as a 10" preferred height for vole habitat would be achieved. Under Alternatives 1 and 3 the exclusion area was delineated based on an assessment of the meadow portion with the highest capability closest to the owl activity center. Under Alternative 4, the exclusion area would be expanded beyond the meadow to include the herbaceous vegetation within the historic nest stand itself. While not a meadow habitat type, the historic nest stand is dominated by lodgepole pine with an herbaceous understory capable of supporting voles; this portion of the PAC is representative of habitat utilized by Great Gray Owls in other portions of its range (Bull and Henjum 1990).

For the primary evaluation criteria in this analysis, acres of PAC meadow habitat maintained at a height optimal for primary prey at a reproductive site (*Microtus* spp.), acres of potentially suitable meadow habitat for primary and alternate prey (*Microtus* spp. and *Thomomys* spp. respectively) within an Allotment, and the estimated number of potential territories were used. Permit compliance was assumed in making comparisons.

Alternative 4 potentially affects the least meadow acres and potential reproductive territories. This is largely the result of the large exclusion area in the Willow Unit of Herring Creek Allotment. Acres vary slightly by alternative for the Eagle Meadow Allotment but these acres represent acres within a PAC, a verified reproductive site. The Bell Meadow Allotment acres and potential territories do not vary by alternative because a large exclosure is in place in suitable habitat at Bell Meadow and remains so under all action alternatives.

The Cascade addition includes one potential territory and a meadow with one of the highest vole numbers of any in the prey management study. Thus, there is high potential for a reproductive Great Gray Owl site in the Cascade addition to be affected under Alternative 1. The other proposed additions, McCormick and Niagara, lack habitat capability for Great Gray Owl.

Table 3.13-6 Suitable meadow habitat and potential territory estimate for Great Gray Owl

Area	Suitable Meadow Habitat (acres)	Potential Territory
Bell Meadow Allotment	177	2
Eagle Meadow Allotment	538	4
Proposed McCormick addition	0	0
Proposed Niagara addition	0	0
Herring Creek Allotment	458	8
Proposed Cascade addition	16	1

Given the small census population size and limited geographic distribution of the southern Sierra population of Great Gray Owl (Hull et al. 2010), changes in the number of potential reproductive territories could have important conservation implications for this distinct population.

Table 3.13-7 PAC meadow habitat acres maintained at a height optimal for *Microtus* spp.

Protected Activity Center (PAC)	Alternative 1 (Proposed Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Lower Eagle Meadows	3	3	10

Table 3.13-8 Potentially suitable meadow habitat potentially affected by action alternative (accounting for exclusions that maintain meadow vegetation at a height optimal for *Microtus* spp)

Allotment	Alternative 1 (Proposed Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Bell Meadow	228	228	228
Eagle Meadow	505	505	498
Herring Creek	383	367	167
Total	**1,116**	**1,100**	**893**

Table 3.13-9 Potential reproductive territories affected by action alternative (accounting for exclusions that maintain meadow vegetation at a height optimal for *Microtus* spp)

Allotment	Alternative 1 (Proposed Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Bell Meadow	1	1	1
Eagle Meadow	3	3	3
Herring Creek	9	8	4
Total	**13**	**12**	**8**

CUMULATIVE EFFECTS

The proposed project implements the SNFPA and tiers to the SNFPA analysis. The SNFPA analysis considered and modeled the cumulative effects of implementing SNFPA compliant projects at broad landscape scales within the Sierra Nevada bioregion covered by the plan.

For the site-specific analysis of cumulative effects, the spatial scale of occupied site and potentially suitable meadow habitat were used for the species being analyzed. For past action considerations, current environmental conditions were used as a proxy for the impacts of past actions because the existing condition reflects the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. There are some private inholdings in the Eagle Meadow Allotment boundaries; most of these parcels have summer cabins. Livestock are not permitted to use private inholdings. No State lands occur in the action area. State activities include authorization of hunting and fishing and maintenance of a livestock exclosure on a 30 acre parcel in the Long Valley Subunit for deer habitat improvement.

Lower Eagle Meadow is the only known occupied site. There are no private or State lands or activities that coincide with this occupied site. For past action considerations current environmental conditions were used as a proxy for the impacts of past actions because the existing condition reflects the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. Activities that are presently occurring and that are reasonably foreseeable to continue at this site are dispersed recreation, trail use, and unauthorized Off Highway Vehicle (OHV) use. There is no roaded access to Lower Eagle Meadow. Non-motorized uses, mainly hiking and horseback riding occur on trails located near the meadow edge. The use level appears to be relatively infrequent (i.e. an estimated couple times per week) and below thresholds that would cause site abandonment. Occasionally, perhaps once or twice a year, small groups appear to utilize stone fire rings in the forest along the meadow edge but outside the nest stand. For the last two years, quad tracks from OHVs have been observed in the meadow after hunting season. Such use is unauthorized and if not curbed, could become a significant risk factor to Great Gray Owl and meadow habitat. OHVs could cause disturbance to owl nesting and foraging; wheel rutting could develop and result in erosion. A gate closure repair completed in Fall 2007 (addressing the apparent point of access off Forest Road 5N80) has been effective in curbing the unauthorized OHV use.

Some meadow restoration work is reasonably foreseeable and will benefit Great Gray Owl habitat suitability at the following locations: Crab Meadow and Round Meadow (Bell Meadow Allotment); Burt Reed Meadow (Herring Creek Allotment).

For potentially suitable meadow habitat, other activities that are presently occurring and that are reasonably foreseeable to continue in the action area are recreational trail use and camping. The action alternatives do not add to or promote recreation uses. As camping within meadow habitat is discouraged and generally does not occur, and as most human activity occurs during the day and the owls are mainly nocturnal, it was concluded that the spatial and temporal overlap of these cumulative effects is not an issue.

Willow Flycatcher

DIRECT AND INDIRECT EFFECTS

Death, injury, and disturbance

The Willow Flycatcher is susceptible to death, injury, and disturbance by livestock. For example, livestock can knock over nests (USDA 2001, 2003, 2004). This potential effect appears to be adequately mitigated by protection requirements in Forest Plan Direction (USDA 2010). If breeding Willow Flycatcher is confirmed (e.g. at Lily Lake), those areas will be protected from livestock during the nesting season.

Potential reduction in habitat quality

Livestock grazing can alter willow habitat and exacerbate chronic conditions that influence meadow hydrology (Green et al. 2003). The contemporary influence of managed livestock grazing on Willow Flycatcher status in high quality habitat is unknown at the bioregional scale (Green et al. 2003) as well as locally. However, the two main conditions as per the conservation assessment (Green et al. 2003): meadow drying and meadow condition to maintain meadow wetness throughout the breeding cycle have been maintained as indicated by existing condition. No downward changes are expected under any of the action alternatives.

Brood parasitism

Livestock grazing indirectly affects Willow Flycatcher through the association of Brown-headed Cowbird (*Molothrus ater*) with livestock (Verner and Ritter 1983, Morrison et al. 1999, USDA 2001). On a local level, cowbirds may greatly influence flycatcher productivity, even at high elevations (Green et al. 2003). Generally however, higher elevation forest simply may not provide a full component of habitat requisites for cowbirds, and/or most cowbirds may arrive (with cattle) too late in the nesting season to greatly impact breeding Willow Flycatchers (Green et al. 2003). This appears to be the case for the Allotments in question as Willow Flycatcher protocol surveys conducted on these Allotments indicated very low cowbird numbers (USDA 2008). Locally then, it appears cowbird numbers are well below thresholds to be a conservation concern in these Allotments at this time.

As habitat objectives are being met for this species (Weixelman 2006) and as the SNFPA (USDA 2004) puts protective measures in place for the Willow Flycatcher, and as the proposed action complies with those standards and those of the Conservation Assessment, Willow Flycatcher habitat should remain suitable.

CUMULATIVE EFFECTS

The proposed project implements the SNFPA and tiers to the SNFPA analysis. The SNFPA analysis considered and modeled the cumulative effects of implementing SNFPA compliant projects at broad landscape scales within the Sierra Nevada bioregion covered by the plan.

For the site-specific analysis of cumulative effects, the spatial scale of "historically occupied site" was used for the species being analyzed. The spatial scale of occupied site is the appropriate scale for a site-specific analysis addressing site-specific impacts to the species being addressed.

There are no private or State lands or activities that coincide with occupied sites in the analysis area. For past action considerations, current environmental conditions were used as a proxy for the impacts of past actions because the existing condition reflects the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

Activities that are presently occurring and that are reasonably foreseeable to continue at historically occupied sites are identified and discussed below by site based on specialist experience making field visits to the sites:

Willow Meadow

Other activities at Willow Meadow are quite limited. A little used horse trail is present; there is no roaded access. No vegetation management activities are planned.

Long Valley 2

The Long Valley 2 site receives moderate recreation use in that recreational users are typically present most weekdays and probably all weekends. A designated motorized trail skirts one boundary of the site and an unclassified horse trail skirts the other. OHV noncompliance probably occurs on the order of several times each month (i.e. unauthorized cross-country travel off the designated trail). Portions of the horse trail meander through willow habitat. The Long Valley OHV Restoration (Decision Memo, April 10, 2015) project will improve water quality, soil productivity and natural vegetation resources by stabilizing, restoring and protecting water, soils, vegetation, and wildlife habitat damaged by unauthorized motorized use in areas hydrologically connected to Long Valley Creek.

Eagle Meadow

Eagle Meadow receives high-levels of recreation use; users are typically present every day. Recreation use types include stock use special events (i.e. horse group trail rides), hiking, mountain biking, and dispersed camping. Recreational stock use of the meadow probably occurs most weekdays and all weekends.

Upper Bell Meadow

Upper Bell Meadow receives high-levels of recreation use; users are typically present every day. The recreation use types are primarily hiking, fishing, and horseback riding. Hiking and horseback riding uses largely remain on a system trail on the meadow edge. Fishing activity occurs probably daily in willow habitat. Anglers working their way to fishing spots could potentially knock over flycatcher nests if nests were present.

Mule deer

DIRECT AND IND/RECT EFFECTS

Death, injury, and disturbance

Specific to this analysis area, the presence of livestock has the potential to disturb and displace mule deer from preferred habitat. Based on a comprehensive study on cattle-deer interactions that was conducted on the Stanislaus in the 1980s (Loft et al. 1987; 1989; 1991), we know that deer on the Stanislaus shift habitat use by reducing use of habitats preferred by cattle and increasing use of habitats avoided by cattle. Cattle and deer both prefer meadow, riparian, and aspen habitats.

Of the action alternatives, Alternative 4 would have the lowest potential of disturbing deer while Alternative 1 would have the highest. In particular, the Alternative 1 Allotment additions (McCormick, Niagara, and Cascade) could impact an additional 8,269 acres of deer habitat by

potentially displacing deer to less preferred habitat. This displacement could result in lower fawn recruitment and survival. Under Alternatives 3 and 4, no Allotment additions are proposed so the potential for deer-cattle interactions within the 8,269 acres of proposed additions would not be an issue. Of the action alternatives, Alternative 4 would result in the least disturbance to deer as livestock numbers would be lowest and the overall amount of acres subject to deer-cattle interactions would be lowest. (Tables 3.13-10 and 3.13-11).

Table 3.13-10 Number of cow/calf pairs potentially displacing mule deer

Allotment	Alternative 1 (Proposed Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Bell Meadow	80	80	64
Eagle Meadow	150	150	120
Herring Creek	156	156	78
Total	386	386	262

Table 3.13-11 Deer range acres subject to deer-cattle interactions

Allotment	Alternative 1 (Proposed Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Bell Meadow	13,300	13,300	13,239
Eagle Meadow	25,155	20,300	20,300
Herring Creek	23,676	20,262	9,347
Total	62,131	53,862	42,886

Potential reduction in habitat quality

Specific to this analysis area, livestock use has the potential to reduce habitat quality for mule deer. A comprehensive study on cattle-deer interactions was conducted on the Stanislaus in the 1980s (Kie et al. 1991; Loft et al. 1987, 1991, 1993; Loomis et al. 1991). The results of this research indicated that “moderate” grazing, defined in the study as similar to existing levels, decreased hiding cover for deer, reduced use of preferred habitat by deer, increased home range size of deer, and increased energetic demands for deer (ibid). Loomis et al. (1991) concluded that based on study results, continuous moderate grazing provides an estimated 82 % of the potential deer carrying capacity for an area. The amount of preferred deer habitat potentially affected by a reduction in habitat quality varies by alternative.

Table 3.13-12 Acres preferred deer habitat (meadow, riparian and aspen) quality potentially reduced

Allotment	Alternative 1 (Proposed Action)	Alternative 3 (Current Management)	Alternative 4 (Resource Protection)
Bell Meadow	5,337	5,340	5,291
Eagle Meadow	9,854	7,703	7,646
Herring Creek	9,310	7,874	4,829
Total	24,501	20,917	17,766

CUMULATIVE EFFECTS

For the site-specific analysis of cumulative effects for this species, the spatial scale of potential suitable habitat that overlaps the action area was used. Past action considerations relied on current environmental conditions as a proxy for the impacts of past actions because the existing condition reflects the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. There are some private inholdings in the Eagle Meadow Allotment boundaries; most of these parcels have summer cabins. Livestock are not

permitted to use private inholdings. No State lands occur in the action area. State activities include authorization of hunting and fishing and maintenance of a livestock exclosure on a 30 acre parcel in the Long Valley Subunit for deer habitat improvement. Other activities that are presently occurring and that are reasonably foreseeable to continue in the action area are recreational trail use, camping, and hunting. Hunting of deer is highly regulated and managed by CDFW. For example, CDFW recently reduced the number of deer tags available in the allotments area by nearly 30 percent largely in response to the immediate impact of the 2013 Rim Fire. Deer herd recovery is expected to improve as vegetation regrowth progresses in the burned area.

Summary of Effects Analysis across All Alternatives

Sierra Nevada red fox

Under Alternative 4, the least amount of suitable SNRF habitat is potentially affected (13,938 acres) while Alternative 1 has the most (20,337 acres) and Alternative 3 totals 17,911 acres. The potential for SNRF prey habitat changes would be greatest under Alternative 1 and least under Alternative 4 (Tables 3.13-4 and 3.13-5) but there is a great deal of uncertainty as to how any changes may impact Sierra Nevada red fox.

Great Gray Owl

Alternative 4 potentially affects the least meadow acres and potential reproductive territories. There is high potential for a reproductive Great Gray Owl site in the Cascade addition to be affected under Alternative 1. The reduction of livestock numbers in Alternative 4 and concomitant increase in the amount of meadow vegetation would likely improve habitat conditions for voles, increase vole abundance, and reduce vole population cycling time.

Willow Flycatcher

Habitat objectives are being met for this species (Weixelman 2006) as the SNFPA (USDA 2004) puts protective measures in place for the Willow Flycatcher. The proposed action complies with those standards and those of the Conservation Assessment, therefore Willow Flycatcher habitat should remain suitable.

Mule deer

Under Alternative 4, the least amount of suitable deer habitat is potentially affected (24,562 acres) while Alternative 1 has the most (29,715 acres) and Alternative 3 totals 29,376 acres. The potential for disturbance would be greatest under Alternative 1 and least under Alternative 4 (Tables 3.13-10 and 3.13-11)

Compliance with the Forest Plan and Other Direction

Sierra Nevada red fox

Standards and Guidelines are limited to #32 (USDA 2004) which calls for an analysis of activities within 5 miles of a verified Sierra Nevada red fox detection and an evaluation of activities for a 2-year period. While suitable habitat for Sierra Nevada red fox is contiguous with occupied habitat, no verified detections have occurred to date within 5 miles of the action area.

Great Gray Owl

Great Gray Owl surveys will continue as funding and staffing allow.

The action alternatives call for maintaining herbaceous vegetation height commensurate with the needs of Great Gray Owl prey as informed by a special management study. Alternative 4 provides the most assurance that this standard will be met.

Standards apply mainly to habitat condition and objectives in meadows and are addressed by the action alternatives (Watershed Report). Great Gray Owl will benefit by application of these standards.

The ecological importance for the management, restoration, and monitoring of meadow and riparian habitats in the Sierra Nevada is well established (Ratliff 1985; USDA 2001, 2004; Potter 2005).

Willow Flycatcher

The action alternatives maintain habitat suitability for Willow Flycatcher.

Standards apply mainly to habitat condition and objectives in meadows and are addressed by the action alternatives (Watershed Report, project record). Willow Flycatcher will benefit by application of these standards. The ecological importance for the management, restoration, and monitoring of meadow and riparian habitats in the Sierra Nevada is well established (Ratliff 1985; USDA 2001, 2004; Potter 2005).

Mule deer

Mule deer – Protect habitat needs on identified critical summer and winter range, especially where fawning areas are located. While deer carrying capacity may be reduced, the action alternatives, largely through application of utilization standards, largely maintain deer habitat capable of supporting a viable population of deer in the action area.

3.14 SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101). Alternatives 2, 4, 1, then 3 respectively from most to least could potentially improve the long-term productivity by reducing the impacts of grazing on the landscape. Where not already impaired due to legacy impacts, resource conditions would be maintained or would show improvement towards desired conditions.

3.15 UNAVOIDABLE ADVERSE EFFECTS

Implementation of any of the alternatives would result in some unavoidable adverse environmental effects. Although formation of the alternatives included avoidance of some effects, other adverse effects could occur that cannot be completely mitigated. The environmental consequences section for each resource area discusses these effects.

3.16 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of a mined ore. No irreversible commitments of resources would result from implementation of any of the alternatives because no permanent, irreversible resource loss would occur.

Irretrievable commitments are those that are lost for a period of time such as the temporary poor condition of vegetation in an individual management unit. Irretrievable losses can be regained over time. No irretrievable commitments of resources would result from implementation of the No Action Alternative because no grazing would occur and, therefore, no significant resource losses of any kind would result. The annual use of forage by livestock would be an ongoing irretrievable loss while grazing is authorized on these Allotments. Short-term rangeland vegetation loss (foraging, browsing, and trampling of vegetation) would occur in grazed areas under all action alternatives. These losses would be temporary because the vegetation would recover to its potential productivity if grazing ceased to occur. Implementation of all action alternatives would irretrievably commit an indeterminate amount of fossil fuels in order to execute and manage grazing activities over time.

3.17 OTHER REQUIRED DISCLOSURES

National Environmental Policy Act of 1969: NEPA at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders." This EIS was prepared in accordance with the following regulations:

National Historic Preservation Act: The National Historic Preservation Act (NHPA) of 1966 is the principle, guiding statute for the management of cultural resources on NFS lands. Section 106 of NHPA requires federal agencies to consider the potential effects of a Preferred Alternative on historic, architectural, or archaeological resources that are eligible for inclusion on the National

Register of Historic Places and to afford the President's Advisory Council on Historic Preservation an opportunity to comment. The criteria for National Register eligibility and procedures for implementing Section 106 of NHPA are outlined in the U.S. Code of Federal Regulations (36 CFR Parts 60 and 800, respectively). Section 110 requires federal agencies to identify, evaluate, inventory, and protect National Register of Historic Places resources on properties they control.

Potential impacts to archaeological and historic resources were evaluated in compliance with Section 106. The Forest Service and the California State Historic Preservation Officer (SHPO) have agreed that the rangeland management program will be performed in accordance with the terms and conditions of a Programmatic Agreement (PA, FS No. 06-MU- 11040218-059, project record) to satisfy the Stanislaus NF's NHPA Section 106 responsibilities for all individual undertakings of the program. The PA outlines procedures for the identification, evaluation, and resolution of adverse effects to historic properties in Allotment areas. The criteria for determining adverse effects are outlined in the PA. The resolution of adverse effects, if adverse effects area identified, is also established in the PA.

Public law protects the confidentiality of cultural resources information. The Archeological Resources Protection Act, as referenced in the Freedom of Information Act, protects from public disclosure the nature and location of archeological sites. For this reason, site locations in the project area are not displayed in the EIS, nor are the contents of these sites discussed in detail.

Executive Order 12898 Environmental Justice: EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (issued February 11, 1994), requires that each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high or adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. None of the alternatives disproportionately affect minority and low-income populations. Social and economic effects of all alternatives were analyzed (Chapter 3.08, Society, Culture and Economy).

Clean Water Act: regulates the dredging and filling of freshwater and coastal wetlands. Section 404 (33 USC 1344) prohibits the discharge of dredged or fill material into waters (including wetlands) of the United States without first obtaining a permit from the U.S. Army Corps of Engineers. Wetlands are regulated in accordance with federal Non-Tidal Wetlands Regulations (Sections 401 and 404). No dredging or filling is part of this proposed action and no permits are required.

Clean Air Act of 1970: provides for the protection and enhancement of the nation's air resources. No exceeding of the federal and state ambient air quality standards is expected to result from any of the alternatives.

Endangered Species Act (ESA) of 1973: requires that any action authorized by a federal agency not be likely to jeopardize the continued existence of a threatened or endangered species, or result in the destruction or adverse modification of habitat of such species that is determined to be critical. Section 7 of the ESA (16 USC 1531 et seq.), as amended, requires the responsible federal agency to consult the USFWS and the National Marine Fisheries Service concerning endangered and threatened species under their jurisdiction.

The USFWS was consulted during analysis, and project activities (permitted grazing) were assessed to determine their effects on threatened, endangered, and candidate plant and animal species. Two amphibian species (*Yosemite toad* and *Mountain Yellow-Legged Frog*, were listed in 2014 as threatened and endangered respectively), two Forest Service sensitive terrestrial wildlife species (*Willow Flycatcher* and *Great Grey Owl)* and one candidate terrestrial wildlife species *(Sierra Nevada Red Fox)* are found within the project analysis area in Tuolumne County, California (USFWS 2012). The Wildlife BE prepared for this project indicates that continued grazing "**May Affect**

individuals, but is not likely to result in a trend towards Federal listing or loss of viability" for the *Willow Flycatcher, Great Grey Owl and Sierra Nevada Red Fox* (EIS Chapter 3.13 and Wildlife BE, project record) The Biological Assessment-Aquatics prepared for this project indicates that continued grazing "**May Affect and is Likely to Adversely Affect**" *Yosemite toad and Sierra Nevada Yellow-Legged Frog.* (EIS Chapter 3.02 and Aquatics BA, project record). There are no Federally Threatened, Endangered, or Candidate Plants in the project area.

National Forest Management Act (NFMA) of 1976: amends the Forest and Rangeland Renewable Resources Planning Act of 1974 and sets forth the requirements for Land and Resource Management Plans (Forest Plans) for the National Forest System. The proposed action is consistent with the NFMA and the Forest Plan.

Federal Land Policy and Management Act (FLPMA), Section 402(G): This project would be in compliance with FLPMA, Section 402(G) because two year advance notice of term grazing permit cancellation would be given to the permittees for the Bell Meadow, Eagle Meadow, and Herring Creek Allotments, as required, if Alternative 2 (No Action Alternative) is selected by the responsible official or if permit cancellation is deemed appropriate through the regular permit administration process.

Executive Order 11988, Floodplain Management: Floodplains are found along stream channels throughout the Allotments. Implementation of any of the action alternatives would maintain or improve the existing condition of these floodplains by maintaining or improving meadow conditions. The No Action Alternative (Alternative 2) would also improve the condition of floodplains. The intent of Executive Order 11988 would be met since this project would not affect floodplains in the BEH Range Allotments analysis area and thereby would not increase flood hazard.

Executive Order 11990, Protection of Wetlands: Wetlands within the project area include meadows, stream channels, springs, fens, and shorelines. This project is consistent with Executive Order 11990 since this project would maintain or improve the condition of wetlands in the BEH Range Allotments (Chapter 3.02 Aquatic Species and Watershed Report, project record).

Prime Farmland, Rangeland, and Forest Land (USDA Regulation 9500-3): There are no prime farmlands, rangelands, or forest lands located on the Stanislaus National Forest (Forest Plan EIS, p. 3-979). Therefore no effects to prime farmland, rangeland, or forest lands would occur with implementation of any of the alternatives.

Migratory Bird Treaty Act: The Migratory Bird Treaty Act decreed that all migratory birds and their parts (including eggs, nests, and feathers) were fully protected. Under the Act, taking, killing or possessing migratory birds is unlawful. The original intent was to put an end to the commercial trade in birds and their feathers that had wreaked havoc on the populations of many native bird species. On January 17, 2001, President Clinton signed an executive order directing executive departments and agencies to take certain actions to further implement the Migratory Bird Treaty Act (FR Vol. 66, No.11, January 17, 2001).

The Forest Service and U.S. Fish and Wildlife Service have entered into a memorandum of understanding (MOU) to promote the conservation of migratory birds as a direct response to the executive order (USDA Forest Service and USFWS 2008). One of the steps outlined for the Forest Service is applicable to this analysis: "*Within the NEPA process, evaluate the effects of agency actions on migratory birds, focusing first on species of management concern along with their priority habitats and key risk factors*." The Forest Service additionally agreed, to the extent practicable, to evaluate and balance benefits against adverse effects, to pursue opportunities to restore or enhance migratory bird habitat, and to consider approaches for minimizing take that is incidental to otherwise lawful activities.

The selected alternative would comply with the Migratory Bird Treaty Act but may result in an "unintentional take" of individuals during proposed activities. However the project complies with the U.S. Fish and Wildlife Service Director's Order #131 related to the applicability of the Migratory Bird Treaty Act to Federal agencies and requirements for permits for "take". In addition, this project complies with Executive Order 13186 because the analysis meets agency obligations as defined under the January 16,2001 Memorandum of Understanding between the Forest Service and U.S. Fish and Wildlife Service designed to complement Executive Order 13186. If new requirements or direction result from subsequent interagency memorandums of understanding pursuant to Executive Order 13186, this project would be reevaluated to ensure that it is consistent.

4. Consultation and Coordination

The first section of this chapter shows the preparers and contributors followed by a second section outlining the distribution of the EIS.

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4.02 DISTRIBUTION OF THE EIS

The Forest Service is circulating either the EIS or a notice of the availability of the EIS to the following agencies, elected officials, tribes, organizations and individuals.

Federal, State and Local Agencies

Advisory Council on Historic Preservation
US Fish and Wildlife Service
Tuolumne County Administrator's Office
Calaveras County Board of Supervisors
Tuolumne County Board of Supervisors
California Department of Fish & Game
California Regional Water Quality Control Board - Central Valley Region, Sacramento
California Regional Water Quality Control Board - Central Valley Region, Redding

Tribes

Tuolumne Band of Me-Wuk Indians
Chicken Ranch Tribal Council
Washoe Tribe of Nevada and California
California Valley Miwok Tribe
American Indian Council of Mariposa County
Calaveras Band of Miwuk Indians

Organizations

California Farm Bureau Federation
California Cattlemen's Association
Tuolumne County Alliance for Resources and Environment
Central Sierra Environmental Resource Center
Sierra Forest Legacy
Western Watershed Project
High Sierra Hiker's Association
Dodge Ridge Corporation
Pacific Crest Trail Association

Elected Officials

U.S. Senator Barbara Boxer
U.S. Senator Diane Feinstein
U.S. Representative Tom McClintock
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Index

Additions
Cascade, 8, 14, 15, 16, 17, 54, 73, 74, 80, 81, 92, 95, 113, 121, 123, 134, 138, 139, 141, 148, 149, 150, 166, 167, 169, 172, 173, 174, 181, 182, 183, 184, 201, 202, 203, 206, 208, 211, 213
McCormick, 8, 15, 16, 17, 28, 73, 91, 112, 139, 148, 149, 150, 162, 163, 172, 173, 174, 182, 183, 201, 203, 206, 208, 211
Niagara, 5, 8, 15, 16, 17, 20, 24, 52, 57, 73, 80, 91, 106, 107, 112, 121, 123, 124, 139, 148, 149, 150, 158, 162, 163, 172, 173, 174, 182, 183, 201, 203, 206, 208, 211
Affected Environment, 1, 39, 40, 41, 47, 73, 89, 95, 104, 120, 128, 135, 145, 157, 189, 200
Air Quality, 42
Allotment Management Plans, 3, 8, 9, 14, 18, 21, 28, 32, 98
Allotments
Bell Meadow, 1, 2, 3, 5, 6, 7, 8, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 30, 31, 36, 41, 47, 49, 51, 52, 54, 55, 56, 62, 73, 74, 78, 80, 81, 83, 89, 91, 92, 93, 94, 95, 96, 97, 105, 106, 107, 108, 109, 110, 111, 112, 114, 116, 117, 121, 122, 124, 130, 131, 132, 136, 139, 141, 145, 146, 147, 148, 149, 156, 157, 158, 159, 160, 161, 162, 163, 165, 166, 167, 171, 172, 173, 174, 177, 178, 180, 182, 183, 185, 189, 191, 192, 193, 194, 195, 200, 201, 203, 204, 206, 208, 209, 210, 211, 212, 218
Eagle Meadow, 1, 2, 3, 5, 6, 7, 8, 9, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 30, 31, 32, 36, 41, 47, 49, 52, 55, 57, 65, 68, 70, 73, 76, 78, 80, 81, 90, 91, 92, 94, 95, 96, 97, 106, 107, 108, 109, 110, 112, 113, 115, 116, 117, 121, 122, 123, 124, 130, 131, 132, 136, 139, 141, 146, 149, 157, 158, 162, 163, 164, 165, 166, 172, 173, 174, 177, 178, 180, 182, 183, 185, 189, 191, 192, 193, 194, 200, 201, 202, 203, 204, 206, 207, 208, 209, 211, 212, 218
Herring Creek, 1, 2, 3, 5, 6, 7, 8, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 30, 31, 36, 41, 47, 48, 49, 52, 55, 57, 62, 66, 69, 73, 74, 78, 80, 81, 83, 84, 91, 92, 94, 95, 96, 106, 107, 108, 109, 110, 113, 114, 117, 121, 123, 124, 130, 131, 132, 135, 136, 139, 140,141, 146, 149, 155, 156, 157, 158, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 177, 178, 180, 182, 183, 185, 189, 191, 192, 193, 194, 195, 200, 201, 203, 206, 208, 209, 210, 212, 218
Alternatives
Alternative 1 (Proposed Action), 8, 14, 16, 18, 21, 25, 32, 33, 57, 66, 67, 79, 85, 92, 111, 118, 122, 130, 139, 148, 151, 172, 191, 195, 206
Alternative 2 (No Action), 18, 30, 31, 32, 33, 66, 67, 82, 85, 93, 114, 118, 124, 131, 140, 149, 151, 177, 186, 192, 195
Alternative 3 (Current Management), 18, 19, 20, 32, 33, 67, 83, 85, 93, 115, 118, 125, 132, 139, 140, 149, 151, 179, 193, 194, 195, 206
Alternative 4 (Resource Protection), 21, 23, 24, 25, 30, 31, 67, 84, 85, 93, 117, 125, 132, 141, 150, 182, 194, 195
Aquatic Habitat
Aquatic habitat, 173, 177, 179, 183
Aquatic Species Sensitive
Sierra Nevada Yellow-legged Frog, 66
Aspen, 5, 7, 20, 42, 90, 94, 95, 96, 110, 112, 189
Authorization Parameters
AUMs, 100, 130, 133, 139, 141
infrastructure, 9, 15, 17, 19, 22, 24, 34, 88, 92, 133
permitted grazing area, 15, 19, 21, 22, 31, 117
utilization standards, 16, 23, 107
Counties
Tuolumne County, 2, 11, 41, 78, 128, 129, 130, 133, 217
Economy
economic, 40, 128, 129, 131, 132
employment, 128, 129
income, 128, 129, 131, 133, 217
Environmental Consequences, 1, 39, 40, 57, 79, 92, 96, 111, 121, 130, 137, 142, 148, 172, 189, 205
cumulative effects, 39, 71, 83, 113, 125, 132, 133, 141, 176, 181, 182, 184
summary of effects, 85, 118
Forage Utilization, 16, 19, 23, 32, 69, 101, 107, 115, 116, 172
Forest Plan
Forest Plan Direction, 4, 8, 14, 44, 46, 69, 71, 94, 98, 104, 107, 108, 112, 113, 116, 117, 118, 120, 126, 133, 134, 142, 144, 147, 148, 150, 152, 154, 177, 180, 182, 184, 186, 188, 196, 207, 210
SNFPA, 6, 37, 203, 209, 210, 213
Standards and Guidelines, 6, 11, 18, 19, 20, 24, 25, 32, 36, 44, 45, 79, 100, 106, 107, 111, 139, 140, 141, 148, 149, 150, 152, 172, 179, 182, 185, 186, 213
Indicators, 47, 72, 89, 94, 103, 120, 128, 134, 144, 153, 154, 188, 199
Infrastructure
cattleguards, 15, 22
corrals, 5, 6, 15, 21, 22, 23, 54, 66, 90, 106, 108, 109, 138, 167, 168, 169, 183
fences, 15, 16, 22, 32, 130, 131, 132, 180
troughs, 16, 20, 22

Invasive Species
noxious and invasive weeds, 7, 26, 72, 94, 95, 96, 97, 102, 103, 105
Issues
significant issues, 11
Meadow Condition
Ecological Status, 6, 103
Meadow Hydrologic Function, 5, 27, 36, 111, 134, 139, 141, 154, 158, 159, 163, 167, 168, 172, 175, 176, 177, 179, 181, 182, 184
Mitigation
Adaptive Management Strategy, 18, 20, 24, 25, 28, 29, 32, 176
Resource Conservation Measures, 11, 18, 20, 24, 25, 27, 32, 139, 141, 148, 150, 152, 176, 182
Standards and Guidelines, 6, 11, 18, 19, 20, 24, 25, 32, 36, 44, 45, 79, 100, 106, 107, 111, 139, 140, 141, 148, 149, 150, 152, 172, 179, 182, 185, 186, 213
Mitigation and Other Requirements, 15, 18, 20, 21, 24, 25, 97, 148
Monitoring, 28, 29, 32, 46, 55, 97, 103, 104, 106, 107, 108, 110, 111, 117, 118, 120, 139, 141, 148
Recreation
developed campgrounds, 34, 121
dispersed camping, 7, 121, 123, 124, 211
hiking, 42, 114, 120, 121, 146, 155, 191, 193, 209, 211
horseback, 42, 62, 120, 121, 122, 189, 209, 211
Recreation opportunity spectrum (ROS), 120, 121, 122, 123, 125, 126
recreation use, 114, 120, 125, 146, 170, 189, 207, 210, 211
trailhead, 42, 121, 122, 161, 189
Regulations
Clean Air Act, 9, 217
Clean Water Act, 7, 9, 98, 152, 154, 217
Endangered Species Act, 9, 98, 198, 200, 217
Environmental Justice, 128, 129, 133, 217
Forest and Rangeland Renewable Resources Planning Act, 4, 9, 98, 218
National Historic Preservation Act, 9, 216
NEPA, 1, 3, 9, 12, 14, 18, 28, 29, 30, 40, 41, 43, 44, 98, 120, 196, 216, 218
NFMA, 218
Research Natural Areas
Bell Meadow RNA, 146, 148
Resource Conditions
PFC, 25, 27, 28, 29, 36, 51, 53, 54, 57, 111, 117, 137, 138, 140, 154, 158, 159, 160, 163, 164, 167, 168, 169, 172, 173, 174, 177, 178, 179, 180, 182, 183, 184, 185, 186
Riparian
Critical Aquatic Refuge, 41
Riparian Conservation Area, 41, 154
Riparian Conservation Objectives, 152, 186
Riparian Vegetation, 109
Sensitive Plants
Mingan moonwort, 75, 77
Society and Culture
social, 40, 128, 131, 132, 217
Soil, 35, 40, 51, 66, 69, 134, 135, 137, 138, 139, 140, 142, 146
Special Aquatic Features
fens, 33, 39, 79, 81, 82, 83, 84, 85, 111
seeps, 33, 79, 80, 82, 83, 84, 85
shorelines, 160, 169, 173
springs, 6, 154, 176, 182, 184
streambanks, 33, 139, 152, 179, 186
wetlands, 217, 218
Special Areas
Research Natural Areas, 144, 146
Roadless Areas, 144, 145, 148
Special Interest Areas, 144, 147
Wild and Scenic Rivers, 41, 144, 147, 149, 157
Wilderness, 4, 7, 37, 40, 41, 42, 48, 54, 57, 70, 78, 97, 98, 144, 145, 146, 188, 189, 190, 191, 192, 193, 194, 195, 196
Special Interest Areas
Bull Run SIA, 144, 145, 147, 148, 151
Terrestrial Wildlife
deer, 20, 204, 205, 212, 213
PACs, 6, 26, 110, 202, 207, 208
Terrestrial Wildlife Sensitive
Great Gray Owl, 6, 22, 37, 110, 113, 116, 198, 200, 201, 202, 203, 207, 208, 209, 210, 213
Northern Goshawk, 200
Sierra Nevada Red Fox, 37, 200, 201, 206, 217
Willow Flycatcher, 37, 110, 200, 203, 204, 210, 213, 214, 217
Vegetation, 41, 105, 145, 146, 157, 163, 167, 207
meadow vegetation, 6
riparian vegetation, 104, 153, 186
Water Quality, 7, 37, 153, 154, 155, 177, 185
Watershed, 22, 36, 37, 40, 51, 69, 71, 99, 152, 153, 154, 158, 161, 162, 165, 166, 170, 171, 172, 176, 177, 182, 196, 213, 214, 218
Cumulative watershed effects, 176
Meadow Hydrologic Function, 111, 153, 154, 186
water quality, 7, 37, 153, 154, 155, 177, 185
Wilderness, 4, 7, 37, 40, 41, 42, 48, 54, 57, 70, 78, 97, 98, 144, 145, 146, 188, 189, 190, 191, 192, 193, 194, 195, 196
Wildlife
PACs, 6, 26, 110, 202, 207, 208
Wildlife Sensitive
Great Gray Owl, 6, 22, 37, 110, 113, 116, 198, 200, 201, 202, 203, 207, 208, 209, 210, 213
Northern Goshawk, 200
Sierra Nevada Red Fox, 37, 200, 201, 206, 217
Willow Flycatcher, 37, 110, 200, 203, 204, 210, 213, 214, 217

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A. Abbreviations and Acronyms

ACHP	Advisory Council on Historic Preservation
AMP	Allotment Management Plan
AMS	Aquatic Management Strategy
AOI	Annual Operating Instructions
APE	Area of Potential Effects
ARPA	Archaeological Resources Protection Act
ARU	Automated Recording Unit
AUM	Animal Unit Month
BA	Biological Assessment
BE	Biological Evaluation
BEH	Bell Meadow, Eagle Meadow, and Herring Creek (Allotments)
BMP	Best Management Practice(s)
CAR	Critical Aquatic Refuge
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CFU	Colony Forming Unit
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRMR	Cultural Resources Management Report
CWE	Cumulative Watershed Effects
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	(US) Environmental Protection Agency
ERA	Equivalent Roaded Acres
ESA	Endangered Species Act of 1973
FAR	Functional At-Risk
FLPMA	Federal Land Policy and Management Act
FONSI	Finding of No Significant Impact
FSEIS	Final Supplemental Environmental Impact Statement
FSH	Forest Service Handbook
FSM	Forest Service Manual
GGO	Great Gray Owl
GIS	Geographic Information System
GPS	Global Positioning Systems
HUC	Hydrologic Unit Code
IDT	Interdisciplinary Team
IRA	Inventoried Roadless Area
LRMP	Land and Resources Management Plan
LTCTM	Long Term Condition and Trend Monitoring
MHF	Meadow Hydrologic Function
MHFRA	Meadow Hydrologic Function Rapid Assessment
MIM	Multiple Indicator Monitoring
MIS	Management Indicator Species
MOU	Memorandum Of Understandig
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFS	National Forest System

NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
NRIS	Natural Resource Information System
NVUM	National Visitor Use Monitoring
OHV	Off-Highway Vehicle
OR	Outstandingly Remarkable
ORV	Off Road Vehicle
PA	Programmatic Agreement
PAC	Protected Activity Center
PFC	Proper Functioning Condition
PSW	Pacific Southwest (Research Station)
QAPP	Quality Assurance Project Plan
RCA	Riparian Conservation Area
RCO	Riparian Conservation Objective
RIVPACS	River Invertebrate Prediction and Classification System
RNA	Research Natural Area
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
RPD	Relative Percent Difference
RWQC	Recreational Water Quality Criteria
SHPO	State Historic Preservation Officer
SIA	Special Interest Area
S&G	Standard and Guideline(s)
SNFPA	Sierra Nevada Forest Plan Amendment
SNRF	Sierra Nevada Red Fox
SOPA	Schedule of Proposed Actions
SPD	Salmon Poisoning Disease
SRPM	Standard resource Protection Measure
SSI	StreamScape Inventory
SCI	Stream Condition Inventory
STV	Statistical Threshold Value
TE	Threatened and Endangered
TES	Threatened, Endangered and Sensitive
TEPS	Threatened, Endangered, Proposed and Sensitive
TN	Total Nitrogen
TOC	Threshold of Concern
T/O	Taste and Odor
TP	Total Phosphorus
TR	Technical Reference
TUD	Tuolumne Utilities District
UCD	University of California, Davis
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VQO	Visual Quality Objective
WFL	Willow Flycatcher

B. Cumulative Effects Analysis

According to the Council on Environmental Quality (CEQ) NEPA regulations, "cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR 1508.7). The District queried its databases, including the Schedule of Proposed Actions (SOPA) to determine past, present and reasonably foreseeable future actions as well as present and reasonably foreseeable future actions on private land. This appendix lists the specific findings and information used for the cumulative effects analysis presented for each resource in Chapter 3. This list is not all inclusive since budgets and changing landscape conditions may warrant changes in management priorities or direction.

PAST ACTIONS

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. Existing conditions reflect the aggregate impact of all prior human actions and natural events that affected the environment and might contribute to cumulative effects. This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis for three reasons:

5. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Innumerable actions over the last century (and beyond) impacted current conditions and trying to isolate the individual actions with residual impacts would be nearly impossible.
6. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because information on the environmental impacts of individual past actions is limited, and one cannot reasonably identify each and every action over the last century that contributed to current conditions. Additionally, focusing on the impacts of past human actions ignores the important residual effects of past natural events which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects.
7. Finally, the CEQ issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions" (CEQ 2005).

The cumulative effects analysis in this EA is also consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (73 Federal Register 143, July 24, 2008; p. 43084-43099), which state, in part:

> "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives will add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonably foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision making. (40 CFR 1508.7)"

For these reasons, the analysis of past actions in this section is based on current environmental conditions described in Chapters 1 and 2. If warranted, specialist reports (including BAs and BEs) provide rationale for addressing specific past projects.

PRESENT ACTIONS

For the purposes of cumulative effects analysis, present actions are land disturbance actions with completed NEPA decisions that are not yet fully implemented on the ground. Following is a list of the present land disturbance actions, including brief descriptions of each.

- **Dodge Ridge Upper Road and Base Improvements**: involves improvements to existing ski lift infrastructure, grading of existing trail and installation of an emergency helicopter landing zone and approval of existing equipment storage sheds.
- **Gooseberry Ecological Restoration**: retains and/or re-establishes the ecological resilience of the landscape to achieve long-term sustainability and to provide a broad range of ecological services. Project activities include forest thinning, re-introduction of fire, aspen restoration, meadow restoration, reducing resource impacts caused by roads, trails, and recreation sites, and noxious weed eradication.
- **Juniper Uranium Mine Remediation Project**: involves remediation (clean up) of the abandoned Uranium mine located within the Eagle Meadow Allotment, near Red Rock Meadow.
- **Leland Helicopter 2**: project involves hand thinning with helicopter removal of merchantable logs and hand felling and jackpot burning of non-merchantable material and existing natural fuels on 101 acres adjacent to Leland Meadows.
- **Niagara Aspen Stimulus**: stimulate aspen regeneration by removing encroaching conifers in and around aspen stands.
- **Strawberry Fuel Reduction and Forest Health**: project involves fuel reduction and forest health treatments including thinning, biomass removal, shredding, hand treatments, under burning, and riparian treatments near the communities of Strawberry and Cold Springs.
- **Summit Facilities Hazard Tree Removal**: removal of hazard trees that threaten facilities.

- **Long Valley OHV Restoration**: install rock barriers, wood post barriers, and till devegetated compacted areas on 1 acre of polygon features and 1.5 miles of linear features along Road 5N01A, in areas hydrologically connected to Long Valley Creek.
- **Coyote Meadow Restoration**: Stabilize three headcuts in meadow and re-route trail away from stream and wet portion of meadow.
- **Shell Meadow Restoration**: Stabilize headcuts and remove encroaching conifers within Shell Meadow.

ONGOING ACTIVITIES

- **Recreation**: Recreation is abundant in the area and consists of activities including, but not limited to, Off Highway Vehicle (OHV) use, sight-seeing, wood cutting, camping, hiking, cycling, fishing, backpacking, horseback riding, and winter sports.
- **Livestock Grazing**: There are three active grazing Allotments adjacent to the project area and partially within the cumulative analysis area. These three Allotments, combined with the Allotments being analyzed, run up to a total of 992 cow/calf pairs (4014 Animal Unit Months). Livestock grazing is subject to forage utilization and other standards to protect forest resources.
- **Roadside Hazard Tree Removal**: removal of hazard trees along paved roads to prevent potential tree failure that may result in property damage or personal injury.

REASONABLY FORESEEABLE FUTURE ACTIONS

For the purposes of cumulative effects analysis, reasonably foreseeable future actions are land disturbance projects with proposed actions published in the Stanislaus National Forest SOPA and without completed NEPA decisions. Reasonably foreseeable future Forest Service land disturbance actions are listed below, followed by a brief general description of the project purpose types.

- **Over Snow Vehicle Designation EIS:** Evaluates existing management of oversnow vehicle (OSV) use. The goal of this project is to designate system roads, trails and areas where OSV use will be allowed or prohibited.

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C. Forest Plan Direction

The Stanislaus National Forest, Forest Plan Direction (USDA 2010) identifies the Management Goals and Strategies, Desired Conditions, and Standards and Guidelines (S&Gs) that apply to livestock grazing in the Bell Meadow, Eagle Meadow and Herring Creek Allotments. This direction is summarized in Table C.01-1 (Forestwide S&Gs), Table C.01-2 (Management Areas), and Table C.01-3 (Land Allocations).

Table C.01-1 Forestwide S&Gs applicable to the BEH Rangeland Allotments project

Resource	Forestwide S&G	Project Compliance	Citation
Fish and Wildlife	**Fish and Wildlife Habitat Administration** (5-A): Management practices will allow for medium to high quality habitat for management indicator species (MIS), where potential allows, according to current habitat capability models for these species. Ensure that habitat needs of sensitive species are considered and that habitat needs of Federally listed Threatened and Endangered species are met.	Livestock impacts to habitat for sensitive, Threatened and Endangered Species were considered and disclosed.	MIS Report Wildlife BE Aquatics BE
	Willow Flycatcher (5-A): **Historically Occupied Willow Flycatcher Sites** For historically occupied willow flycatcher sites, assess willow flycatcher habitat suitability within the meadow. If habitat is degraded, develop restoration objectives and take appropriate actions (such as physical restoration of hydrological components, limiting or re-directing grazing activity, and so forth) to move the meadow toward desired conditions. Evaluate site condition of historically occupied willow flycatcher sites. Those sites that no longer contain standing water on June 1 and a deciduous shrub component and cannot be reasonably restored may be removed from the willow flycatcher site database.	Historically occupied Willow Flycatcher habitat in analysis area. Project effects to Willow Flycatcher habitat suitability were analyzed and disclosed.	Wildlife BE
	Yosemite toad (5-A): Exclude livestock from standing water and saturated soils in wet meadows and associated streams and springs occupied by Yosemite toads or identified as “essential habitat” in the conservation assessment for the Yosemite toad during the breeding and rearing season (through metamorphosis). Wet meadow habitat for Yosemite toads is defined as relatively open meadows with low to moderate amounts of woody vegetation that have standing water on June 1 or for more than 2 weeks following snow melt. Specific breeding and rearing season dates will be determined locally. If physical exclusion of livestock is impractical, then exclude grazing from the entire meadow. This standard does not apply to pack and saddle stock. Exclusions in this standard and guideline may be waived if an interdisciplinary team has developed a site-specific management plan to minimize impacts to the Yosemite toad and its habitat by managing the movement of stock around wet areas. Such plans are to include a requirement for systematically monitoring a sample of occupied Yosemite toad sites within the meadow to: (1)	Livestock impacts to Yosemite toad were analyzed and are disclosed Surveys for presence of Yosemite toad in suitable habitat are complete. Livestock are excluded from Yosemite toad habitat by managing the movement of stock around wet areas during breeding and rearing season.	Aquatics BE Allotment Management Plans for Herring Creek and Eagle Meadow Allotments

Resource	Forestwide S&G	Project Compliance	Citation
	assess habitat conditions and (2) assess Yosemite toad occupancy and population dynamics. Every 3 years from the date of the plan, evaluate monitoring data. Modify or suspend grazing if Yosemite toad conservation is not being accomplished. Plans must be approved by the authorized officer and incorporated into all Allotment plans and/or special use permits governing use within the occupied habitat. Complete one survey cycle in suitable habitat for the Yosemite toad within this species' historic range to determine presence of Yosemite toads.		
Fish and Wildlife	**Management Indicator Species** (5-A): Prepare Management Indicator Species (MIS) report per Sierra Nevada Forests MIS Amendment	MIS report discloses potential impacts on MIS	MIS Report
	Recovery Species Management (5-L): Maintain information on the status and known locations of all species which are candidates or proposed for Federal listing as Threatened or Endangered. Conduct a Biological Evaluation for any project which may affect a species proposed for Federal listing. Modify or mitigate projects where necessary to avoid adverse impacts to habitats for species which are candidates or proposed for Federal listing.	Information available on status and locations of species that are candidates or proposed for federal listing. Project-specific consultation with USFWS.	Wildlife BE Aquatics BE
Lands	**Property Boundary Location and Marking** (8- F): Complete land-line surveys prior to conducting resource activities adjacent to private property. Recognize the sensitivity of private land-use concerns and the need for site-specific consideration of these concerns during the analysis of proposed projects adjacent to inholdings. Specific concerns should be analyzed when proposed activities may occur adjacent to developed subdivisions or areas developed for public recreation.	Private land owners scoped to determine concerns. Comments and concerns were considered. Forest Service Manual 2230.6 states that "The United States is not responsible for intrusion of permitted livestock upon private lands nor for the settlement of controversies between the owner of the livestock and the owner of the land." (Federal Case Law)	Summary of Scoping Comments, project record
Range	**Allotment Management** (9-A): Improve ecological condition of rangelands, where currently unsatisfactory, through improved management, and structural and nonstructural improvements.	Purpose and Need is to ensure conditions are moving toward desired conditions	Chapter 1 Allotment Management Plans
	Allotment Management (9-A): Develop range resources to their reasonably attainable potential and manage them on a sustained yield basis. Manage grazed lands to achieve a stable or upward vegetative trend, except in specified areas of transitory range. Use management strategies that protect the soil and vegetative resources and other resources in a cost effective manner. Consider all vegetation dependent uses when developing Allotment management plans.	Purpose and Need is to ensure resource conditions are moving toward desired conditions Forest-wide direction and project-specific Mitigation and Other requirements are designed to improve resource conditions	Chapter 1 Specialist Reports

Resource	Forestwide S&G	Project Compliance	Citation
Range	**Allotment Management** (9-A): Revise range Allotment management plans to be consistent with law, regulations, Executive Orders, Forest Service direction and Forest Standards and Guidelines, by 1997. Revise and develop Allotment management plans in consultation with all involved parties, including permittees, State or other agencies, and any other involved entities.	Allotment Management Plans have been developed and are available for public review and comment.	Allotment Management Plans
	Allotment Management (9-A): On any Allotment or unit of Allotment, grazing management will be based on the vegetative type or soil type contained which is most susceptible to damage through improper grazing management. Examples: a riparian drainage through annual grassland; meadows within transitory range. Allowable use standards will be established in the Allotment management plans and annual operating plans for each unit of each Allotment. The standards will be based on Regional standards in R5 FSH 2209.21. Priority will be given to range improvement on Allotments with a high percentage of primary range land in unsatisfactory condition, or high conflicts between livestock grazing and other resources and uses.	Allowable use standards established based on regional standards and set in Allotment Management Plans	Allotment Management Plans
	Allotment Management (9-A): On Allotments where discontinuous grazing systems are not in effect, adjust permitted Animal Unit Months to achieve allowable use on the primary range. Transportation systems in established range Allotments will include fences and cattle guards where new roads open up natural livestock barriers. Reduce or eliminate livestock grazing from ranges in unsatisfactory range condition which cannot be improved through better management or treatment at the current level of grazing.	Permitted Animal Unit Months adjusted over time and are compatible with allowable use standards Fences and cattle guards will be installed in addition areas Improvement of range condition is expected	Range Report
	Allotment Management (9-A): **Perennial Range** Includes meadows, perennial grassland, sagebrush, broadleaf and riparian vegetative types. When grazing management is based on perennial range the following apply: 1. On Allotments or pastures under intensive management provide rest or deferment during the growing season at least every third year. 2. On Allotments under intensive management, as part of an approved discontinuous grazing system, allow grazing use to exceed normal allowable use (as defined in R5 FSH 2209.21) up to one year out of two. 3. Under extensive or maintenance management where continuous season-long grazing is allowed, remove livestock when grazing reaches the allowable use level specified for the designated key areas. 4. Under all management strategies base on-dates for livestock on the phenological development of key forage or indicator species. Refer to R5 FSH 2209.21 for range readiness standards or use comparable criteria for species not listed. One exception is where an intensive management system limits early grazing to that which the range	Standards and guidelines applied to grazing management on BEH Allotments through Allotment Management Plans and Terms and Conditions of Term Grazing Permits. Implementation of alternatives would be consistent with direction found in FSH 2209.21	Allotment Management Plans Range Report

Resource	Forestwide S&G	Project Compliance	Citation
	can withstand. 5. When primary range occurs within riparian areas: Allowable herbaceous forage utilization levels will be set according to Regional methods at standards that will contribute to the achievement of good to excellent vegetative and soil conditions (FSH 2209.21, Range Analysis Handbook).		
Range	**Grazing** (9-A): To protect hardwood regeneration in grazing Allotments, allow livestock browse on no more than 20 percent of annual growth of hardwood seedlings and advanced regeneration. Modify grazing plans if hardwood regeneration and recruitment needs are not being met.	Hardwood browse standards applied through Terms and Conditions of grazing permit, Allotment Management Plans, and Annual Operating Instructions. Hardwood browse monitoring occurs.	Chapter 2, Resource Conservation Measures: Aspen Monitoring Plan
	Range Improvements - Nonstructural (9-B): Plan non-structural range improvements using interdisciplinary input.	No nonstructural range improvements proposed	Not Applicable
	Range Improvements - Structural (9-C): Construct all structural improvement to Regional standards. FSH 2209.22 R5 and the 1988 USDA publication "Fences" for the standards.	All proposed fencing will be constructed according to regional standards.	Allotment Management Plans
	Grazing Permit Administration (9-D): Monitor at least 85 percent of Allotments yearly to determine grazing use levels and condition of range facilities.	Monitoring of Allotments occurs annually. Project-specific implementation monitoring specified in Monitoring Plan	Monitoring Plan
	Grazing Permit Administration (9-D): Table 7 (Forest Plan Direction, p. 51) sets forth maximum allowable forage utilization levels for some common range vegetation types of the Stanislaus National Forest. Allowable uses limit the extent to which one or a group of key species may be grazed in key areas. The allowable use level must provide for sufficient herbage residue to ensure favorable plant vigor and soil protection on good and excellent condition range, or to contribute to improvement in lower condition range. Allowable use levels for specific areas will be set at or below these maximums to conform to local range condition, soil stability, or special circumstances. Allowable use levels will be detailed in the Allotment Management Plan for each Allotment. Pastures receiving periodic full growing season rest can have higher allowable use levels, as shown. If condition classes of vegetation and soil vary, use the lower class to establish the allowable level.	Allowable use levels are based on site-specific conditions and are consistent with maximum allowable forage utilization levels set forth in Table 7(Forest Plan Direction, p. 51) Allowable use levels are detailed in Allotment Management Plans, Grazing Permits, and Annual Operating Instructions for each Allotment	Range Report Allotment Management Plans Monitoring Plan
	Range Studies (9-E): Monitor ecological condition and trend using Regionally established methods and standards (R5 FSH 2209.21) on a ten year schedule.	Ecological condition and trend of key areas monitored using regional methods	Range Report Monitoring Plan
Range	**Noxious Weed Management** (9-E): As part of project planning, conduct a noxious weed risk assessment to determine risks for weed spread (high, moderate, or low) associated with different types of proposed management activities. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy to develop mitigation measures for high and moderate risk activities.	Project-specific noxious weed risk assessment conducted as part of project planning	Botany Report Weed Risk Assessment
	Noxious Weed Management (9-E): When	Project-specific noxious weed	Botany Report

Resource	Forestwide S&G	Project Compliance	Citation
	recommended in project-level noxious weed risk assessments, consider requiring off-road equipment and vehicles (both Forest Service and contracted) used for project implementation to be weed free. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy. Minimize weed spread by incorporating weed prevention and control measures into ongoing management or maintenance activities that involve ground disturbance or the possibility of spreading weeds. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy. Conduct follow-up inspections of ground disturbing activities to ensure adherence to the Regional Noxious Weed Management Strategy.	risk assessment recommends weed prevention practices applicable to livestock grazing on the BEH rangeland Allotments	Weed Risk Assessment
	Noxious Weed Management (9-E): Encourage use of certified weed free hay and straw. Cooperate with other agencies and the public in developing a certification program for weed free hay and straw. Phase in the program as certified weed free hay and straw becomes available. This standard and guideline applies to pack and saddle stock used by the public, livestock permittees, outfitter guide permittees, and local, State, and Federal agencies. Include weed prevention measures, as necessary, when amending or re-issuing permits (including, but not limited to, livestock grazing, special uses, and pack stock operator permits).	Permittees are encouraged to use certified weed free hay and straw. This practice is recommended in each Term Grazing Permit, Allotment Management Plan, and Annual Operating Instructions	Botany Report Weed Risk Assessment Allotment Management Plans
Sensitive Plants	**Sensitive Plants Interim and Recovery Management** (12-A): Protect sensitive plants from activities which might cause them to become Federally listed as Threatened or Endangered. Identify populations of sensitive plants which occur in areas planned for timber sales or other projects. Modify planned projects to avoid or minimize adverse impacts to sensitive plants. Where projects may jeopardize a sensitive plant species perform a Biological Evaluation, botanical investigation and develop management guidelines, as necessary, for the species involved. Prepare species management guidelines for all sensitive species in order of the degree of risk posed by management activities. Conduct surveys and monitoring necessary to detect potentially damaging disturbances, changes in known populations and locations of new populations.	Surveys conducted in project area. One sensitive plant species – Yuba Pass Willowherb (Epilobium howellii) - is known to occur in the project area. BE prepared by botany specialist. Continued grazing is not likely to cause sensitive plant to become Federally listed.	Sensitive Plants BE
Sensitive Plants	**Sensitive Plant Surveys** (12-A): Conduct field surveys for TEPS plant species early enough in the project planning process that the project can be designed to conserve or enhance TEPS plants and their habitat. Conduct surveys according to procedures outlined in the Forest Service Handbook (FSH 2609.25.11). If additional field surveys are to be conducted as part of project implementation, survey results must be documented in the project file.	Field surveys for TEPS plant species were conducted during project planning.	Sensitive Plants BE
Soils	**Soil Support Services** (13-A): Soil properties or conditions should not be altered to the degree that would result in a 15 percent or more reduction in the inherent productivity potential of the soil.	Livestock impacts to soil properties and conditions are not likely to exceed Forest Plan standards and	Soil Report

Resource	Forestwide S&G	Project Compliance	Citation
	Soil Cover: Manage soil cover to avoid a High Erosion Hazard condition, as defined by the R-5 Erosion Hazard Rating method. Soil cover should be in place prior to seasonal precipitation. Soil Porosity: Maintain soil porosity above 90 percent of its natural condition on at least 85 percent of a treatment unit or activity area (90 percent where aerial logging systems are used). Plantable landings and skid trails will be tilled, if compacted. Standard does not apply to system roads, administrative sites, or livestock driveways and bedding grounds. Soil Organic Matter: Maintain topsoil organic matter to at least 85 percent of its original total in the top 12 inches. Applies to areas dedicated to growing vegetation, i.e., timber and forage production, vegetation that contributes to the quality of the recreational experience, and for watershed protection. Stockpile topsoil to rehabilitate disturbed areas such as borrow pits, mined areas, material storage sites, etc. Best Management Practices (BMPs): Implement BMPs to mitigate the environmental impacts of erosion, compaction, and soil displacement. Require special soil mitigation to use ground skidding equipment on slopes steeper than 35%. Require special soil mitigation to use ground skidding equipment on soils that erode, displace, or compact easily. Where actual or potential slope instability is identified, specific mitigating measures will be developed by an interdisciplinary team including a geologist.	guidelines	
	Soil Resource Improvement (Planning, Treatment and Maintenance) (13-B): Identify and evaluate the need for soil fertilization and other soil improvement techniques in areas where the soil is likely to respond to treatment. (36 CFR 219.27(b)(2). Treat areas that are found to be cost effective and that will respond favorably. Productivity lost as a result of soil erosion, soil compaction, loss of organic matter, or soil displacement, will be restored as practical to meet Soil Quality Standards. Include these areas in the Forest WINS inventory (Watershed Improvement Needs Survey), and in project K-V plans for restoration and improvement.	The need for soil resource improvement was evaluated during project analysis. Soil resource improvement and/or restoration would be implemented in future projects, as capability allows.	Soil Report

Resource	Forestwide S&G	Project Compliance	Citation
Soils	**Soil Hydrologic Functions Soil Environmental Health** (13-C): Soil Moisture Regime is unchanged where productivity or potential natural plant community are dependent upon specific soil drainage classes. Soil Hydrologic Function: Infiltration and permeability are not reduced to ratings of 6 or 8 as defined in Region 5 Erosion Hazard Rating System (Chapter 50, R-5 FSH 2509.22). Use Region 5 Cumulative Watershed Effects Analysis (Chapter 20, R-5 FSH 2509.22) to determine the extent of area needed to meet the soil hydrologic function threshold defined above. Soil Environmental Health: Soil reaction class, buffering or exchange capacities, or biological populations are not altered to the degree that significantly affects soil productivity, soil hydrological function, or the health of humans and animals.	Livestock impacts to Soils and Hydrologic Function were analyzed by soil and hydrology specialists. Continued grazing within standards is not likely to result in noticeable changes to soil hydrologic function or soil environmental health. Project-specific Cumulative Watershed Effects analysis was conducted by qualified hydrology specialist.	Soil Report Watershed Report
Water	**Water Quality Management** (18-A): Implement water quality Best Management Practices (BMPs) as needed for all Forest management activities. BMPs are a system of nearly 100 practices designed to minimize or prevent water pollution from Forest management activities. They cover such activities as timber harvest, road construction, mining, recreation, fire management and grazing. Monitor the implementation and effectiveness of BMPs in selected areas to determine if they are being carried out and if they are accomplishing their objectives. Analyze cumulative watershed effects (CWE) on all applicable proposed Forest management activities to determine off-site effects on the beneficial uses of water.	Water quality BMPs applicable to livestock grazing will be implemented Annual BMP implementation and effectiveness monitoring will continue according to regional protocol Project-specific Cumulative Watershed Effects analysis conducted by hydrologist.	Watershed Report Chapter 2, Mitigation and Other requirements Allotment Management Plans Monitoring Plan
	Water Quantity Management (18-B): Support all valid uses of water from the National Forest. Insure that such uses are carried out commensurate with Federal and State laws and regulations. Follow all Federal and State regulatory practices required in responding to proposals to develop the water resource. Keep current all water rights management for beneficial uses of water on the Forest.	Proposed water development will be carried out commensurate with applicable regulations, including water rights for beneficial uses of water	Watershed Report
	Watershed Maintenance and Improvement (18-D): Maintain or improve watershed condition to provide stewardship of water and soil resources. Survey Forest watersheds and restore degraded areas to improve watershed condition. Conduct periodic watershed surveys to determine the current condition of the water resource, identify potential WIN projects and assess the potential for cumulative watershed effects.	Watersheds surveyed and condition described, Cumulative Watershed Effects analysis conducted	Watershed Report

Table C.01-2 Management Area Direction applicable to the BEH Rangeland Allotments project

Area	Management Area Direction	Project Compliance	Citation
Wilderness and Proposed Wilderness	Range **Allotment Management - Extensive or Maintenance** (9-A-2 and 9-A-3): Manage livestock grazing to preserve the characteristics and values of Wilderness. Improve ecological condition of rangelands, where currently unsatisfactory, through improved management and structural and non-structural improvements. Construct new range improvements only as necessary to manage grazing and protect resource values. Construct improvements using non-motorized tools and access.	Livestock grazing compatible with wilderness values. No new range improvements planned in wilderness. If improvements are necessary in wilderness in future, fence construction will be compatible with wilderness values.	Wilderness Report
	Recreation **ROS Primitive** (10-B-1): Provide for very low interaction between visitors with a range of primitive recreation experiences. Evidence of other users is minimal. Manage to a ROS Class of Primitive. This is the adopted ROS level for management of all Wilderness as shown on the ROS Map The ROS Class of Semi-Primitive Non-Motorized is an acceptable interim level for certain areas within Wilderness.	Range of recreation experiences available in and around the project area. Impacts to recreation opportunity spectrum are disclosed.	Wilderness Report Recreation Report
	Wild and Scenic Rivers **Proposed Wild and Scenic River Management** (19-C): Protect and enhance the Wild and Scenic River characteristics. Manage the same as designated Wild and Scenic Rivers.	Livestock management in Proposed WSRs is compatible with WSR characteristics	Watershed Report
Wild and Scenic Rivers and Proposed Wild and Scenic Rivers	Range **Allotment Management - Extensive or Maintenance** (9-A-2 and 3): Grazing management will be specified in the management plan for the particular river and in the Allotment plan for the Allotment(s) involved. Manage grazing to protect Wild and Scenic River values.	Allotment Management Plans specify grazing management in Wild and Scenic Rivers (WSRs) to protect WSR values	Allotment Management Plans
	Wild and Scenic Rivers **Proposed Wild and Scenic River Management** (19-C): Protect and enhance the Wild and Scenic River characteristics. Manage the same as designated Wild and Scenic Rivers.	Livestock management in Proposed WSRs is compatible with WSR characteristics	Watershed Report
	Wilderness **Wilderness Management** (20-B): Manage Wild Rivers within Wilderness under dual designation. Be consistent with application of guidelines for Wilderness and Proposed Wilderness.	WSRs within wilderness are managed under dual designation, consistent with wilderness guidelines	Wilderness Report
Near Natural	**Description: Bell Meadow Area** This area was part of the Bell Meadow inventoried roadless area, located in the central part of the Forest. It is characterized by limited timber interspersed with meadow and granitic rock. The area is important wildlife habitat and contains several key deer fawning areas. It contains several trails and is a popular entry point to the Emigrant Wilderness which borders that area on the east. It is heavily hunted for deer in the fall. Grazing occurs throughout.	Suitability of grazing in the Bell Meadow Near Natural Area was considered during project analysis. Livestock grazing is allowed in the Bell Meadow (Near Natural) Area	Chapter 3.10 Special Areas
Wildlife	Fish and Wildlife **Structural Habitat Improvement and**	Wildlife objectives were considered. Activities are	Wildlife BE

Area	Management Area Direction	Project Compliance	Citation
	Maintenance (5-K): Conduct activities as needed to meet wildlife objectives. All such activities and objectives will be consistent with the overall objectives of the management area.	consistent with objectives of management areas.	
	Range **Allotment Management** (9-A): Recognize the special value of meadows and riparian areas to fisher, pine marten and other late seral stage wildlife in applying range management systems. Environmental analysis for range activities within these management areas need to consider possible impacts of livestock operations on marten and fisher. Improve ecological condition of rangelands where currently unsatisfactory, through improved management, and structural and non-structural improvements.	Potential impacts of livestock operations on marten and fisher were considered. Ecological condition of rangelands is expected to improve during project implementation	Wildlife BE Range Report
Special Interest Areas	**Management Emphasis** Management emphasis for these areas is to protect and manage unique geological, scenic, historical, archaeological, botanical and memorial features, to make educational opportunities available and preserve the integrity of the special interest feature for which the areas were established. No timber harvests are scheduled; however, a wide range of resource activities is permitted, provided the unique features of each area are protected.	Bull Run Scenic and Geologic Special Interest Area is located within the Herring Creek Allotment. The management emphasis and special characteristics of this Special Interest Area were considered and are compatible with continued livestock grazing on this Allotment.	Appendix F Rangeland Capability and Suitability
	Range **Allotment Management – Extensive or Maintenance** (9-A-2 and 9-A-3): Grazing management will be specified in management plans for the area and the surrounding Allotment. Management is designed to protect the area's special characteristics	Grazing management specified in Allotment Management Plan and is compatible with the area's special characteristics.	Appendix J, Herring Creek Allotment Management Plan
Research Natural Areas	**Management Emphasis**: Research Natural Areas (RNAs) are managed to maintain select vegetative, aquatic, and/or geologic elements in natural conditions. Protection is provided against any activities that directly or indirectly modify ecological processes. (FSM 4063.3)	Bell Meadow Research Natural Area is located within the Bell Meadow Allotment. The purpose of this RNA is aspen research. Suitability was considered.	Appendix J, Herring Creek Allotment Management Plan
	Range **Allotment Management - Extensive or Maintenance** (9-A-2 and 9-A-3): Grazing is not permitted in the upper part of the Bell Meadow RNA the Clark Fork Candidate RNA or the Bourland Meadow RNA. If grazing occurs in other RNAs, its management will be specified in management plans for the areas and the surrounding Allotments. Management is designed to protect the areas special characteristics.	Livestock are excluded from the Bell Meadow RNA (located in the Bell Meadow Allotment) and Bourland Meadow RNA (adjacent to the Bell Meadow Allotment)	Appendix H, Bell Meadow Allotment Management Plan
Developed Recreation Sites	Range **Allotment Management** (9-A-2): Cattle grazing is excluded within all developed recreation sites.	Potential for conflict in developed recreation sites is minimized by herding away from these areas. Adaptive management actions (fencing) could be used if needed to exclude livestock from developed sites.	Recreation Report

Area	Management Area Direction	Project Compliance	Citation
Winter Sports Sites	Range **Allotment Management - Extensive or Maintenance** (9-A-2 and 3): In winter sports sites where Allotment management plans permit grazing, the use will be managed according to the range Standards and Guidelines of the surrounding Management Area. Set allowable use levels based on the heaviest grazed or most sensitive vegetation type included in the area, such as a riparian area or ski run. Fence lodges, parking lots and other facilities as needed to minimize livestock/recreation conflicts.	Livestock grazing near the winter sports site is compatible with standards and guidelines of the surrounding management area(s). Adaptive management actions (fencing) could be used to exclude livestock from developed sites, if needed.	Appendix H, Bell Meadow Allotment Management Plan Recreation Report

Table C.01-3 Land Allocation Direction applicable to the BEH Rangeland Allotments project

Allocation	Direction	Project Compliance	Citation
Wilderness and Wild and Scenic Rivers	**Desired Condition** **Wilderness** - The area generally appears to have been affected primarily by the forces of nature, with the imprint of humanity's work substantially unnoticeable. It offers outstanding opportunities for solitude, or a primitive and unconfined type of recreation. Human influence does not impede or interfere with natural succession in the ecosystems. **Wild and Scenic Rivers** - The outstandingly remarkable values for which wild and scenic rivers have been established, are candidates for designation, or are under study, are protected and preserved for the benefit and enjoyment of present and future generations. Free-flowing conditions of wild and scenic rivers, candidate or study rivers, are preserved. Human influence may be evident, but does not interfere with, or impede the natural succession of river ecosystems.	Grazing is compatible with wilderness character and does not affect the free-flowing conditions of wild and scenic rivers.	Wilderness Report Watershed Report
Great Gray Owl Protected Activity Centers (PACs)	**Desired Condition**: Meadow vegetation in great gray owl PACs supports a sufficiently large meadow vole population to provide a food source for great gray owls through the reproductive period. **Standards and Guidelines**: In meadow areas of great gray owl PACs, maintain herbaceous vegetation at a height commensurate with site capability and habitat needs of prey species. Follow regional guidance to determine potential prey species and associated habitat requirements at the project level.	Vegetative cover height standards have been established in great gray owl (GGO) habitat at Lower Eagle Meadow. Replacing temporary exclosure with permanent fencing will aide in ensuring that habitat needs for GGO are met.	Wildlife BE
Riparian Conservation Areas	**Desired Condition** Water quality meets the goals of the Clean Water Act and Safe Drinking Water Act; it is fishable, swimmable, and suitable for drinking after normal treatment. Habitat supports viable populations of native and desired non-native plant, invertebrate, and vertebrate riparian and aquatic-dependent species. New introductions of invasive species are prevented. Where invasive species are adversely affecting the viability of native species, the appropriate State and Federal wildlife agencies have reduced impacts to native populations. Species composition and structural diversity of plant and animal communities in riparian areas, wetlands, and meadows provide desired habitat conditions and ecological functions. The distribution and health of biotic communities in special aquatic habitats (such as springs, seeps, vernal pools, fens, bogs, and marshes) perpetuates their unique functions and biological diversity. Spatial and temporal connectivity for riparian and aquatic-dependent species within and between watersheds provides physically, chemically and biologically unobstructed movement for their	Water quality BMPs applicable to livestock grazing will be implemented to protect water quality. Standards and guidelines will be implemented to protect native and desired non-native species and to prevent introduction of weeds. Coordination with appropriate State and Federal Wildlife agencies will occur as needed to reduce impacts to native populations. Continued livestock grazing is compatible improve characteristics of riparian areas, wetlands, meadows, and special aquatic habitats. Where already impaired,	Watershed Report Wildlife BE Botany Report Sensitive Plants BE Aquatic BE

Allocation	Direction	Project Compliance	Citation
	survival, migration and reproduction. The connections of floodplains, channels, and water tables distribute flood flows and sustain diverse habitats. Soils with favorable infiltration characteristics and diverse vegetative cover absorb and filter precipitation and sustain favorable conditions of stream flows. In-stream flows are sufficient to sustain desired conditions of riparian, aquatic, wetland, and meadow habitats and keep sediment regimes as close as possible to those with which aquatic and riparian biota evolved. The physical structure and condition of stream banks and shorelines minimizes erosion and sustains desired habitat diversity. The ecological status of meadow vegetation is late seral (50 percent or more of the relative cover of the herbaceous layer is late seral with high similarity to the potential natural community). A diversity of age classes of hardwood shrubs is present and regeneration is occurring. Meadows are hydrologically functional. Sites of accelerated erosion, such as gullies and headcuts are stabilized or recovering. Vegetation roots occur throughout the available soil profile. Meadows with perennial and intermittent streams have the following characteristics: (1) stream energy from high flows is dissipated, reducing erosion and improving water quality, (2) streams filter sediment and capture bedload, aiding floodplain development, (3) meadow conditions enhance floodwater retention and groundwater recharge, and (4) root masses stabilize stream banks against cutting action.	floodplain connectivity, water tables, and soil infiltration characteristics are not likely to show significant improvement by changing livestock management alone. Grazing effects on in-stream flows and sediment regimes in the project area are disclosed. Forage utilization and aspen browse standards are compatible with RCO desired conditions for meadow vegetation and hardwood regeneration. Meadow hydrologic function, where impaired, generally is due to lowered water tables that result from historic activities and is not likely to show significant improvement by changing livestock management alone.	
Riparian Conservation Areas	**Riparian Conservation Objective (RCO) 1**: Ensure that identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.	Beneficial uses in the project area were identified. Water quality BMPs, standards and guidelines, and adaptive management will be implemented to protect the beneficial uses identified.	Watershed Report
	Ensure that management activities do not adversely affect water temperatures necessary for local aquatic- and riparian-dependent species assemblages.	Grazing does not adversely affect water temperatures in the project area.	Watershed Report
	RCO 2: Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fens, wetlands, vernal pools, springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.	Forest-wide standards and guidelines, project-specific resource conservation measures, and monitoring plan developed to ensure these riparian conservation objectives are met.	Watershed Report Sensitive Plants BE Aquatics BE

Allocation	Direction	Project Compliance	Citation
Riparian Conservation Areas	**RCO 2**: Maintain and restore the hydrologic connectivity of streams, meadows, wetlands, and other special aquatic features by identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow paths. Implement corrective actions where necessary to restore connectivity.	Threats to hydrologic connectivity of special aquatic features identified during PFC analysis. Corrective actions would be used where necessary, but are outside scope of project.	Watershed Report
	RCO 2: Prior to activities that could adversely affect streams, determine if relevant stream characteristics are within the range of natural variability. If characteristics are outside the range of natural variability, implement mitigation measures and short-term restoration actions needed to prevent further declines or cause an upward trend in conditions. Evaluate required long-term restoration actions and implement them according to their status among other restoration needs.	Stream characteristics were surveyed and are generally within the range of natural variability. Short-term restoration actions could be implemented, if needed, through the adaptive management process.	Watershed Report
	RCO 2: Prevent disturbance to streambanks and natural lake and pond shorelines caused by resource activities (for example, livestock, off-highway vehicles, and dispersed recreation) from exceeding 20 percent of stream reach or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots. This standard does not apply to developed recreation sites, sites authorized under Special Use Permits and designated off-highway vehicle routes.	Streambank disturbance standards are incorporated in Terms and Conditions of grazing permits, Allotment Management Plans, Annual Operating Instructions, and Monitoring Plan.	Range Report Allotment Management Plans Monitoring Plan
	RCO 2: Cooperate with State and Federal agencies to develop streambank disturbance standards for threatened, endangered, and sensitive species. Use the regional streambank assessment protocol. Implement corrective action where disturbance limits have been exceeded.	Project-specific USFWS consultation. Streambank disturbance monitoring would occur in sensitive reaches and adaptive management actions would be used if standards not met.	Aquatics BE Monitoring Plan
	RCO 2: At either the landscape or project-scale, determine if the age class, structural diversity, composition, and cover of riparian vegetation are within the range of natural variability for the vegetative community. If conditions are outside the range of natural variability, consider implementing mitigation and/or restoration actions that will result in an upward trend. Actions could include restoration of aspen or other riparian vegetation where conifer encroachment is identified as a problem.	Riparian vegetation was surveyed during project analysis. Riparian restoration planned as part of the Gooseberry project. Additional riparian restoration projects may occur as capability and funding allows.	Watershed Report Gooseberry Ecological Restoration Decision Notice
	RCO 4: Ensure that management activities, including fuels reduction actions, within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic- and riparian dependent species.	Impacts to physical and biological characteristics associated with aquatic- and riparian-dependent species are disclosed.	Aquatics BE

Allocation	Direction	Project Compliance	Citation
Riparian Conservation Areas	**RCO 4**: Identify roads, trails, OHV trails and staging areas, developed recreation sites, dispersed campgrounds, special use permits, grazing permits, and day use sites during landscape analysis. Identify conditions that degrade water quality or habitat for aquatic and riparian-dependent species. At the project level, evaluate and consider actions to ensure consistency with standards and guidelines or desired conditions.	Reauthorization of livestock grazing would be consistent with applicable standards and guidelines and/or desired conditions that protect water quality and habitat for aquatic and riparian-dependent species.	Watershed Report Aquatics BE
	RCO 5: Preserve, restore, or enhance special aquatic features, such as meadows, lakes, ponds, bogs, fens, and wetlands, to provide the ecological conditions and processes needed to recover or enhance the viability of species that rely on these areas.	Project-specific resource conservation measures developed to protect ecological conditions and processes in special aquatic features.	Chapter 2.03 Mitigation and other requirements: Resource Conservation Measures
	RCO 5: Assess the hydrologic function of meadow habitats and other special aquatic features during range management analysis. Ensure that characteristics of special features are, at a minimum, at Proper Functioning Condition, as defined in the appropriate Technical Reports (or their successor publications): (1) "Process for Assessing PFC" TR 1737-9 (1993), "PFC for Lotic Areas" USDI TR 1737-15 (1998) or (2) "PFC for Lentic Riparian-Wetland Areas" USDI TR1737-11(1994)	Appropriate Technical Reports and protocols were used to assess the hydrologic function of meadows and special aquatic features.	Watershed Report Special Aquatic Features field notes and Proper Functioning Condition data
	RCO 5: Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map, and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans, and wheeled vehicles. Criteria for defining bogs and fens include, but are not limited to, presence of: (1) sphagnum moss (Spagnum spp.), (2) mosses belonging to the genus Meessia, and (3) sundew (Drosera spp.) Complete initial plant inventories of bogs and fens within active grazing Allotments prior to re-issuing permits.	Fen ecosystems were surveyed and mapped during project analysis. Project-specific resource conservation measures were developed to protect fens from impacts of livestock grazing. Initial plant inventories of fens in project area are complete. Impacts to plant species that occur in fens is disclosed in EIS.	Chapter 2.03 Mitigation and Other requirements: Resource Conservation Measures Special Aquatic Features field notes and Proper Functioning Condition data Botany Report
	RCO 5: Locate new facilities for gathering livestock and pack stock outside of meadows and riparian conservation areas. During project-level planning, evaluate and consider relocating existing livestock facilities outside of meadows and riparian areas. Prior to re-issuing grazing permits, assess the compatibility of livestock management facilities located in riparian conservation areas with riparian conservation objectives.	Relocation of the corrals in RCOs was considered, but is generally not feasible. The corral at Martin's Cow Camp is an historic high sierra cow camp; relocating the corral would adversely affect its eligibility for listing in the National Register of Historic Places. Alternatives 1 and 4 propose new facilities (corrals) outside of RCAs.	Heritage Report

Allocation	Direction	Project Compliance	Citation
Riparian Conservation Areas	**RCO 5**: Under season-long grazing: For meadows in early seral status: limit livestock utilization of grass and grass-like plants to 30 percent (or minimum 6-inch stubble height). For meadows in late seral status: limit livestock utilization of grass and grass-like plants to a maximum of 40 percent (or minimum 4-inch stubble height).	RCA utilization standards are applicable to meadows in the project area and are set forth in Allotment Management Plans for each Allotment	Range Report Allotment Management Plans
	RCO 5: Determine ecological status on all key areas monitored for grazing utilization prior to establishing utilization levels. Use Regional ecological scorecards and range plant list in regional range handbooks to determine ecological status. Analyze meadow ecological status every 3 to 5 years. If meadow ecological status is determined to be moving in a downward trend, modify or suspend grazing. Include ecological status data in a spatially explicit Geographical Information System database.	Regional scorecards, range plant lists, and range handbooks were used to determine ecological status of key areas on a 5 year schedule. Grazing would be modified in meadows where ecological status is moving in a downward trend as a result of current grazing.	Range Report R5 Meadow Ecological Status
	RCO 5: Under intensive grazing systems (such as rest-rotation and deferred rotation) where meadows are receiving a period of rest, utilization levels can be higher than the levels described above if the meadow is maintained in late seral status and meadow-associated species are not being impacted. Degraded meadows (such as those in early seral status with greater than 10 percent of the meadow area in bare soil and active erosion) require total rest from grazing until they have recovered and have moved to mid- or late seral status.	Eagle Meadow Allotment uses an intensive grazing system - utilization levels can be higher if pastures rested. Meadows that are degraded as a result of current grazing will be rested, meadows that are degraded as a result of legacy activities are not likely to improve with exclusion of livestock.	Appendix I, Eagle Meadow Allotment Management Plan
	RCO 5: Limit browsing to no more than 20 percent of the annual leader growth of mature riparian shrubs and no more than 20 percent of individual seedlings. Remove livestock from any area of an Allotment when browsing indicates a change in livestock preference from grazing herbaceous vegetation to browsing woody riparian vegetation.	Riparian browse standard is applicable in the project area and are set forth in Term Grazing Permits, Allotment Management Plans, and Annual Operating Instructions	Allotment Management Plans
	RCO 6: Identify and implement restoration actions to maintain, restore or enhance water quality and maintain, restore, or enhance habitat for riparian and aquatic species.	Restoration of advancing headcuts would occur, if needed, as part of Adaptive Management process or in a separate project.	Monitoring Plan Watershed Report
	RCO 6: Recommend restoration practices in: (1) areas with compaction in excess of soil quality standards, (2) areas with lowered water tables, or (3) areas that are either actively down cutting or that have historic gullies. Identify other management practices, for example, road building, recreational use, grazing, and timber harvests that may be contributing to the observed degradation.	Restoration practices could be implemented, if needed, as part of Adaptive Management process or in a separate restoration project if current grazing is causing excessive compaction, lowered water tables, or active down cutting.	Watershed Report Soil Report Chapter 2.03 Mitigation and Other requirements: Adaptive Management

D. Glossary

Adaptive Management	A system of management practices based on clearly identified intended outcomes and monitoring to determine if management actions are meeting those outcomes; and, if not, to facilitate management changes that will best ensure that those outcomes are met or re-evaluated. Adaptive management stems from the recognition that knowledge about natural resource systems is sometimes uncertain (36 CFR 220.3).
Administrative Unit	A National Forest, a National Grassland, a purchase unit, a land utilization project, or other comparable unit of the National Forest System.
A Horizon	The uppermost layer of a soil profile, often rich in organic matter.
Aggradation	The increase in land elevation due to the deposition of sediment.
Alluvial	Pertaining to processes or materials associated with transportation or deposition by running water.
Animal Unit	One mature (1,000 lb.) cow or the equivalent based upon average daily forage allowance of 26 lbs. dry matter per day under range conditions.
Animal Unit Month (AUM)	The amount of forage required by one animal unit for one month.
Aquatic	Growing or living in or frequenting water; taking place in or on water.
Aquatic Ecosystem	A stream channel, lake or estuary bed, the water itself, and the biotic (living) communities that occur therein.
Arborglyphs	Tree carvings made in the bark of aspen trees by shepherds, many of them Basque and Irish American, throughout the Western United States
ARC/INFO	The name of a Geographic Information System software program.
Area	A discrete, specifically delineated space that is smaller, and in most cases much smaller, than a Ranger District.
Area of Potential Effects (APE)	This is the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.
Aspect	The direction a slope faces. For example, a hillside facing east has an eastern aspect.
Biological Diversity (Biodiversity)	The number and abundance of species found within a common environment. This includes the variety of genes, species, ecosystems, and the ecological processes that connect everything in a common environment.
Biota	The plant and animal life of a particular region.
Biotic Potential	Factors that influence the ability of an animal to utilize its environment, including: reproductive rates, dispersal ability, habitat and life requisite specificity, and adaptability. Combine, these factors assign biotic potential of the animal.
Buffer	Used in the context of GIS; a buffer is a zone of a specified distance around a feature in a coverage.
California Wildlife Habitat Relationships (CWHR)	A system of classifying vegetation in relation to its function as wildlife habitat. Tree-dominated habitat is classified according to tree size and canopy closure.
Capability	The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at a given level of management intensity. Capability depends on current conditions and site conditions such as climate, slope, landform, soils and geology, as well as the application of management practices, such as silviculture or protection from fire, insects, and disease.
Chief	The Chief, Forest Service, Department of Agriculture (36 CFR 212).
Code of Federal Regulations (CFR)	A codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the Federal Government.

Collaboration	Managers, scientists and citizens working together to plan, implement and monitor National Forest management. The intention is to engage people who have information, knowledge, expertise and an interest in the health of National Forest ecosystems and nearby communities.
Connected Actions	Actions that: (i) automatically trigger other actions which may require environmental impact statements; (ii) cannot or will not proceed unless other actions are taken previously or simultaneously; or, (iii) are interdependent parts of a larger action and depend on the larger action for their justification (40 CFR 1508.25).
Connectivity (of Habitats)	The linkage of similar but separated vegetation stands by patches, corridors, or "stepping stones" of like vegetation. This term can also refer to the degree to which similar habitats are linked.
Cow/Calf Pair	One mature (1000 lb.) cow and unweaned calf less than 6 months of age. A cow/calf pair is considered by the Forest Service to be equivalent to 1.32 Animal Units.
Coverage	A digital map or layer of data in the ARC/INFO software program.
Council on Environmental Quality (CEQ)	The Council on Environmental Quality established by Title II of NEPA (40 CFR 1508.6).
Critical Aquatic Refuge (CAR)	A relatively small watershed, ranging in size from about 3,000 to 85,000 acres, that is sometimes nested within an emphasis watershed and has localized populations of rare and/or at-risk populations of native fish and/or amphibians.
Critical Habitat	Areas designated for the survival and recovery of federally listed threatened or endangered species.
Critical Refuge	A relatively small watershed, ranging in size from about 3,000 to 85,000 acres, that is sometimes nested within an emphasis watershed and has localized populations of rare and/or at-risk populations of native fish and/or amphibians.
Cumulative Impact	The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).
Deferred Rotation	Scheduled movement of grazing animals between pastures to provide a period of nongrazing during part of the growing season. In high-elevation range conditions, grazing is deferred at higher elevations until maturity of key forage species.
Degradation	Reduction in quality. The process whereby the water quality and chemical, physical or biological integrity of a water body is decreased. Habitat quality can be changed by certain management activities. If the quality is reduced then habitat degradation has occurred.
Draft Environmental Impact Statement (DEIS)	A detailed written statement as required by section 102(2) (C) of the NEPA (40 CFR 1508.11) that is released to governmental agencies and the general public for review and comment.
Desired Future Conditions	Land or resource conditions that are expected to result based on goals and objectives. Also referred to as Desired Condition.
Ecological Status	The present state of vegetation and soil protection of an ecological site in relation to the potential natural community for the site. Vegetation status is the expression for the relative degree to which the kinds, proportion and amounts of plants in a community resemble that of the potential natural community. Soil status is a measure of the present vegetation and litter cover relative to the amount of cover needed on the site to prevent accelerated erosion.
Ecology	The interrelationships of living things to one another and to their environment, or the study of these interrelationships.
Ecosystem	An arrangement of living and non-living things and the forces that move them. Living things include plants and animals. Non-living parts of ecosystems may be rocks and minerals. Weather and wildfire are two of the forces that act within ecosystems.
Endangered Species	Those plant or animal species that are in danger of extinction throughout all or a significant portion of their range. Endangered species are identified by the Secretary of the Interior in accordance with the Endangered Species Act of 1973.

Environmental Justice	The state (or condition) which all populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benefits of, are not excluded from, and are not affected in a disproportionately high and adverse manner by government programs and activities affecting human health or the environment.
Environmental Impact Statement (EIS)	A detailed written statement as required by section 102(2) (C) of NEPA (CFR 1508.11).
Ephemeral Stream	Streams that flow only as the direct result of rainfall or snowmelt. They have no permanent flow.
Equivalent Roaded Acres	A standardized unit of measure for land disturbance. A road prism is considered the reference to which other types of land disturbing activities are measured. A road is given an ERA coefficient of 1.0 (1 acre of road is equal to 1.0 ERA). Other disturbances such as logging, site preparation and wildfires are equated to a road surface by ERA coefficients that reflect their relative level of contribution to changes in runoff and sediment regimes in the watershed.
Fauna	The animal life of an area.
Fen	An ecosystem with hydric (wet) soil, an aquic (saturated) soil moisture regime, and accumulation of peat (organic soil) in the histic epipedon.
Floodplain	Level or very gently sloping surface bordering a river that has been formed by river erosion and deposition; it is usually subject to flooding and is underlain by fluvial sediments; similar to alluvial plain.
Flora	The plant life of an area.
Focal Species	A species of concern.
Forage	Browse and herbage which is available to and may provide food for grazing animals or be harvested for feeding.
Forb	An herbaceous plant, usually with broad net-veined leaves. In general, any plant not in the grass, sedge or brush families.
Fuels	Plants and woody vegetation, living and dead that are capable of burning.
Functional At-Risk	A term used to describe riparian wetland areas that are in functional condition, but that have existing soil, water, or vegetation attribute that makes them susceptible to degradation.
Geographic Information Systems (GIS)	A computer system capable of storing, manipulating, analyzing, and displaying geographic information.
Grazing System	A defined, integrated combination of animal, plant, soil, and other environmental components and the grazing method(s) by which the system is managed to achieve specific results or goals.
Habitat	The area where a plant or animal lives and grows under natural conditions.
Herbaceous	A plant having little or no woody tissue.
Heritage Program	The comprehensive Forest Service program of responsibilities with regard to historic preservation. A pro-active program to manage prehistoric and historic cultural resources and cultural traditions for the benefit of the public through preservation, public use, and research.
Hydrogeomorphic	The interaction and linkage of hydrologic processes with landforms and the interaction of geomorphic processes with surface and subsurface water in temporal and spatial dimensions.
Image	A graphic representation of a person or thing, typically produced by an electronic device. Common examples include remotely sensed data and photographs.
Indigenous	Any species of plant or animals native to a given land or water area by natural occurrence.
Interdisciplinary Team	A diverse group of professional resource specialists who analyze the effects of Alternatives on natural and other resources. Through interaction, participants bring different points of view and a broader range of expertise.
Intermittent Stream	A stream that flows only at certain times of the year when it receives water from streams or from some surface, such as melting snow.

Irretrievable	A term that applies to the loss of production, harvest, or use of natural resources. For example, some or all of the timber production from an area is lost irretrievably while an area is serving as a winter sports site. The production lost is irretrievable, but the action is not irreversible. If the use changes, it is possible to resume timber production.
Irreversible	A term that describes the loss of future options. Applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity that are renewable only over long periods of time
Key Area	A relatively small portion of a range selected because of its location, use or grazing value as a monitoring point for grazing use. It is assumed that key areas, when properly selected, reflect the overall acceptability of current management over the range and serve as an indicative sample of range conditions, trend or degree of use.
Key Species	Those species which must, because of their importance, be considered in the management program.
Landscape	A large land area composed of interacting ecosystems that are repeated due to factors such as geology, soils, climate, and human impacts.
Legacy	Impacts from past activities (usually a land use) that continue to affect a stream or watershed in the present day.
Management Action	Any activity undertaken as part of the administration of the National Forest.
Meadow	Areas of moist low lying and usually level grasslands. Generally, the water table is just below the surface of the soil and the most abundant vegetation is usually favored by wet but not constantly flooded soil.
Meadow Hydrologic Function	Term describing the functioning of plant-soil-water relationships and processes which affect overall meadow condition.
Mesic	Moderately moist climates or environments. Vegetation: generally refers to vegetation found in moist environments. Soils: refers specifically to soils with mean annual temperatures of 8 to 15 degrees centigrade.
Mitigation	Avoiding the impact altogether by not taking a certain action or parts of an action. Minimizing impacts by limiting the degree or magnitude of the action and its implementation. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action. Compensating for the impact by replacing or providing substitute resources or environments.
Monitoring	The orderly collection, analysis, and interpretation of resource data to evaluate progress toward meeting management objectives.
Mosaic	Areas with a variety of plant communities over a landscape. For example, areas with trees and areas without trees occurring over a landscape.
Multiple Use	The management of all the various renewable surface resources of the National Forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output. (Multiple-Use Sustained-Yield Act; Public Law 86–517)
National Environmental Policy Act (NEPA)	Codifies the national policy of encouraging harmony between humans and the environment by promoting efforts to prevent or eliminate damage to the environment, thereby enriching our understanding of ecological systems and natural resources. It declares the federal government to be responsible for: (a) coordinating programs and plans regarding environmental protection; (b) using an interdisciplinary approach to decision-making; (c) developing methods to ensure that non-quantifiable amenity values are included economic analyses; and (d) including in every recommendation, report on proposals for legislation, or other major federal actions significantly affecting the quality of the environment a detailed environmental impact statement (EIS).

National Forest System	As defined in the Forest Rangeland Renewable Resources Planning Act, the "National Forest System" includes all National Forest lands reserved or withdrawn from the public domain of the United States, all National Forest lands acquired through purchase, exchange, donation, or other means, the National Grasslands, and land utilization projects administered under title III of the Bankhead-Jones Farm Tennant Act (50 Stat. 525, 7 U.S.C. 1010-1012), and other lands, waters or interests therein which are administered by the Forest Service or are designated for administration through the Forest Service as a part of the system (36 CFR 212).
Natural Resource	A feature of the natural environment that is of value in serving human needs.
Natural Succession	The natural replacement, in time, of one plant community with another. Conditions of the prior plant community (or successional stage) create conditions that are favorable for the establishment of the next stage.
Noxious Weeds	Aggressive, non-native plant species that have been introduced. They can be difficult to manage, poisonous, toxic, parasitic, or carrier of insects or disease. Examples of noxious weeds would be scotch broom, yellow star thistle, and cheatgrass.
Old Forest (Old Growth)	Areas that contain large, old trees relative to the species-specific, environmentally-constrained growth capacity of the site.
Palatability	The degree of acceptability of a feed or feedstuff to the taste or the degree of its acceptability to be eaten by an animal.
Parent Material	The unconsolidated and more or less chemically weathered mineral or organic matter from which a soil is developed by soil-forming processes.
Peat	A term that sometimes is applied to organic soils. A soil that contains a minimum of 12 percent organic carbon when no clay is present or a minimum of 18 percent organic carbon when clay content is 60 percent or greater.
Peatland	A type of ecosystem, also referred to as a mire, in which organic matter is produced faster than it is decomposed, resulting in the accumulation of partially decomposed vegetative material termed peat.
Perennial Stream	A stream that typically has running water on a year-round basis.
Permittee	Any entity that has been issued a grazing permit.
Plant Community	A collection of plant species within a designated geographical unit, which forms a relatively uniform patch, distinguishable from neighboring patches of different vegetation types. The components of each plant community are influenced by soil type, topography, climate and human disturbance.
Preferred Alternative	The alternative(s) which the Agency believes would best fulfill the purpose and need for the proposal, consistent with the Agency's statutory mission and responsibilities, giving consideration to environmental, social, economic, and other factors and disclosed in an EIS.
Primary Range	Those areas which livestock naturally prefer to use first. These are characteristically good forage-producing types on flat to gentle topography with available water nearby. They are grazed to allowable use or over-used before secondary range is used to any great extent.
Proper Functioning Condition (PFC)	A term describing riparian-wetland areas that have adequate vegetation, landform, and debris to provide ecological benefits applicable to a particular area. Also, a method of assessment developed for riparian-wetland areas.
Proposed Action	A proposal made by the Forest Service to authorize, recommend, or implement an action to meet a specific purpose and need.
Protected Activity Centers (PACs)	Designated areas that are afforded protection to specific species by restricting certain management activities. For example, California spotted owl PACs protect owl habitat and breeding areas by restricting timber harvest.
Public Involvement	The use of appropriate procedures to: inform the public, obtain early and continuing public participation, and consider the views of interested parties in planning and decision-making.
Public Land	Land for which title and control rests with a government – Federal, state, regional, county, or municipal.
Range	Land supporting indigenous vegetation that is grazed or that has the potential to be grazed, and is managed as a natural ecosystem.

Range Readiness	The defined stage of plant growth at which grazing may begin under a specific management plan without permanent damage to vegetation or soil.
Rapid Assessment	Monitoring protocol that is used to provide information on the condition of a resource with a relatively small investment of time and effort.
Reasonably Foreseeable Future Actions	Those Federal or non-Federal activities not yet undertaken, for which there are existing decisions, funding, or identified proposals. Identified proposals for Forest Service actions are described in 220.4(a) (1) (36 CFR 220.3).
Record of Decision (ROD)	A concise public record of the responsible official's decision to implement an action when an environmental impact statement (EIS) has been prepared.
Recruitment	Additions to a population, either through birth or immigration.
Resilience	The ability of an ecosystem to maintain diversity, integrity, and ecological processes following a disturbance.
Responsible Official	The Agency employee who has the authority to make and implement a decision on a proposed action (36 CFR 220.3).
Rest	Nonuse of range for a full year.
Rest-Rotation	A grazing management system in which rest periods for individual paddocks or grazing units, generally for a full year, are incorporated into a grazing rotation.
Riparian	Referring to or relating to areas adjacent to water or influenced by free water associated with streams or rivers on geologic surfaces occupying the lowest position on a watershed.
Riparian Conservation Area (RCA)	Identified areas within a certain distance from streams, special aquatic features or riparian vegetation. RCA width and protection measures are determined through project level analysis.
Riparian Ecosystem	The ecosystem around or next to water areas that support unique vegetation and animal communities as a result of the influence of water.
Road	A motor vehicle route over 50 inches wide, unless identified and managed as a trail (36 CFR 212).
Roadless Areas	For the purposes of this EIS, a generic term that includes inventoried roadless areas.
Schedule of Proposed Actions (SOPA)	A Forest Service document that informs the public about those proposed and ongoing Forest Service actions for which a record of decision, decision notice or decision memo would be or has been prepared. The SOPA also identifies a contact for additional information on any proposed actions (36 CFR 220.3).
Scope	The range of actions, alternatives and impacts to be considered in an environmental impact statement (40 CFR 1508.25).
Scoping	An early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action (40 CFR 1501.7).
Secondary Range	Those areas suitable for livestock use but which are generally used later and to a lighter degree than primary range. Generally they are on steeper slopes, further from water and have poorer forage-producing capabilities than primary range.
Sensitive Species	Plant or animal species which are susceptible to habitat changes or impacts from activities. The official designation is made by the USDA Forest Service at the regional level and is not part of the designation of threatened or endangered species made by the U.S. Fish And Wildlife Service.
Seral Stage	The stage of succession of a plant or animal community that is transitional. If left alone, the seral stage will give way to another plant or animal community that represents a further stage of succession.
Spatial Data	A GIS contains spatial data. The spatial data represents geographic features associated with real-world locations.
Species	A class of individuals having common attributes and designated by a common name; a category of biological classification ranking immediately below the genus or subgenus; comprising related organisms or populations potentially capable of interbreeding.
Special Aquatic Feature	A meadow, lake, pond, bog, spring, seep, fen, or other wetland.
Stand	A group of trees that occupies a specific area and is similar in species, age and condition.

Standards and Guidelines (S&Gs)	The primary instructions for land managers. Standards address mandatory actions, while guidelines are recommended actions necessary to a land management decision.
Stewardship	Caring for the land and its resources in order to pass healthy ecosystems on to future generations.
Stocking Rate	The relationship between the number of animals and the grazing management unit utilized over a specified time period. May be expressed as animal units per unit of land area for a specified period of time.
Streambank Alteration	Streambank disturbance caused by animals walking along the streambanks or the margins of the stream.
Stubble Height	The height of herbaceous plants remaining after the top portion has been harvested either by grazing animals or mechanical harvesting.
Succession	The observed process of change in the species structure of an ecological community over time. The community begins with relatively few pioneering plants and animals and develops through increasing complexity until it becomes stable or self-perpetuating as a climax community.
Suitability	The appropriateness of certain resource management to an area of land. Suitability can be determined by environmental and economic analysis of management practices.
Sustainability	The ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time.
Sustainable	The yield of a natural resource that can be produced continually at a given intensity of management is said to be sustainable. Recreation activities are sustainable if the human activity does not reduce ecologic sustainability.
Taxa	The name applied to any one group or entity in the scientific classification system.
Terminal Leader (aspen)	The current year's growth at the tip of a primary stem. Trees typically have a single terminal leader, whereas shrubs typically have many.
Threatened Species	Those plant or animal species likely to become endangered throughout all or a specific portion of their range within the foreseeable future as designated by the U.S. Fish and Wildlife Service under the Endangered Species Act of 1973.
Trajectory	The way in which a process or event develops over a period of time.
Trampling	Animal-caused depressions in the soil surface or soil compaction.
Understory	The trees and woody shrubs growing beneath branches and foliage formed collectively by the upper portions of adjacent trees.
Utilization	The proportion of current year's forage production consumed by grazing animals.
Visual Quality	The forest visual resources; terrain, geological features, or vegetation.
Water Table	The upper surface of saturated zone below the soil surface where the water is at atmospheric pressure.
Watershed	The entire region drained by a waterway, lake, or reservoir. More specifically, a watershed is an area of land above a given point on a stream that contributes water to the streamflows at that point.
Wetlands	Areas that are inundated by surface or ground water with a frequency sufficient to support (and that under normal circumstances do or would support) a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.

E. Response to Comments

The Environmental Protection Agency (EPA) published a Notice of Availability (NOA) for the DEIS in the Federal Register on January 31, 2014. The 45-day comment period ended on March 17, 2014. In response to the Forest's request for comments, interested parties submitted 18 unique individual letters. For tracking purposes, the interdisciplinary team assigned a respondent number to each letter as it was received (1-18). Each individual comment within each letter was also given a unique comment number. Forest Service direction requires that a final EIS respond to substantive comments on the draft EIS (FSH 1909.15, 25.1). Specific comments are within the scope of the proposed action, have a direct relationship to the proposed action, and must include supporting reasons for the responsible official to consider (36 CFR 218.2).

This Appendix contains the summary comment statements, organized by the 9 general topics shown below. Similar comments are grouped and followed by the comment numbers and a response. Table E.01-1 lists and identifies the 18 respondents. The content analysis spreadsheet (Comment_Analysis.xlsx, project record) contains all specific individual comments.

1. Adaptive Management and Monitoring
2. Allotment Management
3. Aquatics
4. Invasive Species
5. NEPA
6. Riparian and Meadows
7. Sensitive Plants
8. Water Quality
9. Wildlife

ADAPTIVE MANAGEMENT AND MONITORING

1. Comment: Simply proposing that the Forest will use future "adaptive management" to address existing resource conflicts is inadequate disclosure under NEPA. Western Watersheds Project and Randall Hermann v. United States Forest Service CV-05-189-E-BLW.The Forest Service must list specific management actions that will be used to accomplish specific management goals and any remediation, and should clearly identify the specific triggers that will require implementation of those actions.

13.011 13.018

Response: The EIS provides general information about the adaptive management strategy (p. 28-29). Standards and guidelines and resource conservation measures are a primary component of the Adaptive Management Strategy (p. 26-28). The EIS also provides a Monitoring Plan (Appendix G), which details specific triggers and management actions that would be implemented in order to meet management objectives.

2. Comment: The Forest cannot simply claim that a specified action will result in a "move towards desired condition" but must provide scientific justification for the claims.

13.013

Response: The EIS Chapter 3 addresses direct, indirect, and cumulative effects of each alternative to wildlife, watershed, soils, sensitive plants, and aquatic species, among other resources. The EIS lists mitigation and other requirements (Chapter 2.03) that would minimize adverse effects to these resources, along with appropriate references to the scientific literature (p. 229-240). Numerous scientific publications are cited and utilized in the assessment of effects, both positive and negative. Alternatives 1 and 4 include an Adaptive Management Strategy (p. 28-29) that would respond to a need for change in management and would address ongoing uncertainties and knowledge gaps in the scientific literature. Desired conditions are being met throughout much of the project area; however, specific locations that are not meeting desired conditions were identified by the Interdisciplinary Team (Table 1.03-1). Adjustments to grazing authorization parameters (Chapter 2.02) and resource conservation measures (p. 26-28) were

developed to move these sites towards desired conditions. Resource specialists determined that the effects of the project would generally maintain or improve conditions (Chapters 3.06, 3.09, 3.10, and 3.11).

3. **Comment**: Aspen stands are not adequately protected by Alternative 1. Despite the resource impact being acknowledged, the DEIS fails to provide a feasible, reasonable mitigation measure to reduce the significance of the impact. The only mitigation is the standard monitoring program that may or may not end up triggering any action.

   16.318 16.325

   Response: The EIS provides information about mitigation measures developed to reduce impacts to aspen stands (p. 27). The Monitoring Plan provides more specific information about monitoring of hardwood browse and regeneration (Appendix G). Alternatives 1 and 4 implement resource conservation measures for hardwood regeneration (p. 27) that would construct fences around aspen stands if livestock browse is suppressing aspen recruitment. Monitoring and adaptive management is considered to be a feasible and reasonable mitigation measure for the protection of aspen stands, and is consistent with management direction.

4. **Comment**: Since the Framework Standard and Guideline for streambank stability was adopted, the agency has not only failed to monitor consistently and effectively for compliance with that Standard and Guideline, but agency officials have not even agreed upon the utilization of a scientifically valid method to use for streambank monitoring within the Forest. The Forest doesn't monitor for or compile records about streambank stability.

   16.209

   Response: The Stanislaus National Forest monitors streambank stability using a scientifically valid and regionally accepted method (USDI 2011). The Monitoring Plan provides information about streambank stability (EIS, p. 293-301). Streambank stability would be monitored during project implementation.

5. **Comment**: Several examples of monitoring for BMP effectiveness are provided; however monitoring frequency and methods are not specified.

   6.005

   Response: The Monitoring Plan specifies BMPEP monitoring methods (EIS, p. 298).The Forest conducts Region 5 Range Management BMPEP monitoring annually on key areas chosen at random from a Forest-wide sample pool. BMPEP monitoring may occur more frequently, as needed, to ensure that BMPs are implemented and effective in the project area.

6. **Comment**: It would be a violation of NEPA for the Forest to select Alternative 1, based on the assumption that the monitoring proposed in Alternative 1 will go forward, when in reality the Forest does not have the funding to even do the current level of funding that already required in the Forest Plan. The Forest cannot choose Alternative 1 with the unrealistic expectation that significant additional monitoring dollars will suddenly appear and be consistently available, year after year, to monitor all the special aquatic features, the meadows that are functional-at risk, the water quality sites of high concern, or the key areas for at-risk Yosemite toad or Sierra Nevada Yellow-Legged Frog. Monitoring must be realistic. The reliance on unrealistic monitoring to implement Alternative 1 violates NEPA.

   16.206

   Response: The availability of funding for monitoring is outside the scope of this project. The Monitoring Plan (Appendix G) provides targets and objectives for short- and long-term monitoring in the project area. The plan states that "While actual monitoring accomplishments are dependent upon staff availability and funding constraints, sufficient monitoring should occur to provide the minimum information needed to determine if management is moving resources toward desired conditions. Annual monitoring implementation will be specified every year in the Annual Operating Instructions, and will reflect current monitoring priorities and realistic targets."

(p. 293). Monitoring may be accomplished in the absence of available funding with the help of permittees, volunteers, or other partners.

7. **Comment**: The DEIS relies on implementing BMPs to provide for conservation. The Forest cannot simply assume that implementation of a BMP may be an effective conservation measure but must conduct a site-specific analysis to demonstrate that a given BMP is likely to be effective in the context of this project.

   13.022

   Response: The EIS (Chapter 2.03) describes BMPs that would be implemented under all action alternatives. The purpose of range management BMPs is to protect water quality and aquatic and riparian resources that may be affected by rangeland management activities. The BMPs are applied as needed for the control of nonpoint source pollution associated with livestock grazing activities on NFS land. Each BMP is based on administrative directives that guide and direct the Forest Service planning and permitting of livestock grazing activities on NFS land. BMPs have been shown to be effective in protecting water quality, which would provide a means of habitat conservation for aquatic species. The BMP Effectiveness Program provides for site-specific analysis to verify that BMPs are implemented and effective in protecting water quality. The Monitoring Plan (Appendix G) describes how BMPEP monitoring would be used to assess both implementation and effectiveness of BMPs in the project area.

ALLOTMENT MANAGEMENT

8. **Comment**: The Final Environmental Impact Statement (FEIS) should explain the timing of updates for the AMP's and discuss whether any additional environmental analysis is needed for their development.

   15.004

   Response: The EIS analysis covers AMP updates for all action alternatives, therefore additional analysis is not required to update the AMPs. The EIS provides AMPs for the Bell Meadow, Eagle Meadow, and Herring Creek allotments (Appendices H, I and J). Plans may be modified as part of the adaptive management strategy, as long as modifications are consistent with the decision (Appendix H, p. 303; Appendix I, p. 319; and Appendix J, p. 337). The decision to be made will include approval of new AMPs for each allotment.

9. **Comment**: The Forest Service has a legal responsibility to include, when judging areas to be "capable" for livestock grazing, criteria that removes acres that are (a) critical habitat for a species that is either Threatened or Endangered or highly sensitive and at-risk, (b) high elevation areas with generally shallow soils and a typically short growing season, and (c) areas known to be high-use recreation areas.

   16.355

   Response: The EIS (Appendix F) documents capability analysis and criteria. Capability is defined in CFR 219.3 as “The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at a given level of management intensity. Capability depends on current conditions and site conditions such as climate, slope, landform, soils and geology, as well as the application of management practices, such as silviculture or protection from fire, insects, and disease.” The SNFPA (USDA 2004) Appendix K suggests that NFS lands meeting the following criteria are considered capable:

   - Areas with less than 30% slope for cattle.
   - Areas producing more than or having the potential to produce an average of 200 lbs. of forage per acre per year on an air dry basis over the planning period.
   - Areas accessible to livestock (without such factors as rock or physical barriers).

   The EIS (p. 271-273) states that analysis and identification of capable and suitable lands does not imply that livestock grazing would be restricted to lands that are both capable and suitable.

Incidental use occurs in areas that are not capable as cattle move through capable lands within each Allotment.

10. **Comment**: A change to 40% in the deferred rotation units will be unattainable in normal years and appears capricious, and punitive for grazing, particularly with the positive long term trend analysis. Removing the incentive for good range management is counterproductive to good resource stewardship. We request 50% utilization as the grazing standard in the Niagara Unit as long as monitoring and conditions support the use.

    9.004

    Response: Forest Plan Direction requires that "Pastures receiving periodic full growing season rest can have higher allowable use levels, as shown" (USDA 2010, p. 51-52). The Eagle Meadow allotment is managed using a deferred rotation and rest-rotation grazing system; however the Niagara unit is generally not rested from grazing for a full growing season. Therefore, the following utilization standards for season long grazing in Riparian Conservation Areas (RCAs) apply (USDA 2010, p. 195):

    - For meadows in early seral status: limit livestock utilization of grass and grass-like plants to 30 percent (or minimum 6-inch stubble height).
    - For meadows in late seral status: limit livestock utilization of grass and grass-like plants to a maximum of 40 percent (or minimum 4-inch stubble height).

11. **Comment**: Since the Herring Allotment already lists 23 major meadows within the Allotment, and resource objectives cannot be met, it is highly debatable that adding one large meadow in the Cascade unit with numerous small stringer meadows will suddenly provide such forage capacity that the other 23 meadows will no longer be pressured.

    16.094

    Response: Rangeland forage is not limited to meadows. Where not suppressed by a densely forested canopy, the herbaceous understory provides forage for livestock. Browse species (such as Deerbrush) also provide forage for livestock and are found in openings and in the forest understory. The addition of the Cascade unit would provide additional forage capacity and would allow for increased livestock dispersal. The combination of increased forage capacity and livestock dispersal would reduce grazing pressure on meadows and riparian areas within the existing allotment boundary (EIS, Chapter 3.06).

12. **Comment**: The Niagara Addition would add at least some suitable grazing acres to the Eagle Meadow Allotment, but that addition will be shown to be in conflict with various legal requirements because essential surveys that have not been completed.

    16.070

    Response: The EIS (p. 29) notes that addition areas would be surveyed prior to allowing livestock to use those areas.

13. **Comment**: Areas closed to Grazing page 308 "Livestock are not permitted within Shell Meadow, the permanent exclosure at lower Eagle Meadow. The Eagle Unit is also excluded from livestock." We request a correction to provide consistency in the BEH DEIS.

    9.005

    Response: The EIS (p. 326) shows that Shell Meadow is currently excluded from livestock grazing, and would continue to be excluded under all action alternatives. The Shell Meadow Restoration Decision Memo says that "The meadow is currently fenced to exclude cattle grazing; it is unknown if changes in the grazing permit could occur in the future and allow for grazing in this meadow. To protect the restoration project, retain the existing fence for three years or until vegetative recovery occurs (less than 10% bare ground and no active erosion), whichever is longer." (Decision Memo, September 4, 2013). Grazing exclusion is required by the Shell Meadow project to protect the restoration for three years or until vegetative recovery occurs.

Continued livestock exclusion may be required following vegetative recovery of the restoration area to ensure consistency with Forest Plan Direction or compliance with the Biological Opinion for Yosemite toad (USFWS 2014). Any proposed future changes to grazing management at Shell Meadow would require additional site-specific analysis. The Eagle unit, shown on the Eagle Meadow allotment map (p. 335) is excluded from livestock, but should be distinguished from the Eagle Meadow unit and the Lower Eagle Units, which are both grazed by livestock.

14. **Comment**: A fence on the southeast corner of the Bell Meadow allotment would prevent cows from leaving the permit area. A fence about 200 yards long with a gate for horses and cattle and a cattleguard for backpackers so they don't have to open or close a gate.

    8.001

    Response: The EIS now includes this infrastructure (p. 15); however, surveys may be required prior to fence construction.

AQUATICS

15. **Comment**: The DEIS states "Desiccation of breeding habitat is a primary source of mortality, particularly in years with below-average precipitation or in habitats where the water table has been extensively modified (that is, stream downcutting)" (DEIS Pg. 48), but fails to point out that the principle agent of this down-cutting is grazing, which would appear to be a deliberate omission given that the DEIS is assessing the effects of grazing.

    12.013 18.003 18.006 18.008 18.009 18.010

    Response: Overgrazing can cause or contribute to streambank instability. Current management direction for livestock grazing is designed to prevent overgrazing and damage to streambanks (EIS, p. 25). Implementation of riparian standards and guidelines for streambank disturbance, streambank stability, shrub browse, and forage utilization would prevent stream downcutting.

16. **Comment**: The DEIS provide an inadequate analysis of the impacts to amphibians caused by livestock spread of chytrid fungus. Please provide a site-specific analysis of the risk to amphibians of cattle as a possible vector for spreading chytrid fungus between meadows and Yosemite toad breeding habitats.

    13.026 16.038

    Response: The EIS (p. 58-59) and the Aquatics BA (p. 44-45) provides a detailed analysis of the potential for impacts to amphibians caused by spread of chytrid fungus by livestock.

17. **Comment**: I question the validity of continuing this Proposed Action until such time as the Conservation Strategy, and the Conservation Assessment, which has still not been released for public comment either have been completed and the public and scientific community has had an opportunity to review and comment on them.

    12.011

    Response: The USFWS listed the Yosemite toad as an endangered species (Federal Register 2014). The Yosemite toad Conservation Assessment is available (USDA 2015) and was used in the development of a programmatic Biological Assessment. The USFWS issued a programmatic Biological Opinion and Incidental Take Statements (USFWS 2014), which provide ESA coverage and management direction for several ongoing activities (including livestock grazing) with the potential to affect the Yosemite toad, Mountain Yellow-Legged Frog and the Sierra Nevada Yellow-Legged Frog. There is no legal requirement that a Conservation Assessment or Conservation Strategy be finalized prior to selecting an alternative and issuing a decision for this project.

18. **Comment**: There is nothing contained in the DEIS or the Biological Assessment –Aquatics that outlines the methodologies to be used to complete the systematic monitoring called for in the FPD above.

    12.024

Response: The SNFPA requires that either: 1) "livestock are excluded from standing water and saturated soils in wet meadows and associated streams and springs occupied by Yosemite toads or identified as "essential habitat" in the conservation assessment for the Yosemite toad during the breeding and rearing season (through metamorphosis)…"; or "Exclusions in this standard and guideline may be waived if an interdisciplinary team has developed a site-specific management plan to minimize impacts to the Yosemite toad and its habitat by managing the movement of stock around wet areas. Such plans are to include a requirement for systematically monitoring a sample of occupied Yosemite toad sites within the meadow…" (USDA 2004). Because livestock are excluded from wet meadows occupied by Yosemite toads through metamorphosis (USDA 2004, S&G 53), there is no requirement to outline the methodologies to be used to complete the systematic monitoring called for in the second option (USDA 2004, S&G 54). A monitoring plan is, however, being developed by the Forest Service in cooperation with the USFWS.

19. Comment: The DEIS insufficiently evaluates the potential impacts to endangered species such as California red-legged frog and Lahontan cutthroat trout. For example, the document states, "Detailed analysis was not completed for the following species based on the absence of suitable habitat" (page: 47). However, the document falls short of stating why the habitat is unsuitable or if this condition is caused by past grazing.

15.008

Response: The Aquatics BA (p. 5) shows that California red-legged frog are not analyzed in detail because the project area is outside of the elevation range of the species and Lahontan cutthroat trout are not analyzed because the project area is outside of the local geographic range of the species. The absence of suitable habitat in the project area is not a result of past grazing.

20. Comment: The DEIS/BE/BA ignores the emerging studies relating to removal of Batrachochytrium from amphibian habitat by invertebrates such as Daphnea and Rotifera (Buck et al., 2011; Hamilton et al., 2012; Searle et al., 2013; Schmeller et al., 2014). These micro- invertebrates are highly sensitive to changes in water quality and indeed because of their sensitivity have been used in routine indexes used to monitor water quality. Where is the analysis of water quality and disease risks to these imperiled amphibians?

13.027

Response: The Aquatics BA (p. 44-45) analyzes spread of chytrid fungus by livestock for the BEH Rangeland Allotments. It also analyzes the risk of livestock related water quality impacts to the Yosemite toad (p. 47-49) and Sierra Nevada yellow-legged frog (p. 54-55) in the BEH project area.

INVASIVE SPECIES

21. Comment: The analysis of the potential for cattle to introduce and spread invasive and non-native plants is inadequate. The analysis fails to provide information about the new potential for spread of invasive plants into the over 8000 acres proposed as additions to the Eagle Meadow and Herring Creek allotments. The analysis also insufficiently addresses the role of livestock in spreading invasive plants in the present perimeter in the BEH allotments.

16.327 16.328 16.332 16.333

Response: EIS Chapter 3.05 describes the main vectors and sources of weeds, and states that most of the possible sources are generally not related to cattle (p. 97). The main vectors associated with cattle are described as the possible use of hay and the introduction on the vehicles that deliver the cattle or on the cattle themselves (p. 98). Mitigation and other requirements would be implemented for Alternatives 1 and 4 to reduce the risk of weed and invasive plant introduction and spread (p. 98). The Noxious Weed Risk Assessment (project record) provides information about habitat alteration expected as a result of the project, and describes this risk as moderate.

NEPA

Purpose and Need

22. Comment: The purpose and need statement is neither clearly stated nor does it comply with 40 C.F.R. § 1502.13.

13.002

Response: FSH 1909.15, Chapter 11.21 states that the need for action discusses the relationship between the desired condition and the existing condition in order to answer the question. "why consider taking any action". The EIS states that this action is needed because there is a need to move existing resource conditions toward desired conditions identified in Forest Plan Direction and because there is demand for continued livestock grazing (p. 4). The purpose of the project is to authorize livestock grazing in the project area, ensure compliance with regulations and agency policy, and implement an adaptive management strategy that will move resource conditions toward desired conditions in a manner that is timely and consistent with Forest Plan goals and objectives (EIS, p. 3-4). The purpose and need statement answer the question "why take any action" and is consistent with agency policy (FSH 1909.15 and FSH 2209.13) and federal regulations (40 C.F.R. § 1502.13).

23. Comment: The Forest's incorporation of "continue to authorize livestock grazing" and "implement an adaptive management strategy" as part of its purpose seems designed solely to foreclose selection of the "no grazing" alternative even if this alternative would better ensure that specific locations within the project area that are not meeting or moving toward desired conditions would do so, and thus would better meet Forest Plan objectives.

13.003 13.004

Response: FSH 1909.15, Chapter 11.21 states that the purpose of an action will be to respond to the stated need. The breadth or narrowness of the need influences the scope of the analysis. The EIS states that this action is needed because there is demand for continued livestock grazing (p. 4) and because there is a need to move existing resource conditions toward desired conditions identified in Forest Plan Direction. The purpose is to continue to authorize livestock grazing, implement an adaptive management strategy, and ensure compliance with regulations and agency policy. The 1995 Rescissions Act requires National Forests to complete NEPA analysis and update allotment management plans for rangeland allotments on NFS lands. Gaps between existing and desired conditions were identified, and the EIS provides an analysis to determine which alternative, including Alternative 2 which analyzes no grazing, would best meet Forest Plan objectives while ensuring compliance with agency policy and regulations. The EIS (p. 9) states that the Responsible Official may decide to: (1) select the proposed action; (2) select one of the alternatives; (3) select one of the alternatives after modifying the alternative with additional mitigating measures or combination of activities from other alternatives; or, (4) select the no action alternative, choosing not to authorize continued grazing on the BEH Rangeland Allotments. The incorporation of "continue to authorize livestock grazing" and "implement an adaptive management strategy" is consistent with agency policy (FSH 1909.15 and FSH 2209.13) and not designed to foreclose selection of any alternative.

Alternatives

24. Comment: During public scoping, stakeholders requested an alternative that would focus on reducing or eliminating water quality contamination of forest streams. The "Water Quality Emphasis Alternative was inappropriately eliminated from detailed consideration based on the unsubstantiated assumption that it was similar to Alternative 2 and Alternative 4.

16.092 16.361 16.362 16.364 16.365 16.367 16.384

Response: The water quality emphasis alternative (EIS Chapter 2.04) proposed to minimize livestock grazing along small tributary streams, limit the duration of livestock presence in wet

meadows and meadows with streams, exclude livestock from important wetland features, and exclude or significantly limit livestock grazing from streams where recreation occurs (p. 30-31). This alternative was considered but eliminated from further analysis it would be prohibitively difficult or impractical to implement and because other fully developed alternatives would reduce or eliminate livestock impacts to water quality. Alternative 4 was developed in response to these suggested alternatives, and incorporates additional measures for resource protection while meeting multiple use objectives (36 CFR 222.2(c)) and making forage available to livestock operators (FSM 2203.1). Alternative 4 meets the purpose and need because it is designed to reduce potential impacts to water quality while allowing for continued grazing and ensuring the practicality of implementation. Measures to exclude livestock from streams, wet meadows, wetlands, and recreation areas include fencing and intensive herding. Fencing or intensive herding to remove livestock from tributary streams, meadows with streams, wetland features, and streams where recreation occurs would be impractical to implement due to the amount of time required to either construct and maintain fences or herd livestock. Significant reductions in grazing area and concurrent increases in management cost would dramatically affect the economic viability of this allotment (Social and Economic Report). If allotment management is not economically viable, the allotment would go vacant similar to the no action alternative. In addition, removing or minimizing livestock presence from the areas identified will not ensure water quality protection, because livestock are not the only source of pollutants. Alternative 4 excludes portions of allotments where there is more potential for water quality impacts, but no alternative (including Alternative 2) would eliminate water quality contamination of forest streams. Refer to response to comment 23.

25. **Comment**: The DEIS firstly claims that a habitat and species protection alternative would have little chance of being chosen by the responsible official because other fully developed alternatives would eliminate livestock impacts to sensitive species habitat. While we agree that the Forest officials rarely adopt species protection alternatives, the only alternative considered that would afford habitat and species protection is no grazing. But because of the Forest's constraining purpose and need statement, no grazing would not meet the purpose and need.

13.008

Response: The habitat and species protection alternative (EIS Chapter 2.04) eliminates grazing in all Yosemite toad habitats and eliminates all herding through Yosemite toad occurrences (p. 31). This alternative was eliminated from detailed analysis because other fully developed alternatives would eliminate livestock impacts to sensitive species habitat Refer to response to comment 24. Alternative 4 meets the purpose and need because it protects species and habitats while allowing for continued grazing, ensuring the practicality of implementation, and maintaining the economic viability of the allotments. Alternative 2 eliminates grazing in the project area, and Alternative 4 excludes livestock from occupied Yosemite toad breeding areas and a majority of suitable Yosemite toad habitat. Alternatives 1 and 4 provide for habitat and species protection because they would implement standards and guidelines, resource conservation measures, and an adaptive management strategy to ensure that grazing impacts to habitat and species are minimized. Refer to response to comment 23.

26. **Comment**: The Forest needs to revise the DEIS to consider a reasonable range of alternatives that address the revised purpose and need, that includes reasonable alternatives proposed by the public, and that includes adaptive management components that will ensure protection for proposed and final critical habitats.

13.009

Response: The EIS analyzes four alternatives in detail (Chapter 2.02) and describes three alternatives considered, but eliminated from detailed study (Chapter 2.04). These alternatives include: Water Quality Emphasis, Habitat and Species Protection, and Reduced Grazing Refer to

response to comment 24. Alternatives 1 and 4 include an adaptive management strategy that would allow for any adjustments needed to provide protection of proposed and final critical habitats, once designated. Per 36 CFR 220.5 (e), no specific number of alternatives is required or prescribed.

27. **Comment**: We have identified additional measures to be incorporated into Alternative 1 (including elements of Alternative 4) in order for the preferred action to be more protective of the environment. We suggest the FEIS include resource protection measures such as a reduction of the number of acres affected by grazing, reduced stream bank disturbance, and a decrease in livestock access to areas that include habitat for species of concern such as the Yosemite toad and the Sierra Nevada Yellow-Legged Frog.

15.002 15.003

Response: Alternative 4 was developed in response to scoping comments which suggested additional protection measures. This alternative incorporates additional measures for resource protection, such as a reduction of the number of acres affected by grazing, reduced streambank trampling standard, and livestock exclusion from sensitive areas, including areas with habitat for species of concern (EIS, p. 21). Refer to response to comment 23.

28. **Comment**: A final decision to approve livestock grazing within the BEH allotments will only be in compliance with NEPA if the Forest selects an alternative that significantly diminishes the amount of non-capable acres that are available to livestock.

16.356

Response: Capable lands provide the majority of forage and water for livestock in these allotments, but non-capable lands comprise a majority of the project area. Livestock use non-capable lands as they move through the allotment seeking forage and water. These non-capable lands are suitable for livestock grazing but receive relatively little livestock use. Project-related impacts to non-capable lands are inherently diminished due to the way they are used by livestock. Measures to exclude livestock from non-capable lands include fencing and intensive herding. Fencing or intensive herding to exclude livestock from the abundance of non-capable lands in the project area would be impractical due to the amount of time required to either construct and maintain fences or herd livestock (Social and Economic Report). Significant reductions in grazing area and concurrent increases in management cost would dramatically affect the economic viability of an allotment. If allotment management is not economically viable, the allotment would go vacant as described in the no action alternative. In addition, non-capable lands may become capable if understory forage production were to increase, such as following timber harvest or fire.

29. **Comment**: If Alternative 1 was selected, this project would violate NFMA because the Forest Service is not insuring the viability of sensitive forest species adversely affected by grazing in the Sierra Nevada, including the Yosemite toad, Sierra Nevada yellow-legged frog, Great Gray Owl and Willow Flycatcher.

16.049

Response: 36 CFR 219 (Planning Rule) represents the Forest Service regulations for implementing the Rangeland Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act (NFMA) of 1976 (16 U.S.C. 1600 et seq.). The rule addresses species in terms of requirements for sustainability (219.8) and diversity (219.9) at the Forest Plan level rather than viability at the project level. Except as provided in the plan consistency requirements in 36 CFR 219.15, none of those requirements apply to projects or activities (219.2). NFMA requires Land and Resource Management Plans to be developed using a systematic and interdisciplinary approach to resource management. Forest Plan Direction (USDA 2010) was developed in accordance with NFMA. Appendix C (Forest Plan Direction) shows that the EIS is consistent with Forest Plan Direction, and therefore NFMA. The potential effects of grazing on

threatened, endangered, and sensitive species were carefully analyzed and disclosed in the EIS (Chapters 3.02, 3.03 and 3.13) and project record (Aquatics BA, Sensitive Plants BE, and Wildlife BE).

Environmental Consequences

30. Comment: The DEIS fails to adequately address the negative impacts on recreational usage because it doesn't quantify the number of new recreational users that would come to the area and doesn't mention the extra dollars that these new visitors would spend in the local economy. Recreation conflict issues were not fully disclosed or carefully analyzed in the DEIS. NEPA requires that consideration of those impacts be part of the cumulative effects analysis, and that reasonable measures be considered and adopted in order to reduce the significance of impacts. Alternative 1 suggests increased education and visitor information about multiple use and grazing as a measure to reduce conflicts. This fails to meet the requirement for a hard look under NEPA.

4.003 16.163 16.170 16.173 16.178 16.184

Response: The EIS (Chapter 3.07) describes the impacts of livestock grazing on recreation with indicators and methodology used to evaluate the environmental consequences of each alternative. The number of public comments received related to conflicts between grazing and recreation is analyzed (p. 121). In addition to increased education and visitor information, other measures are considered and adopted to reduce the significance of impacts, including herding and adaptive management. The EIS (Chapter 3.11) describes how the alternatives reduce the significance of impacts to water quality. For Alternatives 1 and 3, implementation of new grazing systems and addition areas would result in reduced grazing pressure, which is expected to reduce sediment deposition and accumulation, indicator bacteria and pathogen concentrations, and nutrient concentrations from the current management (EIS, p 187).

31. Comment: The DEIS failed to take a hard look (as required by NEPA) at the impacts of livestock grazing on lands not capable or suitable for grazing. The Forest has a legal responsibility to fully analyze the environmental impacts of allowing livestock use to take place on lands that are not suitable and capable, to consider reasonable mitigation actions to reduce the impacts of grazing on those acres, and to eliminate or at least significantly reduce livestock grazing in vulnerable resource areas that contain the highest percentage of acres that are neither suitable nor capable.

16.233 16.337 16.338 16.340 16.344 16.345 16.346
16.349 16.351

Response: The EIS (Chapter 3.06) describes the impacts of livestock grazing on both capable and non-capable lands in the project area proportionate to the expected degree of impacts. Capable rangelands, including primary and secondary range, are more accessible and more likely to be used by livestock due to their forage production, proximity to water, and gentle terrain. Lands that are not capable or suitable for grazing are either less likely to be used or are excluded from livestock, impacts associated with livestock use in those areas are inherently reduced.

32. Comment: The analysis should fully evaluate the impacts of existing and proposed grazing management and range developments as well as impacts from past, current and future livestock use on all nine roadless characteristics cited in the Roadless Rule.

13.032

Response: The EIS (p. 145–151) describes the anticipated direct, indirect, and cumulative effects for all four alternatives on Roadless Area Characteristics.

33. Comment: While the Forest's recognition that the project will contribute to the need for a federal listing and the admitted uncertainty on the project's effects on viability are correct in our opinion, this is tantamount to an admission of flagrant violations of the agency's responsibilities under the Endangered Species Act ("ESA"), The National Forest Management Act ("NFMA") and NEPA.

13.025

Response: The USFWS was consulted during analysis, and project activities were assessed to determine their effects on threatened, endangered, and candidate plant and animal species. Two amphibian species (Yosemite toad and Mountain Yellow-Legged Frog), two Forest Service sensitive terrestrial wildlife species (Willow Flycatcher and Great Grey Owl) and one candidate terrestrial wildlife species (Sierra Nevada Red Fox) are found within the project area. The Wildlife BE prepared for this project indicates that continued grazing may affect individuals, but is not likely to result in a trend towards Federal listing or loss of viability for the Willow Flycatcher, Great Grey Owl and Sierra Nevada Red Fox (EIS Chapter 3.13 and Wildlife BE, project record). The Biological Assessment-Aquatics prepared for this project indicates that continued grazing may affect and is likely to adversely affect the Yosemite toad and Sierra Nevada Yellow-Legged Frog (EIS Chapter 3.02 and Aquatics BA, project record). Management requirements would ensure project consistency with the ESA and compliance with applicable Biological Opinions issued for listed species in the project area (EIS, p. 27).

34. Comment: The DEIS analysis of water quality incorrectly assumes that it is the responsibility of forest visitors to filter or boil water before drinking, washing or cooking. It is an environmental justice and social justice issue for the Forest to suggest that all forest visitors, including those who cannot afford a water filter, will come equipped with the means to prevent water-borne illness.

16.051 16.082 16.085

Response: Best available science (Roche et al. 2013) indicates that there are multiple sources of water-borne pathogens. The Forest would recommend that forest visitors filter or boil water, even in the absence of livestock grazing.

RIPARIAN AND MEADOWS

Special Aquatic Features

35. Comment: The Region requires that measures be developed to protect bogs and fens from such activities as trampling by livestock. The Regional guideline does not say protect fens and bogs once they are non-functional. It requires protection of the special aquatic features from livestock trampling. Alternative 1 (and other action alternatives) directly violates the legal requirement of the Framework Amendment, which requires for fens to be protected from trampling by livestock.

16.108 16.109 16.111 16.112 16.378

Response: The EIS (Chapter 2.03) describes Mitigation and Other Requirements that would be implemented to protect special aquatic features. The Adaptive Management Strategy allows for livestock exclusion from any special aquatic features that are functioning at risk and determined to be in a downward trend as a direct result of current livestock grazing. Aquatic Conservation Strategy (ACS) Standards and Guidelines do not require livestock exclusion for special aquatic features that are functioning at risk. Forest standards prescribe that ground disturbing activities be prohibited or mitigated if adversely affecting hydrologic processes. Some special aquatic features in the project area are still recovering from past activities, and some are at risk for reasons unrelated to livestock grazing. The EIS (Chapter 3.11) meets ACS objectives because riparian areas in the project area are generally functioning well under current management and project implementation will continue or improve these conditions.

36. Comment: It is problematic that the Forest has not completed surveys for special aquatic features. Alternative 1 does not provide for regionally required protection of not yet identified special aquatic features due to a lack of complete assessments. This failure to provide important information directly conflicts with NEPA.

13.037 16.114

Response: The EIS (Chapters 3.06 and 3.11) assessed the hydrologic function of meadow habitats and special aquatic features. Special aquatic features (including fens) were systematically surveyed during project analysis, and resource conservation measures were developed to protect

these features from trampling by livestock. The EIS states that "Addition areas will be surveyed for special aquatic features and PFC methodology will be used to establish baseline conditions of special aquatic features prior to livestock being allowed in those areas" (p. 29).

Meadows

37. Comment: These meadow ecosystems will only become more stressed and more at risk from disturbance as climate warming shifts the weather patterns, yet there is no discussion in the DEIS about the possible implications that less moisture and hotter summers will have on the project area. As Class 2 and Class 3 meadows require an upward trend to stay at their current rating, then the added stressors from climate warming will require a change in livestock management for improvement to continue. As weather conditions for the next 20 years cannot be expected to be commensurate to the last 40 years, livestock management as it has been in the recent past should not be the standard for the future.

16.282

Response: EIS Chapter 3.01 addresses Climate Change, and has been updated to provide more information about implications for livestock grazing in the project area. The adaptive management strategy would allow for range managers to adjust livestock management if warranted by changed conditions in the future.

38. Comment: There is clear management direction calling for resting and restoring degraded meadows. The Forest legally cannot continue to allow even moderate levels of livestock use in any meadow that is evaluated to be Functional-At-Risk, and absolutely no livestock use should be approved for any meadow that is at Poor or Very Poor condition under Rapid Assessment Protocol or is shown to be Non-Functional under PFC. To allow livestock use in meadows that do not meet desired conditions or which are far from desired conditions would only be justified if the agency can show why biological resources should not be given priority protection. A plan to ensure that grazing is not allowed in degraded meadows should be spelled out in the final EIS.

16.289 16.290 16.294 16.298 16.300 16.377

Response: Forest Plan Direction states that “If meadow ecological status is determined to be moving in a downward trend, modify or suspend grazing.” and “Degraded meadows (such as those in early seral status with greater than 10 percent of the meadow area in bare soil and active erosion) require total rest from grazing until they have recovered and have moved to mid- or late seral status” (USDA 2010, p. 195). EIS Table 3.06-4 (p. 109) shows that Crab Meadow is the only meadow in the project area with low ecological status and a downward trend. The Gooseberry Ecological Restoration project analyzed for exclusion of Crab Meadow, and the most sensitive parts of the meadow have already been fenced. EIS Appendix B (Cumulative Effects) analyzed the cumulative effects of the BEH project when combined with other projects, so meadow restoration treatments proposed under the Gooseberry project were considered. The EIS also shows that a number of meadows in the project area are either functioning at risk or nonfunctional (p. 159-170). The Watershed Report provided a thorough analysis of meadow hydrologic function and determined that the current condition of meadows in the project area result from impacts of historic overgrazing (p. 179). The Watershed Report (p. 13, 29, 46-47) contains information about historical meadow degradation, including references to historical records, past specialist accounts, and professional observations, that support the statement that historical use is the primary source of meadow degradation. The Watershed Report also states that “Where already impaired, meadow hydrologic function is not likely to show significant improvement by changing livestock management alone” (p. 5). Resting degraded meadows from grazing does not necessarily result in improvements to meadow condition, and implementation of standards and guidelines would prevent potential meadow degradation from continued grazing in the project area (Frietas et al. 2014). Alternatives 1 and 4 would implement mitigation and other requirements (EIS Chapter 2.03), including an adaptive management strategy and resource conservation measures that would prevent meadow degradation. If future assessments indicate

that meadow ecological status is moving in a downward trend or that meadows in the project area are in early seral status or degraded to the extent that total rest is required, this would be accomplished using the adaptive management strategy described in the EIS.

39. Comment: The statement that historical use is the main source of degradation in meadows and riparian areas is highly debatable based on field evidence gathered by stakeholders.

16.286 16.287

Response: Refer to response to comment 38. While current grazing does result in short term impacts to meadows, Forest Plan standards and guidelines are designed to prevent long term degradation of meadows and riparian areas.

40. Comment: No information is provided by the USFS about major hydrological issues at Upper and Lower Round Meadows, or livestock damage that is contributing to their declining condition.

16.260

Response: The EIS (p. 160) lists Round and Lower Round meadows as nonfunctional. The Watershed Report (p. 13-19) provides additional information about the condition and hydrologic function of meadows in the Bell Meadow allotment, including Round and Lower Round meadows.

41. Comment: The DEIS does not provide consideration for how the impact of grazing affects meadows as a source of late season water supply.

16.278

Response: Late season water supply is directly related to meadow hydrologic function. The effects of livestock grazing on meadow hydrologic function were carefully analyzed and disclosed (EIS, p. 159-169) and in the Watershed Report.

SENSITIVE PLANTS

42. Comment: The EIS's effects analysis on Bruchia bolanderi was highly cursory and surprisingly inaccurate: "It has limited habitat at these elevations since it is usually on stream banks and many meadows do not have streams going through them" (DEIS p.79). In contrast to that inaccurate statement, a map of the meadows in these allotments clearly shows that the majority of meadows have streams in them. This is even acknowledged: "Many of the meadows have streams through them and are connected by streams." (DEIS p.80). Obviously, for the DEIS to suggest that Bruchia bolanderi is unlikely to be present due to the lack of meadows with streams runs counter to the evidence.

16.313

Response: The EIS (Chapter 3.03, p. 79) states that "Bruchia bolanderi has predominantly been found on steep, moist vertical banks of streams on this forest. These are areas that can be impacted if cattle go down the slope to water or walk up and down the stream. Those types of impacts were not seen when the collections were made. Cattle generally avoid steep stream banks in favor of those that are more laid back that allow easier access to the stream. They tend to continue to the same access points. There are forest standards that limit impacts to no more than 20% of the bank. It is unlikely there would be additional access points created through steep banks that are suitable habitat for B. bolanderi. Therefore there would be no direct effects in this alternative." While many meadows do have streams through them, Bruchia bolanderi tends to grow on steep vertical banks of perennial streams, and this type of habitat is both limited in the project area and less likely to be impacted by cattle trailing. Additionally, streambank standards and guidelines would mitigate potential impacts to the species by limiting the amount of streambank disturbance that occurs. These standards may be adjusted through the adaptive management process if monitoring determines that the current standard provide inadequate protection for sensitive plants.

WATER QUALITY

43. Comment: Although the DEIS indicates *"low risk of exceeding bacterial and pathogenic water quality standards"* across allotments currently, we have received evidence from the Central Sierra Environmental Resource Center that grazing activities in the BEH Rangeland Allotments are not meeting Basin Plan water quality objectives for fecal coliform and may be in violation of other standards (e.g. total suspended sediment and turbidity) during certain times of the year.

6.003

Response: The EIS (Chapter 3.11) assesses and analyzes the potential impacts on water quality that would result from continued grazing and associated project activities. While data presented by CSERC may indicate site specific exceedance of Basin Plan standards, several other factors (recreation, wildlife, forest management activities) can contribute to water quality impacts, and other data collected in the project area indicate that grazing is generally meeting EPA standards and presents a low risk to forest visitors (Roche et al. 2013). Management actions proposed in the EIS are in compliance with all applicable water quality laws and regulations. While the potential for site specific exceedance exists, the project is designed to minimize potential impacts to water quality associated with livestock grazing by implementing mitigation and other requirements and utilizing an adaptive management process that would allow the forest to address site specific exceedance of applicable water quality standards as they are identified. Mitigations designed to minimize impacts to water quality include standards and guidelines such as limits to streambank disturbance, Best Management Practices, Resource Conservation Measures (especially for special aquatic features and meadow hydrologic function), and adaptive management, which allows adaptive actions like adjusting stocking rates, livestock movement and distribution, fence construction, or installation of livestock water developments (EIS, p. 24-29). The Forest is working with the Central Valley Regional Water Quality Control board to ensure compliance with all applicable water quality laws.

44. Comment: The DEIS misinterprets the Central Valley Regional Water Quality Control Board's Basin Plan because improperly applies beneficial uses based on assumptions about Rec 1 and Rec 2. In addition, the DEIS fails to assess risk as required by the Basin Plan.

6.004 16.151 16.152 16.153 16.155 16.156 16.157

Response: The EIS (Chapter 3.11) provides an interpretation of the Basin Plan in order to assess and analyze the potential impacts on water quality that would result from continued grazing and associated project activities. This interpretation is not intended to provide an official designation of the beneficial uses in the project area. Rather, beneficial uses were interpreted using local knowledge in order to provide a thorough analysis of the potential effects of livestock grazing on water quality and the potential risk to human health and safety in the project area.

45. Comment: The DEIS' analysis of water quality impacts relies heavily on a study that was not done in compliance with state standards for sampling and monitoring, because the protocol requires taking a minimum of five samples within a 30-day period. The study failed to compare sample results with the State threshold limit for recreational waters and fecal coliform, and instead compared study results to a federal standard that is not as strict as the State limit. As a result, the study does not represent the best available science according to the Basin Plan.

16.131 15.154 16.067

Response: The UC Davis study examined grazing impacts on water quality on NFS lands by comparing the levels of potential contaminants associated with grazing to existing regulatory benchmarks and recommended maximum nutrient concentrations (Roche et al. 2013). Although standards for water quality frequently use fecal coliform as the indicator, the UC Davis study compared bacteria levels to the EPA recommended standard, which uses E.coli as the indicator. Research has shown that E. coli has a stronger correlation to pathogens than fecal coliform; therefore, E. coli is a more accurate indicator of the potential risk to human health and safety.

Although other studies were referenced in the EIS, the UC Davis water quality study is the most comprehensive study of grazing impacts to water quality on NFS lands in the region, and represents the most current best available science.

46. Comment: Grazing activities in the BEH rangeland allotments do not comply with the Clean Water Act or the Porter Cologne Act because grazing does not meet water quality standards but the Forest does not have a waiver or permit for nonpoint source pollution from the regional water quality control board.

6.003	16.005	16.078	16.079	16.080	16.087	16.088
16.089	16.090	16.103	16.121	16.126	16.136	16.137
16.139	16.142	16.143	16.144	16.145	16.146	16.147
16.148	16.149	16.150	16.413			

Response: The Forest will continue working with the regional water quality control board to obtain a permit or waiver for nonpoint source pollution in order to ensure compliance with all applicable water quality regulations.

WILDLIFE

Deer

47. Comment: The impact of this action to hunted species is not fully analyzed and mitigated. Per the DEIS, Alternative 1 will have the highest impact to deer populations; however, the DEIR does not include mitigation measures to offset the impact of grazing to the deer population. Per the DEIS, Alternative 1 could result in lower fawn recruitment and survival. The Department has reduced the number of deer tags available in the allotments area by nearly 30 percent in response to the declining deer population. The impact of declining game populations from this action could combine with the impacts to wildlife populations resulting from other actions, such as the Forest Service Travel Management Plan, and catastrophic events, such as the Rim Fire, to create a significant adverse cumulative effect to game species and hunting opportunities.

17.007

Response: EIS Chapter 3.13 and the Wildlife Report describe potential direct, indirect and cumulative impacts to deer populations, including the potential for the project to cause death, injury, and disturbance as well as the potential reduction in deer habitat quality.

Great Gray Owl

48. Comment: The reasoning behind the 3-acre exclusion is unclear related to the viability of sustaining a healthy vole population in Lower Eagle Meadow. … If Lower Eagle Meadow is capable of 10-12" or greater, as is recommended by virtually every study of this species, then the FS does not adequately explain or demonstrate the logic for choosing to instead maintain the meadow at a lower vegetation height. Alternative 1 appears to rely on lower quality habitat that could threaten long-term persistence of owls in the project area and on the Stanislaus National Forest in general.

16.013

Response: Forest Plan Direction (USDA 2010, p. 187) shows "In meadow areas of great gray owl PACs, maintain herbaceous vegetation at a height commensurate with site capability and habitat needs of prey species. Follow regional guidance to determine potential prey species and associated habitat requirements at the project level." The EIS (p. 209) states that "In the Lower Eagle PAC, vegetation height for voles would be maintained by a fenced exclusion area. Within the fenced exclusion area, foraging habitat quality would be maximized as a 10" preferred height for vole habitat would be achieved." Alternatives 1 and 3 delineate the exclusion area based on an assessment of the meadow portion with the highest capability closest to the owl activity center. Alternative 4 expands the exclusion area beyond the meadow to include the herbaceous vegetation within the historic nest stand itself. Livestock are excluded from Lower Eagle Meadow under all alternatives; therefore the vegetation height within the exclusion area would be equal to

the maximum vegetative height based on meadow capability. Alternative 4 potentially affects the least meadow acres and potential reproductive territories; however, all alternatives are consistent with Forest Plan Direction for Great Grey Owl.

Table E.01-1 List of Respondents

ID	Type	Timely	Last	First	Organization(s)
1	Unique	Yes	Gheno	Tony	
2	Unique	Yes	Rosen	Ted	
3	Unique	Yes	Frailing	John	
4	Unique	Yes	Stevens	Mark	
5	Unique	Yes	Clark	Valerie	
6	Unique	Yes	McConnell	Sue	CVRWQCB
7	Unique	Yes	Pedro	Craig	TCAO
8	Unique	Yes	Harvey	John	
9	Unique	Yes	Brennan	Bob and Sherri	
10	Unique	Yes	Gaiser	Richard	SGA
11	Unique	Yes	Fischer	Eloise	
12	Unique	Yes	Martin	Dave	
13	Unique	Yes	Connor	Michael	WW
14	Unique	Yes	Royce	Evan	TCBOS
15	Unique	Yes	Munson	James	EPA
16	Unique	Yes	Buckley	John	CSERC, SFL, HSHA, SC, DOW
17	Unique	No	Single	Jeffrey	CDFW
18	Unique	No	Wilbur	Kirk	CCA

CCA California Cattlemen's Association
CDFW California Department of Fish and Wildlife
CSERC Central Sierra Environmental Resource Center
CVRWQCB Central Valley Regional Water Quality Control Board
DOW Defenders of Wildlife
EPA Environmental Protection Agency
HSHA High Sierra Hikers Association
SC Sierra Club
SFL Sierra Forest Legacy
SGA Stanislaus Grazing Association
TCAO Tuolumne County Administrator's Office
TCBOS Tuolumne County Board of Supervisors
WW Western Watersheds

F. Rangeland Capability and Suitability Analysis

The National Forest Management Act of 1976 regulations found at 36 CFR 219.20 require a determination of rangeland capability and suitability in Forest Plans. Capability is defined in 36 CFR 219.3 and Forest Service Manual 1905. The Stanislaus National Forest Land and Resource Management Plan (USDA 1991) provides a general definition of suitable range as areas which are accessible to livestock and can produce at least 50 pounds of forage per acre per year. The 1991 LRMP analysis and planning process determined that Allotments in the project area were suitable for livestock grazing. The 2001 Sierra Nevada Forest Plan Amendment (USDA 2001), Appendix K, provided additional guidance for determinations of rangeland capability and suitability. The two-step process and recommended criteria described in Appendix K of the 2001 SNFPA was used to determine project-level rangeland capability and suitability.

DEFINITIONS

- **Capability** is defined in CFR 219.3 as "The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at a given level of management intensity. Capability depends on current conditions and site conditions such as climate, slope, landform, soils and geology, as well as the application of management practices, such as silviculture or protection from fire, insects, and disease."
- **Suitability** is defined in CFR 219.3 as "The appropriateness of applying certain resource management practices to a particular area of land as determined by an analysis of the economic and environmental consequences and alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices."

STEP 1: CAPABILITY ANALYSIS

Capability for grazing was determined through geographical information system (GIS) analysis. GIS layers were used to determine acreages within the Allotments that meet the general capability criteria. Capable acres are estimates only, due to limitations in availability and accuracy of the GIS data. Capability analysis is not a precise mapping exercise, and estimates are not necessarily indicative of the actual on-the-ground conditions. Capable lands will remain the same in all alternatives, as capability is determined by applying the same capability criteria at the appropriate scale. The following criteria were used to determine capability of lands within the project area:

- Areas with less than 30% slope
- Areas less than 1 mile from perennial water sources such as perennial streams, springs, lakes, ponds and troughs
- Areas assumed to produce an average of at least 200 lbs. of forage per acre per year.
- Areas accessible to livestock (lacking physical barriers)

Slope was determined using a Digital Elevation Model (DEM). Slopes less than 30% were selected. The Stanislaus National Forest base layer and rangeland constructed features layer were used to determine locations of perennial water sources. Perennial water sources were buffered by a distance of 1 mile. Forage productivity was estimated using the best information available for GIS analysis. The Forest vegetation layer was used as a proxy for forage production because there is limited data on forage productivity in the project area, because obtaining actual forage production data would be prohibitively costly, and because the information available is adequate for the purpose of this analysis. Meadows, shrublands, annual grasslands and mixed conifer types with less than 40% canopy cover were selected from the vegetation layer. These vegetation types generally have the potential to produce an average of 200 lbs. of forage per acre per year and are considered capable of supporting

livestock grazing (Potter 1998, Fites 1993, USDA 2210 Field Write-Ups). Areas inaccessible to livestock (areas where livestock access is precluded by physical barriers or deep water) were removed from the capable areas.

STEP 2: SUITABILITY ANALYSIS

The second step identifies which of those capable lands are suitable for grazing. Not all lands in the National Forest System are considered suitable for grazing. Suitable lands are lands where livestock grazing is compatible with other land uses, resource values, and social and economic values. This process involves selecting which Land Management Areas are incompatible with livestock grazing. The Stanislaus National Forest, Forest Plan Direction (USDA 2010) provides direction about the suitability of Management Areas and Land Allocations. The management areas in the project area include:

- **General Forest**: These areas will be managed for wood, water, fish and wildlife, recreation, and range. Extensive range management will be employed.
- **Developed Recreation Sites**: Provide developed recreation opportunities for the public including: picnic areas, campgrounds, parking areas, boat ramps, visitor information centers, vistas and overlooks, resorts, organization camps and recreation residences. Protect or improve the natural forest setting surrounding these facilities. Cattle grazing is excluded within all developed recreation sites.
- **Developed (Non-Recreation) Sites**: Commercial livestock grazing does not occur in developed (non-recreation) sites, except as may be needed to achieve specific goals and as approved by the District Ranger. Any livestock grazing that occurs on these sites will be managed according to the Standards and Guidelines of the surrounding Management Area.
- **Near Natural**: Emphasis is placed on providing a natural appearing landscape in a non-motorized setting. Public motorized use is not normally allowed and no timber harvest is scheduled. Wildlife habitat management, watershed protection, dispersed non-motorized recreation, livestock grazing and mineral uses are allowed. The area is characterized by a high quality visual setting where changes are rarely evident. Land altering practices are limited in scope and duration.
- **Pinecrest Basin**: Apply management area direction for developed recreation sites and winter sports sites. Includes Pinecrest Lake Resort, organization camps, Dodge Ridge Ski Area and Aspen Meadow Pack Station, recreation residence, campsites, Experimental Forest, Spotted Owl PAC and administrative sites.
- **Research Natural Areas**: Research natural Areas (RNAs) are managed to maintain select vegetative, aquatic, and/or geologic elements in natural conditions. Protection is provided against any activities that directly or indirectly modify ecological processes. Grazing is not permitted in the upper part of the Bell Meadow RNA, the Clark Fork Candidate RNA or the Bourland Meadow RNA. If grazing occurs in other RNAs, its management will be specified in management plans for the areas and the surrounding Allotments. Management is designed to protect the areas special characteristics.
- **Scenic Corridor**: Emphasize the scenic and recreation values of major trail, road and highway corridors, developed recreation sites, major rivers and lakes, and other areas of concentrated recreation use.
- **Special Interest Areas**: Management emphasis for these areas is to protect and manage unique geological, scenic, historical, archaeological, botanical and memorial features, to make educational opportunities available and preserve the integrity of the special interest feature for which the areas were established. A wide range of resource activities is permitted, provided the unique features of each area are protected. Grazing management will be specified in management

plans for the area and the surrounding Allotment. Management is designed to protect the areas' special characteristics.

- **Wild and Scenic River (Tuolumne River)**: Manage selected river corridors to preserve their notable values or features as part of, or for eventual inclusion in, the National Wild and Scenic River System. Designated and proposed Wild and Scenic Rivers, along with immediate environments, will be managed to preserve their free flowing condition and protect their outstandingly remarkable values. Grazing is not permitted in the Tuolumne Wild and Scenic River area, except as occurs when livestock are herded through on their way to or from their Allotments.
- **Wilderness**: manage to maximize the quality and naturalness of the wilderness environment. Minimize impacts to the wilderness resource while allowing it to be used for primitive recreation and preserving scenic, scientific, educational and historic values. Mechanized use is not normally allowed. All National Forest Lands within Congressionally designated Wilderness and areas recommended for Wilderness will be managed in accordance with the Wilderness Act of 1964 as amended.
- **Wildlife**: This area emphasizes late seral stage management indicator species (MIS) and all other wildlife which require mature and older forest habitats for part or all of their life cycle. Management indicator species used to prescribe management direction are spotted owl, fisher and marten which are all designated sensitive species. Recognize the special value of meadows and riparian areas to fisher, pine marten and other late seral stage wildlife in applying range management systems. Environmental analysis for range activities within these management areas need to consider possible impacts of livestock operations on marten and fisher.
- **Winter Sports Sites**: In winter sports sites where Allotment management plans permit grazing, the use will be managed according to the range Standards and Guidelines of the surrounding Management Area. Set allowable use levels based on the heaviest grazed or most sensitive vegetation type included in the area, such as a riparian area or ski run. Fence lodges, parking lots and other facilities as needed to minimize livestock/recreation conflicts.

Land Management Areas and Land Allocations that are incompatible with livestock grazing were removed from the capable and suitable areas, as these areas are unsuitable for livestock grazing.

CAPABLE AND SUITABLE RANGELAND IN THE PROJECT AREA

Project-level capability and suitability analysis identified rangelands in the project area that are both capable and suitable for livestock grazing. Analysis and identification of capable and suitable lands does not imply that livestock grazing would be restricted to lands that are both capable and suitable. Incidental use occurs in areas that are not capable as cattle move through capable lands within each Allotment. Tables F-1 and F-2 display the approximate acreage of capable and suitable lands in the project area.

Table F.01-1 Estimated capable and suitable acres by Allotment

Alternative	Allotment	Total	Capable	Suitable	Capable and Suitable
Alternative 1 (Proposed Action)	Bell Meadow	13,236	3,478	12,797	3,269
	Eagle Meadow	25,062	3,652	23,452	3,392
	Herring Creek	18,147	2,672	18,056	2,652
Alternative 3 (Current Management)	Bell Meadow	13,219	3,463	12,797	3,265
	Eagle Meadow	20,700	3,231	19,098	2,971
	Herring Creek	17,263	2,621	17,155	2,599
Alternative 4 (Resource Protection)	Bell Meadow	13,236	3,478	12,744	3,253
	Eagle Meadow	20,240	3,208	18,556	2,912
	Herring Creek	14,733	2,243	9,916	1,278

Table F.01-2 Estimated capable and suitable acres for additions proposed in Alternative 1

Addition Area	Total Area	Capable	Suitable	Capable and Suitable
Cascade	3,300	409	3,300	409
Niagara	2,400	194	2,400	194
McCormick Pocket	2,450	259	2,449	259

G. Monitoring Plan

INTRODUCTION

The BEH Range Allotments EIS analyzes the environmental impacts of continued grazing on the Bell Meadow, Eagle Meadow, and Herring Creek Allotments, located in the central Sierra Nevada Mountains in Eastern Tuolumne County, California. These Allotments are administered by the Summit Ranger District and the Stanislaus National Forest. The Stanislaus National Forest, Forest Plan Direction describes the most current management direction for these Allotments, including broad-scale management objectives and resource-specific standards and guidelines applicable to livestock grazing. This monitoring plan describes the monitoring that would occur if Alternative 1 (the Proposed Action) is selected. Should another action alternative be selected, a similar monitoring plan would be prepared for the selected alternative. Should an alternative be selected that eliminates grazing on an Allotment or Allotments, monitoring would not occur. This monitoring plan is incorporated by reference in the Term Grazing Permits and Allotment Management Plans (AMPs) for the Bell Meadow, Eagle Meadow, and Herring Creek Allotments, and is a necessary component of project implementation. Additional analysis is not required to implement this monitoring plan. This plan may be modified as part of the adaptive management strategy, as long as modifications are consistent with the decision and with applicable management direction.

This monitoring plan provides targets and objectives for short- and long-term monitoring on the Bell Meadow, Eagle Meadow, and Herring Creek Allotments. The overall goal is to ensure that resources are moving toward desired conditions. While actual monitoring accomplishments are dependent upon staff availability and funding constraints, sufficient monitoring should occur to provide the minimum information needed to determine if management is moving resources toward desired conditions. Annual monitoring implementation will be specified every year in the Annual Operating Instructions and will reflect current monitoring priorities and realistic targets.

Two types of monitoring will be conducted on the Bell Meadow, Eagle Meadow, and Herring Creek Allotments. Implementation (Short-term) Monitoring will be used to monitor implementation of the provisions of the Term Grazing Permit, including compliance with the Term Grazing Permit, Annual Operating Instructions and Allotment Management Plans. Effectiveness (Long-term) Monitoring tracks changes in resource conditions in response to livestock use and management. Evaluation of monitoring data will determine if adaptive management adjustments are needed.

MONITORING OBJECTIVES

Specific objectives for monitoring on the Bell Meadow, Eagle Meadow and Herring Creek Allotments are:

- To determine compliance with the Term Grazing Permit and Annual Operating Instructions.
- To evaluate the implementation of management practices to insure movement from the Existing Conditions towards achievement of Desired Conditions, and use Adaptive Management to adjust livestock management strategies as necessary to meet Desired Condition.
- To evaluate the degree and rate at which prescribed management practices are meeting Allotment objectives. If properly implemented practices are not effective in achieving desired conditions, they will be changed as necessary.
- To demonstrate to all interested parties and partners that implementation of the Allotment Management Plans is effective in achieving multiple use management and is sound resource management of Forest Service lands.

IMPLEMENTATION MONITORING

Implementation monitoring will be used to determine whether the selected alternative is implemented as planned in this document. Implementation monitoring will be conducted annually, if needed, as indicated below to determine whether the Allotments are being managed in accordance with the Terms and Conditions of the Grazing permits, AMPs and Annual Operating Instructions (AOIs). If this monitoring reveals that the terms and conditions of the grazing permit are not being met, such as failing to maintain range improvements, administrative action is taken following the procedures defined in the Region Five Suspension and Cancellation Guidelines. Implementation monitoring includes:

Table G.01-1 Implementation Monitoring

Monitoring Type	Monitoring Timing	Standard	Method
Permit Compliance	Before livestock turnout and throughout grazing season	100% Compliance Improvement maintenance; proper livestock numbers, season of use, and pasture rotation	Improvement inspections Livestock counts Allotment inspections
Range Readiness	Prior to on-date(s)	plant growth is at an appropriate stage of development	Measure and record plant development and soil moisture Photographs
Meadow Forage Utilization	Mid-season and end of season	-30% or 6” stubble height for meadows in early-seral status -40% or 4” stubble height for meadows in late-seral status -50% meadows in units that are rested every other year	Height Weight Method Stubble Height Method Landscape Appearance Method Photographs
Riparian Conservation Standards	End of season	4” Stubble Height 20% bank disturbance 20% riparian browse	Multiple Indicator Monitoring (MIM)
Aspen Browse Standards	Prior to livestock turnout and end of season	20% browse	Cole Browse Method
Special Aquatic Features	End of Season	No annual standards, annual monitoring to document use	Measure % bare peat with line-point intercept method Photographs
Meadow Hydrologic Function	Initial measurements to be taken annually, then every 3-5 years as needed	Unstable headcut, knick point or gully; excessive aggradation or degradation	Survey bank profiles using permanent benchmark
Sensitive Plants	As needed	Livestock impacts to sensitive plants are minimal	Sensitive plant surveys by qualified botanist
Invasive Plants	As needed	Minimize weed spread	Follow-up inspections of ground disturbing activities
Terrestrial Wildlife Habitat - GGO	End of Season	Vegetative cover height meets need of prey species	Measure and record vegetative cover height

Compliance Monitoring

Permit administration by the Forest Service includes compliance monitoring. Items to be monitored as part of implementation monitoring may include, but are not limited to the following:

- Livestock counts and brand inspections
- Actual livestock use and movements (from permittees records).
- Improvement inspections to insure that maintenance is completed to standard and on time.
- Compliance with the Annual Operating Instructions.
- Determination of any unauthorized use.

- Repeated livestock presence outside Allotment boundaries or in exclosures.

If permit non-compliance occurs, corrective action will be taken according to the Region 5 Grazing Permit Administration, Suspension & Cancellation Guidelines (R5 FSM 2231.62, 2002). The intent is to provide a consistent and fair approach for permit administration actions which provide the permittee an opportunity to remedy the noncompliance. Actions may include suspension or cancellation of the permit or civil actions, as appropriate depending on if the problem is persistent or willful. The permittee will be billed for any excess use at the unauthorized use rate. The permittee is encouraged to monitor the Allotment continuously throughout the grazing season and coordinate with the Forest Service to resolve any problems that arise in a timely manner.

Range Readiness

Monitoring for range readiness is performed by the Forest Service on an annual basis to determine when livestock should be turned out on an Allotment. Range readiness is generally determined on key areas within an Allotment, but may occur in other strategically selected locations to ensure that livestock do not cause long-lasting damage to the soil and vegetation. The location(s) for determining range readiness would remain flexible in order to respond to patterns of anticipated use. Range readiness is based on plant phenology, soil moisture level, annual climate patterns, or other site-specific constraints for each key area. Readiness standards are based on the phenology (stage of development) of selected plant species. The range will be considered ready for grazing when soil is dry and firm enough to prevent significant trampling damage, and when the following vegetation development is achieved on each Allotment:

Table G.01-2 Range Readiness Indicators

Bell Meadow Allotment:	
Readiness Indicator Species:	Growth stage:
Bromus marginatus, mountain brome	when average height reaches 6 inches
Sitanion hystrix, squirrel tail	when average height reaches 6 inches
Elymus glaucus, blue wild rye	when average height reaches 6 inches
Carex integra, smooth beak sedge	when flowers mostly open, stamens showing
Eagle Meadow Allotment:	
Readiness Indicator Species:	Growth stage:
Carex integra, smooth beak sedge	when flowers mostly open, stamens showing
Veratrum californicum, corn lily	when average height reaches 24 inches
Achillea millefolium, western yarrow	when average height reaches 4 inches
Herring Creek Allotment:	
Readiness Indicator Species:	Growth stage:
Carex nebraskensis, Nebraska sedge	when flowers mostly open, stamens showing
Carex integra, smooth beak sedge	when flowers mostly open, stamens showing
Veratrum californicum, corn lily	when average height reaches 24 inches
Achillea millefolium, western yarrow	when average height reaches 4 inches

Forage Utilization

Implementation of utilization standards monitoring will focus on key areas, but may occur in other locations within these Allotments as need dictates. Herbaceous utilization in key areas will be measured using one of the following methods: the Height Weight Curve method on key species, the Stubble Height method, and/or Landscape Appearance method. Repeated photographs may also be used.

Riparian Conservation Standards

Implementation of Riparian Conservation Standards will focus on sensitive stream reaches on these Allotments. Riparian Stubble Height, Streambank Alteration, and Streamside Browse Utilization will be determined using the Multiple Indicator Monitoring (MIM) method on streambanks accessible to cattle.

Aspen Browse Standards

Monitoring of aspen browse will occur in identified aspen stands on these Allotments. Effort will be made to monitor aspen browse prior to livestock entry on the Allotment to determine baseline browse levels. Hardwood browse in aspen stands will be measured using monitored at defined intervals using specified aspen browse protocol(s).

Special Aquatic Features

Annual monitoring of special aquatic features may occur, if necessary, to document short-term (annual) impacts to special aquatic features. Photographs and/or bare peat measurements may be used to provide more information about livestock impacts to special aquatic features and to draw a link between annual impacts and long-term trend.

Meadow Hydrologic Function

Identified headcuts, knick points and/or small gullies in hydrologically functional meadows will be monitored by a qualified hydrologist as needed to ensure that meadow hydrologic function is not compromised as a result of grazing. Monitoring may occur annually, if necessary, to detect changes in headcuts, knick points and/or small gullies and/or to determine if the current season's grazing use is compromising meadow hydrologic function.

Sensitive Plants

Short term monitoring for sensitive plants may occur as needed to assess impacts to sensitive plants caused by livestock.

Invasive Plants

Monitor for invasive plants in the vicinity of and along the primary travel routes from the location where the cattle first come on the Allotment. The frequency of monitoring will depend on the risk of introduction and/or spread of invasive plants, as determined by baseline information.

Monitoring Recommendations for Noxious Weeds

Monitor for weeds and invasive plants in the vicinity of and along the primary travel routes from the location where the cattle first come on the Allotment at least every two years. The frequency may be adjusted once a baseline and trends have been established.

Do baseline surveys in the areas of new corral construction. If this is not possible they will be assumed to have been weed and invasive free. Any plants of concern found in in the future will be assumed to have been introduced by Allotment management and use activities.

EFFECTIVENESS MONITORING

The objective of effectiveness monitoring is to evaluate the degree and rate at which prescribed management practices are meeting Allotment objectives. If properly implemented practices are not effective in achieving Desired Conditions, they will be changed as necessary. Key Areas will receive effectiveness monitoring on the Bell Meadow Allotment. Range conditions and trend at specified key areas are assumed to be indicative of responses to management practices throughout the entire Allotment. Project specific long term (project effectiveness) monitoring is the most critical portion of project monitoring because it answers the question as to how well project objectives were met. For example, long-term monitoring can answer the question as to how well grazing management practices have achieved LRMP standards and guidelines, or what progress has been made in achieving those standards. Table G.01-3 outlines the various elements of long term monitoring for the Proposed Action. Included in the long term monitoring plan for the Proposed Action are: 1) the goals/objectives of the monitoring; 2) methods; 3) frequency of the monitoring; and 4) the expected results. Effectiveness monitoring includes, but is not limited to, the types of monitoring described in Table G.01-3.

Table G.01-3 Effectiveness monitoring plan for BEH Rangeland Allotments

Monitoring Type	Monitoring Frequency	Standard	Method
Meadow Ecological Status	Every 5 years	Meadow vegetation is Late seral, Overall score is high or moderate with upward trend (depending on site potential)	R5 Range Condition and Trend monitoring protocol
Special Aquatic Features	Every 3 to 5 years to determine condition and trend	Proper functioning condition or Functioning At-Risk and in upward trend	Appropriate Proper Functioning Condition protocol* Repeat Photographs
Meadow Hydrologic Function	Every 3 to 5 years or as needed to determine trend	Meadows are hydrologically functional	Meadow Hydrologic Function Rapid Assessment Protocol*
Sensitive Plants	As needed	Determine impacts to sensitive plants	Sensitive plant surveys by qualified botanist
Invasive plants	As needed	Determine the risk of introducing, establishing, or spreading invasive species	Invasive plant surveys by qualified specialist

Meadow Ecological Status

Ecological Status of meadow vegetation will be determined in key areas using the Rooted Frequency Vegetation Sampling method. The Rooted Frequency protocol was developed and refined as part of an overall Regional rangeland monitoring program. The purpose of the United States Department of Agriculture (USDA) Forest Service Region 5 Range Monitoring Project was to establish permanent plots on key range sites across National Forest lands in Region 5 (California) in order to provide long-term monitoring of range condition (ecological status) of each meadow. Permanent plots were generally established at Allotment key areas starting in 2000 and are reread every 5 years to detect long-term trends in vegetation, such as fluctuations in species composition or ground cover. Table G.01-4 displays locations and schedules are given for monitoring long-term trend in meadow ecological status within the analysis area.

Table G.01-4 R5 condition and trend plots and monitoring schedule within the BEH project

Allotment	Unit	Meadow	Year Baseline Established	Year of Next Reading
Bell Meadow	Round	Round Meadow	2000	2015
Bell Meadow	Crab	Crab Meadow	2000	2015
Bell Meadow	Mud	Mud Lake Meadow	2000	2015
Eagle Meadow	Niagara	Barn Meadow	2000	2015
Eagle Meadow	Sardine	Red Rock Meadow	2000	2015
Eagle Meadow	Long Valley	Long Valley Meadow	2000	2015
Herring Creek	Bull Run	Meadow at 4N17	2000	2015
Herring Creek	Hammill	Hammill Canyon	2000	2015
Herring Creek	Willow	Wire Corral	2000	2015

Special Aquatic Features

Special Aquatic Features (springs, seeps and fens) will be re-visited every 3-5 years. If cattle use is apparent, the appropriate PFC Technical report and assessment protocol will be used to assess the condition of the feature. “A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lentic Areas” USDI TR 1737-16 (1999, revised 2003) will be used to assess the condition of springs, seeps and shorelines. “Assessing Proper Functioning Condition for Fen Areas in the Sierra Nevada and Southern Cascade Ranges in California” USDA R5-TP-028 (April 2009) will be used to assess the condition of fens in the analysis area. Monitoring will occur at known special aquatic features, or other features that are found during project implementation. Monitoring of

special aquatic features will focus on determining PFC and trend and will prioritize the most at-risk special aquatic features. Soil ground cover measurements and photographs may also be used to document trends in livestock impacts or recovery of special aquatic features over time.

Meadow Hydrologic Function

- In meadows where hydrologic function is already impaired, monitoring will determine whether livestock impacts are causing continued degradation of the hydrologic function of the meadows.
- Where headcuts, knick points and/or small gullies were identified during project analysis, a qualified hydrologist will monitor the headcuts, knick points and/or small gullies to ensure that meadow hydrologic function is not compromised as a result of grazing

Best Management Practices Evaluation Program

The Best Management Practices Effectiveness Program (BMPEP) is annual monitoring that is used to verify that BMPs are implemented and effective in protecting water quality. Range Management BMPEPs are conducted on key areas chosen at random from a Forest-wide sample pool. The USFS Region 5 Range Management BMPEP protocol monitors herbaceous and woody utilization, streambank disturbance/alteration, groundcover, rilling, bank stability, floodplain erosion, and lentic habitats (springs, fens, natural ponds). Results of this monitoring are reported to the Forest Service Regional Office as well as the Water Board.

Stream Condition Inventory

SCI is a long-term stream channel monitoring protocol designed to track changes in habitat over time. Stream reaches would be re-surveyed every 5 to 10 years or when significant watershed events occur. The SCI stream attributes and protocols are designed to measure a suite of characteristics for inventorying stream condition at a specific time and place.

Sensitive and Watchlist Plants

If there are two years of successive drought, monitor the Drosera rotundifolia occurrence to ensure that cattle can’t access it early in the season the following year if it is also dry.

Invasive Plants

Monitor for weeds and invasive plants in the vicinity of and along the primary travel routes from the location where the cattle first come on the allotment at least every two years. The frequency of monitoring may be adjusted once a baseline and trends are established.

Permittee Monitoring

The permittees are responsible for ensuring that forage use is at or below the allowed levels and that standards and guidelines as listed in the Term Grazing Permit, Part 3, are met. The permittees are encouraged to participate in Allotment monitoring. At a minimum, the permittees will be invited to learn and participate in range monitoring activities performed by the Forest and District Range Staff.

Since meeting the standards and guidelines are the permittees’ responsibility, it is highly recommended that the permittee enter into a formal Partnership Agreement to conduct range monitoring on their Allotment(s). Standard protocols and instruction on their use will be provided. It is recommended that the Forest Service and the permittees work together to conduct formal mid- and post-season monitoring for key areas as listed in the Allotment Management Plan. The permittees are encouraged to maintain written documentation of monitoring conducted by him/her, and to share this information with the Forest Service on a timely basis. Written results of any permittee performed monitoring and measurements should be provided to the appropriate Forest Service staff within 30 days of the end of the grazing season.

Table G.01-5 Monitoring locations and methods

Location	Aspen Browse	Forage Utilization	Meadow Hydrologic Function	Meadow Ecological Status	Riparian Conservation Standards	Special Aquatic Features	TES Species
Bell Meadow Allotment							
Bear Lake		X		X			
Camp Lake						X	
Crab Meadow **(Key Area)**	X	X	**Key**	**Key**	X	**Key**	
Gianelli Area						X	
Gooseberry Creek	X						
Kerrick Corral	X						
Lily Lake	X					X	
Lower Bell Meadow	X	X		X			
Lower Round Meadow	X	X	**Key**	X	**Key**	X	
Middle Bell Meadow	X	X		X			
Mud Lake **(Key Area)**		**Kay**	**Key**	**Key**	**Key**	X	
Round Meadow **(Key Area)**	**Key**	**Key**	**Key**	**Key**	**Key**		
Upper Bell Creek					X		X
Eagle Meadow Allotment							
Barn Meadow	**Key**	**Key**	X	**Key**		X	
Eagle Meadow	X	X	**Key**	X	X	**Key**	
Long Valley		X	**Key**	**Key**	X	X	
Lower Eagle Meadow		**Key**	**Key**	X			**Key**
McCormick Pocket		X	X		X	X	
Meadow at T1N, R6E, Sec. 35		X		X			X
Niagara Addition Area		X	X			X	
Niagara Creek	X				X		
Northwest Allotment		X				X	
Red Rock Meadow		X	**Key**	X	**Key**		
Sardine meadow		X		X			
Shell Meadow			X	X			X
Herring Creek Allotment							
Bloomer Lake		X	X	X	X	X	X
Bluff Meadow		X	X	X	X	X	X
Bull Run Meadow	X	X	X	X	X	X	
4N12 Meadow **(Key Area)**		X		**Key**			
Burt Reed Meadow	X	X	X	X		X	
Cascade Addition Area		X	X	X	X	X	
Castle Meadow		X	**Key**	X	X		X
Coyote Meadow		X	X	X			X
Fiddler's Green	**Key**	X		X	X		
Groundhog Meadow		X	X	X	X		X
Herring Creek Reservoir			X			X	
Hammill Canyon **(Key Area)**	X	**Key**	**Key**	**Key**	**Key**		
Leland Meadow		X	X	X	X		X
Punch Bowl	X	X	X	X	X	X	
Willow Meadow		X	**Key**	X	X	X	X
Wire Corral **(Key Area)**		X	X	**Key**		X	X

ALLOTMENT KEY AREAS AND OTHER MONITORING LOCATIONS

A Key Area is defined as a relatively small portion of a range selected because of its location, use, or grazing value as a monitoring point for grazing use. It is assumed that key areas, if properly selected, will reflect the overall acceptability of current grazing management over the whole range management unit. During planning and analysis, the Interdisciplinary team compared desired conditions and existing conditions in the project area. The team identified a need for change in management where resource conditions did not meet desired conditions. Project-specific monitoring will place emphasis on those resources and/or areas that were identified as having a need for change. The potential criteria to be considered in the selection of key areas include: range sites, vegetation types, livestock distribution and use patterns, crucial wildlife areas, and sensitive or at-risk resources.

Key Areas for the Allotments are listed in Table G.01-5. Key areas will remain constant for the duration of this AMP unless changed after consultation, coordination and cooperation with the permittees and other interested parties. Additional locations may be monitored, depending on monitoring objectives. Monitoring priorities are indicated by the label “key”and other potential monitoring is indicated by an “X” although additional monitoring could occur at any location as determined by need.

EVALUATION

Data collected from both implementation and effectiveness monitoring will be used to evaluate management effectiveness and progress toward achieving desired conditions. Results of monitoring may indicate a need for adaptive management options such as additional drift fencing or mitigation to protect sensitive resources. Actions within the scope of this EIS will be implemented through the Annual Operating Instructions. Those mitigations that are outside the scope of the EIS will be analyzed under a separate NEPA document prior to implementation. The following criteria will be used as indicators that adaptive management adjustments are needed:

- Forage utilization and stubble height standards are not met.
- Meadow Ecological Status is in a downward trend.
- Livestock browse on riparian shrubs or hardwoods exceeds standards.
- Livestock disturbance to streambanks exceeds standards.
- Headcut advancement is occurring and is attributable to livestock use.
- Special Aquatic Features are rated is Functional-at-Risk with a downward trend or Non-Functional.
- Livestock presence outside Allotment boundaries, in developed recreation sites or in other unauthorized areas becomes problematic.
- Livestock impacts to threatened, endangered, or sensitive species are at unacceptable levels.

ADAPTIVE MANAGEMENT

Adaptive management refers to the concept of allowing decisions, which are focused on desired outcomes, to be made with the best information available and to be adjusted during implementation to achieve desired conditions. Decision-making is expected to proceed using the best information available. Monitoring and evaluation are used to assess the effects of those decisions and to identify new information that may become available. Decisions are adapted, as needed, to respond to new information.

Data collected from both implementation and effectiveness monitoring will be used to evaluate management effectiveness and progress toward achieving desired conditions. Adaptive management actions will be used to achieve management objectives when monitoring indicates that adjustments are necessary in order to achieve defined desired conditions.

Management actions will be applied through the Annual Operating Instructions issued for each Allotment. These possible management actions are designed to be used alone or in combinations in order to achieve management objectives.

- Adjust stocking rate to light, moderate or heavy grazing intensity
- Implement alternative riparian grazing dates based upon specific conditions (topography, range rider, upland water sources, livestock use patterns)
- Use salt or supplement to draw livestock toward or away from specific areas
- Change season of use, animal numbers; do not exceed permitted AUMs
- Rest from livestock grazing for one or more seasons
- Construct fence to exclude livestock from areas of concern (riparian, streams, springs, wetlands, mesic meadows, etc.)
- Reconstruct fence to ensure effective exclusion of livestock from exclusion areas.
- Control livestock distribution patterns by constructing cross fences (electric, standard, permanent or temporary)
- Manage livestock trailing locations using barriers to deter cattle traffic (logs and other natural barriers)
- Construct livestock water development (pipeline, tanks, well, submersible pumps, solar)
- Implement restoration practices, where appropriate, if current grazing is causing or contributing to observed degradation (excessive compaction, lowered water tables, or active down cutting)
- Treat invasive plant infestations by pulling, digging, solarization (covering with a tarp), flaming, and other mechanical means.

Permittee and agency flexibility during adaptive management implementation will be needed. Flexibility is provided to adjust livestock grazing practices in response to unpredictable management situations caused by weather fluctuations (e.g., drought), livestock behavior, unexpected monitoring results or acts of nature such as wildfires. Adaptive actions would be constrained by Forest Plan direction, Allotment-specific NEPA decisions, regulations, policy and Term Grazing Permit terms and conditions.

In keeping with the adaptive management concept, Forest Plan Direction utilization standards would be adjusted if monitoring and evaluation determines that the current standards do not continue to meet or move towards attaining Forest Plan goals and objectives.

Continued monitoring of forage utilization in key use areas and of riparian and upland condition and trend as described in the Forest Plan will be used to determine if the grazing program continues to achieve desired future conditions and Forest Plan objectives for vegetation management. If monitoring shows that livestock grazing is not meeting or moving towards desired conditions, adaptive management would make it possible for management to review and correct the problems as described above. If monitoring shows that livestock grazing is meeting desired conditions, adaptive management could allow for greater grazing flexibility through the Annual Operating Instruction process (reasonable adjustment in season of use, numbers, etc.).

H. Bell Meadow Allotment Management Plan

INTRODUCTION

Forest Service regulations (36 CFR 221.1 and 222.2) allow Allotment Management Plans (AMPs) to be included in grazing permits consistent with the Federal Land Policy Management Act (FLMPA), as amended by the Public Rangelands Improvement Act (PRIA). An AMP is defined in FLPMA as a document outlining a specific program of action for livestock management. Included in the AMP is the authorized number of livestock and season of use, selected grazing strategy and range improvement plan and all other management objectives identified as a result of the environmental analysis process.

The Bell Meadow AMP outlines the management decisions of the BEH Rangeland Allotments EISand documented in the Record of Decision (ROD) signed by the Responsible Official, the Forest Supervisor, on DATE, YEAR. The decision authorizes continued livestock grazing on the Bell Meadow, Eagle Meadow, and Herring Creek Allotments. This Allotment Management Plan is intended to guide on-the-ground management of the Bell Meadow Allotment for the next 10 or more years. Additional analysis is not required to implement this management plan. This plan may be modified as part of the adaptive management strategy, as long as modifications are consistent with the decision and with applicable management direction.

The BEH Rangeland Allotments Record of Decision prescribes implementation of specific design criteria, including an Adaptive Management Strategy (AMS) that would be implemented to achieve defined desired conditions through ongoing monitoring and adjustments to livestock management, as necessary to implement management direction and to continue improving resource conditions on this Allotment.

Allotment Location and Description

The Bell Meadow Allotment is located on the Summit Ranger District in Tuolumne County, California (Figure H.01-1). It is bounded on the west by Dodge Ridge; on the north by the South Fork of the Stanislaus River; on the east by Lake Valley and Chain Lakes; and, on the south by Bell Mountain. The location is generally described as Townships 3 and 4 North and Ranges 18 and 19 East. The Allotment ranges in elevation from about 6350 to 9150 feet. Annual precipitation averages 50-60 inches. The Bell Meadow Allotment encompasses about 13,240 acres, all of which are National Forest System (NFS) lands.

GOALS AND OBJECTIVES

Goals and Objectives for the Bell Meadow Allotments are based on current Forest Plan Direction, which presents management direction from original Forest Plan as modified through the Forest Plan appeals and amendment processes (USDA 2010). Goals and objectives are also based on the management decisions of the BEH Rangeland Allotments EISas documented in the Record of Decision signed by the Responsible Official, the Forest Supervisor, on DATE, YEAR. The decision is intended to guide on-the-ground management of the Bell Meadow Allotment for the next 10 or more years. The goals and objectives of this Allotment Management Plan are:

1. To meet multiple-use objectives by allowing continued livestock grazing on forage-producing National Forest System lands in this Allotment.
2. To ensure consistency with all applicable management direction, including Forest Plan objectives, standards and guidelines.
3. To move resource conditions toward desired conditions. Gaps between existing conditions and desired conditions indicate a need to change grazing management by updating AMPs.

4. To implement an adaptive management strategy that will allow decisions to be made with the best information available and will adjust management during implementation to achieve desired conditions in a manner that is timely and consistent with Forest Plan Direction.

Stanislaus National Forest Goal for Range

Manage livestock to utilize available forage while avoiding adverse impacts on soil, vegetation, water quality, wildlife, fisheries and riparian zones.

Desired Conditions

Desired conditions are land or resource conditions expected to result if planning goals and objectives are fully achieved. The following desired conditions were identified during planning for the BEH Rangeland Allotments project and are consistent with Stanislaus National Forest Management Direction.

Aspen Regeneration

A diversity of age classes of hardwood shrubs is present and regeneration is occurring.

Meadow Hydrologic Function

Meadows are hydrologically functional: streams have floodplain connectivity to dissipate high flow energy, stream morphology is suitable for optimizing ground water retention, and the water table supports desired plant species composition and structural diversity.

Yosemite toad Populations

Provide habitat for diverse and viable populations of all native and desired non-native species.

Great Gray Owl

Meadow vegetation in great grey owl PACs supports a sufficiently large meadow vole population to provide a food source for GGO through the reproductive period.

Ecological Status of Meadows

Species composition and structural diversity of plant and animal communities in riparian areas, wetlands, and meadows provide desired habitat conditions and ecological functions.

Special Aquatic Features

Maintain and restore the distribution and health of biotic communities in special aquatic habitats (springs, seeps, vernal pools, fens, bogs, and marshes) to perpetuate their unique functions and biological diversity.

Water Quality

Water quality meets the goals of the Clean Water Act and Safe Drinking Water Act; it is fishable, swimmable, and suitable for drinking after normal treatment.

Developed and Dispersed Recreation

Minimize conflicts between recreational users and grazing operations.

Wilderness Character

Minimize conflicts between recreational users and grazing operations.

Sensitive and Watchlist Plants

Provide for protection and habitat needs of sensitive plants and watchlist species, so that Forest activities will not jeopardize their continued existence.

Invasive Weeds

Manage weeds using an integrated weed management approach.

Need For Change

Following is a description of resources and locations where a wherever existing conditions do not meet desired conditions as specified in the Forest Plan Direction (USDA 2010):

Aspen Regeneration

Locations: Crab Meadow, Kerrick Corral, Bell Meadow, and Round and Lower Round Meadows

Need for Change: Protect aspen regeneration by ensuring Forest Plan standards and guidelines are met. Additional monitoring of aspen populations will facilitate better understanding of timing and patterns of livestock/wildlife aspen browse.

Meadow Hydrologic Function

Locations: Crab Meadow, Mud Lake Meadow, Round Meadow, Lower Round Meadow, and Upper Bell Meadow, Lily Lake.

Need for Change: For meadows/areas that are hydrologically functional, ensure that grazing is not causing new headcuts, causing accelerated advancement of headcuts and/or contributing to bank instability or channel incision. Monitor identified headcuts, knick points and small gullies and report any changes to district hydrologist. Ensure standards for streambank disturbance are not exceeded.

Ecological Status of Meadows

Locations: Crab Meadow and Round Meadow

Need for Change: Increase abundance of late-seral species in these meadows. Forest Plan standards and guidelines are designed to maintain meadows in satisfactory condition and improve condition of meadows where unsatisfactory.

Special Aquatic Features

Locations: Springs, seeps, and fens located throughout Allotment.

Need for Change: Reduce impacts of livestock to Special Aquatic Features by improving livestock distribution and minimizing time spent near Special Aquatic features. Update AMPs to incorporate and implement an adaptive strategy to improve the condition of Special Aquatic Features that are Functioning At-Risk

Water Quality

Locations: All streams, lakes and rivers

Need for Change: Implement grazing BMPs to protect water quality. Implement adaptive management actions if necessary to protect water quality.

Developed and Dispersed Recreation

Locations: Crabtree Trailhead

Need for Change: Herd livestock away from developed recreation areas and high-use dispersed camping areas. Use adaptive management actions (fencing) if needed to prevent livestock drift into developed recreation areas.

Wilderness Character

Locations: High use destinations in Emigrant Wilderness - Camp Lake, Bear Lake, Grouse Lake

Need for Change: Disperse cattle and minimize drift outside Allotment.

Sensitive and Watchlist Plants

Locations: Sundew (Drosera rotundifolia) occurrence located in small pond above Camp Lake.

Need for Change: Minimize or avoid cattle presence near Sundew population above Camp Lake.

Invasive Weeds

Locations: Aspen Pack Station and throughout Allotment.

Need for Change: Forest Service encourages use of certified weed free hay and straw for all pack and saddle stock used by the permittee.

MANAGEMENT REQUIREMENTS

Standards and Guidelines

Livestock will be removed from an area when any standard or guideline is reached or exceeded or by the scheduled off date, whichever occurs first. Where more than one standard is applicable to a given key area (example: forage utilization and streambank disturbance in a meadow with a sensitive stream reach), the standard reached first will dictate livestock removal. The following standards were developed by the Forest Service with the goal of achieving desired conditions, and are applicable to livestock grazing on this Allotment:

Stanislaus National Forest, Forest Plan Direction 2010, Range Standards and Guidelines

- Improve ecological condition of rangelands, where currently unsatisfactory, through improved management, and structural and nonstructural improvements.
- Develop range resources to their reasonably attainable potential and manage them on a sustained yield basis. Manage grazed lands to achieve a stable or upward vegetative trend, except in specified areas of transitory range. Use management strategies that protect the soil and vegetative resources and other resources in a cost effective manner. Consider all vegetation dependent uses when developing Allotment management plans.
- Revise range Allotment management plans to be consistent with law, regulations, Executive Orders, Forest Service direction and Forest Standards and Guidelines, by 1997. Revise and develop Allotment management plans in consultation with all involved parties, including permittees, State or other agencies, and any other involved entities.
- On any Allotment or unit of Allotment, grazing management will be based on the vegetative type or soil type contained which is most susceptible to damage through improper grazing management. Examples: a riparian drainage through annual grassland; meadows within transitory range. Allowable use standards will be established in the Allotment management plans and annual operating plans for each unit of each Allotment. The standards will be based on Regional standards in R5 FSH 2209.21. Priority will be given to range improvement on Allotments with a high percentage of primary range land in unsatisfactory condition, or high conflicts between livestock grazing and other resources and uses.
- On Allotments where discontinuous grazing systems are not in effect, adjust permitted Animal Unit Months to achieve allowable use on the primary range. Transportation systems in established range Allotments will include fences and cattle guards where new roads open up natural livestock barriers. Reduce or eliminate livestock grazing from ranges in unsatisfactory range condition which cannot be improved through better management or treatment at the current level of grazing.
- Standards and Guidelines for Perennial Range. Includes meadows, perennial grassland, sagebrush, broadleaf and riparian vegetative types. When grazing management is extensive and is based on perennial range the following apply:
- Under extensive or maintenance management where continuous season-long grazing is allowed, remove livestock when grazing reaches the allowable use level specified for the designated key areas.
- Under all management strategies base on-dates for livestock on the phenological development of key forage or indicator species. Refer to R5 FSH 2209.21 for range readiness standards or use comparable criteria for species not listed. One exception is where an intensive management system limits early grazing to that which the range can withstand.

- When primary range occurs within riparian areas: Allowable herbaceous forage utilization levels will be set according to Regional methods at standards that will contribute to the achievement of good to excellent vegetative and soil conditions.
- Allowable uses limit the extent to which one or a group of key species may be grazed in key areas. The allowable use level must provide for sufficient herbage residue to ensure favorable plant vigor and soil protection on good and excellent condition range, or to contribute to improvement in lower condition range. Allowable use levels for specific areas will be set at or below these maximums to conform to local range condition, soil stability, or special circumstances. Allowable use levels will be detailed in the Allotment management plan for each Allotment. Pastures receiving periodic full growing season rest can have higher allowable use levels, as shown. If condition classes of vegetation and soil vary, use the lower class to establish the allowable level.
- Monitor ecological condition and trend using Regionally established methods and standards (R5 FSH 2209.21) on a ten year schedule.

Weed Free Hay

Encourage use of certified weed free hay and straw. Cooperate with other agencies and the public in developing a certification program for weed free hay and straw. Phase in the program as certified weed free hay and straw becomes available. This standard and guideline applies to pack and saddle stock used by the public, livestock permittees, outfitter guide permittees, and local, State, and Federal agencies.

Streambank Standards

Prevent disturbance to streambanks and natural lake and pond shorelines caused by resource activities (for example, livestock, off-highway vehicles, and dispersed recreation) from exceeding 20 percent of stream reach or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots. This standard does not apply to developed recreation sites; sites authorized under Special Use Permits and designated off-highway vehicle routes.

Special Aquatic Features

Assess the hydrologic function of meadow habitats and other special aquatic features during range management analysis. Ensure that characteristics of special features are, at a minimum, at Proper Functioning Condition, as defined in the appropriate Technical Reports (or their successor publications): (1) “Process for Assessing PFC” TR 1737-9 (1993), “PFC for Lotic Areas” USDI TR 1737-15 (1998) or (2) “PFC for Lentic Riparian-Wetland Areas” USDI TR 1737-11 (1994).

Fen Ecosystems

Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map, and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans, and wheeled vehicles. Criteria for defining bogs and fens include, but are not limited to, presence of: (1) sphagnum moss (Sphagnum spp.), (2) mosses belonging to the genus Meessia, and (3) sundew (Drosera spp.) Complete initial plant inventories of bogs and fens within active grazing Allotments prior to re-issuing permit.

Meadow Utilization Standards

Under season-long grazing:

- For meadows in early seral status: limit livestock utilization of grass and grass-like plants to 30 percent (or minimum 6-inch stubble height).

- For meadows in late seral status: limit livestock utilization of grass and grass-like plants to a maximum of 40 percent (or minimum 4-inch stubble height).

Meadow Ecological Status

Determine ecological status on all key areas monitored for grazing utilization prior to establishing utilization levels. Use Regional ecological scorecards and range plant list in regional range handbooks to determine ecological status. Analyze meadow ecological status every 3 to 5 years. If meadow ecological status is determined to be moving in a downward trend, modify or suspend grazing. Include ecological status data in a spatially explicit Geographical Information System database.

Riparian Browse Standards

Limit browsing to no more than 20 percent of the annual leader growth of mature riparian shrubs and no more than 20 percent of individual seedlings. Remove livestock from any area of an Allotment when browsing indicates a change in livestock preference from grazing herbaceous vegetation to browsing woody riparian vegetation.

Hardwood Regeneration

To protect hardwood regeneration in grazing Allotments, allow livestock browse on no more than 20 percent of annual growth of hardwood seedlings and advanced regeneration. Modify grazing plans if hardwood regeneration and recruitment needs are not being met.

Threatened and Endangered and Sensitive Species

No threatened, endangered, or sensitive species are known to exist on this Allotment. Species Federally listed as threatened or endangered on this Allotment include Sierra Nevada Yellow-Legged Frog. Habitat for Sierra Nevada Yellow-Legged Frog occurs in Bell Creek above Crabtree Trailhead. Meeting standards for streambank disturbance is the priority for protecting habitat for this species.

Other Applicable Management Requirements

Water Quality

Implement the following Pacific Southwest Region BMPs applicable to grazing:

- Practice 8-1. Rangeland Management Planning: Use the Allotment Management Plan (AMP) planning process to develop measures to avoid, minimize, mitigate and/or restore adverse impacts to water, aquatic and riparian resources during rangeland management activities.
- Practice 8-2. Rangeland Permit Administration: Manage rangeland vegetation and grazing to protect water, aquatic and riparian resources through administration and monitoring of Grazing Permits and Annual Operating Instructions (AOI).
- Practice 8-3. Rangeland Improvements: Implement range improvements to protect, maintain or improve water, aquatic and riparian resources and associated beneficial uses.

Salting

Salt and supplemental feeds will be placed in lightly used areas and at least one quarter mile from riparian areas, other water sources, and livestock concentration points.

Dead Livestock

As soon as possible, dead animals must be taken at least 100 feet from streams or lakes and out of sight of trails, roads, and campgrounds.

Age of Calves

Forest Service regulations require that any calf over 6 months old at time of entry onto the Allotment count as and be billed as an adult.

Private Lands

The permittees are responsible for keeping their livestock off private land unless they have permission of the landowner to graze. The Forest Service permit only applies to National Forest land and land waived to the Forest Service for grazing.

Noxious and Invasive Weed Prevention

Forest Service encourages use of certified weed free hay and straw for all pack and saddle stock used by the permittee.

Livestock Distribution and Move Dates

Livestock distribution and movements between units as established by this Allotment Management Plan are necessarily flexible. Actual moves will be determined, to the extent practical, by on-the-ground inspections. Livestock will be removed from specific areas when any standard or guideline is reached or exceeded on any of the key areas. Permittees are encouraged to maintain a current knowledge of the status of the key use areas with regard to allowable use standards and current use levels.

Allotment/Pasture Exit

No livestock should be on the Allotment after the end of the authorized off date. Any remaining livestock on the forest more than five days after the end of the season, without range staff authorization, will be billed for excess use. The off-date may be modified due to range conditions with an agreement between the Forest Service and the permittee. Any extensions of the grazing season must be requested in writing at least 15 days in advance of the scheduled off-date, and are subject to inspections by Supervisor's Office Range staff as well as District Ranger approval. If an emergency situation, beyond the permittee's control, making it impossible to remove all livestock by the end of the permitted season, then the authorized Forest Officer will be contacted immediately.

Areas Closed to Grazing

The Bell Meadow Research Natural Area is excluded from livestock grazing. Livestock are not permitted within Upper Bell Meadow, including the aspen exclosure located in the Eastern portion of Middle Bell Meadow. Livestock trespass into areas excluded from livestock grazing will be addressed promptly. Repeated livestock trespass will be addressed using the adaptive management process (reconstruct fence to ensure effective exclusion of livestock) or through regular permit administration.

Riding and Herding

Riding and herding are needed to improve distribution of livestock throughout the grazing season. The permittee will ride the Allotment as necessary to keep all livestock within the appropriate grazing unit(s).

Pack and Saddle Stock

Pack and saddle stock can be ridden anywhere on the Stanislaus National Forest. To protect the forest, users are encouraged to pack in (certified weed free) supplemental feed for their animals. Only tether horses to trees for short periods as hooves can cause damage to tree roots and plants.

Motorized Travel Management and Off-Highway Vehicle Use Restrictions

The permittee may be authorized to use Off Highway vehicles (OHV) off designated routes, trails, or OHV use areas to conduct permitted activities. Permittee use of OHVs is subject to approval by the authorized officer. Restrictions apply, and permission for OHV use will be authorized annually in the AOI.

Heritage Resources

It is prohibited to disturb, collect, or in any way damage any known prehistoric, historic, or archaeological resource. New discoveries: If previously unidentified cultural resources are discovered, care shall be taken by the permittee and the Forest Service to ensure that such sites are not disturbed. The permittee shall notify the Forest Officer as soon as possible if a new site is found so that appropriate evaluation and mitigation measures can be made.

GRAZING SYSTEM

Permitted Livestock Numbers

Grazing of up to 80 cow/calf pairs (calves less than six months) is permitted on this allotment. The actual number of livestock will be allocated in Annual Operating Instructions (AOIs) each year, but will not exceed 268 Animal Unit Months (AUMs). Adjustments to annual authorized livestock numbers may occur during the grazing season, based on conditions, range inspections and/or monitoring results. Permitted livestock numbers will not be exceeded unless an adjustment in season occurs and overall AUMs (as calculated by the permitted numbers and season) are not exceeded. Up to 5 head of horses (18 AUMs) would also be authorized on each Allotment to be used for Allotment administration.

Season of Use

Livestock will graze in the Bell Meadow Allotment between the estimated on-date of July 1 and the estimated off-date of September 15. On dates are approximate and will be based on range readiness (plant phenology, soil moisture level, annual climate variation, or other site-specific constraints for each key area). The season of use may be administratively adjusted by allowing livestock to enter the Allotments as much as two weeks early and/or remain on the Allotment as much as two weeks past the permitted date, as long as all applicable standards are not exceeded. If livestock graze all authorized areas, reaching allowable use in each area prior to the “off date”, they will be moved off NFS lands early. If, however, livestock graze through available areas and reach the end of the grazing season prior to reaching allowable use, an extension may be authorized, providing other Forest Plan guidelines and objectives are met. An extended season of use would only be authorized if it has been determined through field inspections that soil, water, vegetative and other resource conditions are suitable.

Grazing System

Bell Meadow Allotment is divided into units to implement a deferred grazing system. The Allotment would be divided into three units, or pastures, that would be used to improve distribution of forage utilization while livestock are moved through the Allotment. The units are referred to as the Round unit (Western unit), Crab unit (Northeastern unit), and Mud unit (Southeastern). A deferred grazing system will be achieved through intensive herding and dispersal, or through fencing or other infrastructure, if necessary. The cattle are trucked to and unloaded at a corral near Kerrick Horse Camp on July 1, depending on range readiness. The herd spends a day or two in the Round unit, where they will rest and “mother-up” before being pushed into the other units. From there the cattle are separated into two cow/calf herds, about 40 pair each. One herd is driven to the Mud unit and the other herd is moved to the Crab unit. Cattle will stay in the Mud and Crab units for about 6 weeks or until forage utilization approaches allowable use standards. Around mid-August, the cattle are allowed to drift back into the Round unit. Livestock remain in the Round unit for about 2 weeks, then are gathered into the Bell Meadow gathering pasture. Livestock are gathered and moved in small groups back to the corral near Kerrick Horse Camp and trucked off the Allotment by the permitted off-date of September 15, unless otherwise specified in the AOI.

Livestock Distribution

Keep livestock distributed as evenly as possible throughout capable and suitable rangelands. Riding and herding is necessary to maintain the distribution pattern and prevent cattle from congregating or drifting off the Allotment. Herd cattle away from concentrated use areas and popular recreation areas. Cattle are excluded from developed recreation sites and from the Lodge, parking area and facilities at the Dodge Ridge Ski Area. Salting may be used in addition to herding to improve livestock distribution. Place salt in underutilized upland areas at least ¼ mile (about 1300 feet) from water. Disperse cattle away from riparian areas and special aquatic features as much as possible to minimize impacts to sensitive resources and water quality and to improve upland forage utilization.

ANNUAL OPERATING INSTRUCTIONS

Each year at the annual permittee meeting (or through correspondence if no meeting is held), the permittee(s) and the Forest Service will develop a set of Annual Operating Instructions (AOI) based on this Allotment Management Plan. The Annual Operating Instructions and permittee meetings are critical to successfully implementing the Allotment Management Plan. The AOI will detail the authorized use, current season's grazing strategy, improvement maintenance responsibilities, allowable use standards, key areas, and other additional instructions. The AOI will become an amendment to this AMP and as such, a part of the Term Grazing Permit. The AOI should include, at a minimum:

1. Authorized Use--the maximum permissible amount of grazing use, including numbers, class of livestock and season of use.
2. Grazing strategy--this is the planned grazing management schedule and may be modified during the grazing season depending on conditions. Changes can be made as long as the objectives will still be met. Changes in the original grazing strategy must be agreed upon by both the permittee and the FS or the FS must be notified before implementing any change. Any deviation in the grazing strategy must follow the prescriptions and meet the objectives in the plan.
3. Range Improvement Responsibilities--this includes a list of any improvements to be constructed or reconstructed during that grazing season. All improvements the permittee has responsibility for must be annually maintained.
4. Planned Monitoring--identify the key areas to be watched and go over the standards to be monitored. Monitoring needs to be done often enough to predict movement dates.
5. Additional instructions--may include travel restrictions, upcoming projects or other miscellaneous business.
6. Annual Reporting by the Permittee--a form for annual reporting will be included with the AOI. The permittee will complete the form to the best of his/her ability and return it to the Forest Service. Information to be provided annually should include actual livestock numbers grazed, time of grazing livestock, distribution, range improvement condition, and maintenance activities conducted.

RANGELAND IMPROVEMENTS

Existing range improvements, maintenance responsibilities, and maintenance standards are listed in Part 3 of the Term Grazing Permit for this Allotment and are included here for consistency. All existing improvements shall be maintained and operable to Forest Service standards. All new improvements shall be constructed according to Regional standards. Refer to FSH 2209.22 R5 and the 1988 USDA publication "Fences" for the standards.

Existing Improvements

Table H.01-1 Existing Improvements on the Bell Meadow Allotment

ID	Description of Range Improvement	Location
7146A	Fence around Middle Bell Meadow	T4N, R19E, Section 30
7146B	Exclosure Fence at Upper Bell Meadow	T4N, R19E, Sections 30 and 31
7146BB	Fence around Lower Bell Meadow	T4N, R19E, Section 36
7146C	Allotment Boundary Fence West of Lily Lake	T4N, R19E, Sections 34 and 35
7146I	Drift Fence across Bell Meadow Trail	T4N, R19E, Section 35
7146E	Cattleguard Dodge Ridge on 4N99	T4N, R19E, Section 34
7146F	Cattleguard West of Lily Lake on 4N25	T4N, R19E, Section 35
7378A	Trough 1 at Old Layton Camp	T4N, R19E, Section 19
7378C	Trough 2 and Spring at Gooseberry	T4N, R19E, Section 18

Cow Camp

In addition to the improvements listed above, the Permittee has permission to set up a temporary camp in the Kerrick Horse Camp Area to better manage the Allotment. This includes: trailers (3), corrals, cook trailer and piped watering system and trough. The permittee can move in two weeks before on-date to set up camp and stay two weeks after off-date to clean site and remove all of the above facilities.

Planned Improvements

Corral and handling facility is planned on the Bell Meadow Allotment at Forest Service Road 4N25. Meadow restoration, including temporary fencing is planned for Crab and Round Meadow as part of the Gooseberry project. Maintenance of temporary fences associated with the Gooseberry project is not the responsibility of the permittee. New fencing is planned on this Allotment as part of the BEH Rangeland Allotments decision.. The decision authorizes approximately .25 mile of allotment boundary fence on the Southeast corner of the Bell Meadow allotment. Additional fencing may be needed if implementation of the grazing strategy cannot be achieved through herding alone.

Maintenance Responsibilities and Standards

The permittee is responsible for maintaining all assigned improvements before cattle are turned out and throughout the grazing season, so that each improvement is fully functioning and in good repair. If serious or repeated problems occur with an improvement, contact the District Range Technician and work cooperatively to find a long-term solution. The permittee is responsible for checking with adjoining permittees to find out when the livestock will come on. A permittee taking non-use is still responsible for maintaining the assigned Allotment boundary fences.

Fence Maintenance Standards

- All broken wires will be spliced and repaired in such a manner that tension can be maintained.
- Broken or rotten posts, jacks, poles, braces, and staples will be replaced on an annual basis to maintain the fence for its intended purpose. Wires will be re-stretched when needed.
- The top wire on all post and wire fences will be kept at 42 inches and the bottom wire at 18 inches if constructed to that standard.
- All gates should be closed when livestock enter the grazing units and opened and tied back when cattle have left the unit or Allotment.

- Wire gate tension should be sufficient to prevent the gate from sagging and still be easily opened and closed. Gate loops will be made of smooth wire and not barbed wire. Gate loop closers should be used whenever possible.
- Trees that have fallen on fences will be cut out and removed as needed. Loose or broken wire or poles will be repaired or replaced.
- Corrals will be kept clean of litter, in good repair and in usable condition.
- Tighten or replace wire on gateposts and braces as needed.
- Water Development Maintenance Standards
- Maintain spring source exclosures by insuring livestock accessibility is prevented through replacement or shoring up of jacks, poles, wires, staples, or other materials as necessary.
- Headbox lids/covers shall be in place throughout the season to prevent dirt, rodents, or other refuse from getting into the headbox.
- All outlets, pipes and valves from the headbox shall be functioning and all leakage shall be kept to a minimum.
- All headboxes shall be checked and cleared of mud and other materials.
- Water troughs will be kept at heights that allow easy access by livestock. Troughs that have been elevated by trampling should be periodically backfilled or reset to a useable height.
- Water should not be allowed to overflow the sides of the troughs. Overflow pipes must be checked and kept functioning properly.
- Troughs that become uneven due to settling will be leveled and reset.
- Inlet/outlet pipes will be protected from livestock with line poles or posts. These will be checked to ensure effective protection.
- Troughs, storage tanks and pipelines will be drained annually to prevent moss and debris buildup and prevent damage from freezing.
- Poles, posts and trough framing material used in the construction of water development will be maintained or repaired as needed.
- Pipeline leaks will be repaired or the damaged sections replaced with materials similar to the original construction materials.

MONITORING AND EVALUATION

The Monitoring Plan for the BEH Rangeland Allotments decision is a part of this Allotment Management Plan and will be used to guide monitoring and evaluation on the Bell Meadow Allotment. Three types of monitoring will be conducted on this Allotment. Implementation (Annual) Monitoring will be used to monitor implementation of the provisions of the Term Grazing Permit, including compliance with the Annual Operating Instructions. Effectiveness (Long-term) Monitoring tracks changes in vegetative conditions in response to livestock use and management. Permittee monitoring will ensure that standards and guidelines as listed in the Term Grazing Permit, Part 3 are met. Evaluation of monitoring data will determine if adaptive management adjustments are needed.

Monitoring Objectives

Specific objectives for monitoring on the Bell Meadow Allotment are:

1. To determine compliance with the Term Grazing Permit and Annual Operating Instructions.
2. To evaluate the implementation of management practices to insure movement from the Existing Conditions towards achievement of Desired Conditions, and use Adaptive Management to adjust livestock management strategies as necessary to meet Desired Condition.
3. To evaluate the degree and rate at which prescribed management practices are meeting Allotment objectives. If properly implemented practices are not effective in achieving Desired Conditions, they will be changed as necessary.
4. To demonstrate to all interested parties and partners that implementation of the Allotment Management Plan is effective in achieving multiple use management and is sound resource management of Forest Service lands.

Allotment Key Areas and Monitoring Priorities

Key Areas for the Bell Meadow Allotment are shown in Table H.01-2. Key areas will remain constant for the duration of this AMP unless changed after consultation, coordination and cooperation with the permittee and other interested parties. Monitoring priorities are indicated by the label "key"and other potential monitoring is indicated by an "X". Monitoring priorities were determined based on discrepancies between existing resource conditions and desired conditions on this Allotment. Additional monitoring may occur, as needed.

Table H.01-2 Monitoring locations and methods for Bell Meadow Allotment

Location	Aspen Browse	Forage Utilization	Meadow Hydrologic Function	Meadow Ecological Status	Riparian Standards (MIM)	Special Aquatic Feature(s)	TES Species
Bear Lake		X		X			
Camp Lake						X	
Crab Meadow (Key Area)	X	**Key**	**Key**	X	X	**Key**	
Gianelli Area						X	
Gooseberry Creek	X						
Kerrick Corral	X						
Lily Lake	X					X	
Lower Bell Meadow	X	X		X			
Lower Round Meadow	X	X	**Key**	X	**Key**	X	
Middle Bell Meadow	X	X		X			
Mud Lake (Key Area)		**Key**	**Key**	**Key**	**Key**	X	
Round Meadow (Key Area)	**Key**	**Key**	**Key**	**Key**	**Key**		
Upper Bell Creek					X		X

Implementation Monitoring

Range Readiness

Range readiness is based on plant phenology, soil moisture level, annual climate variation, or other site-specific constraints for each key area. Readiness inspections may occur at Allotment key areas, but may also be determined at other locations with similar elevation, soil moisture, geomorphology and key species phenology. The range will be considered ready for grazing when soil is dry and firm enough to prevent compaction and displacement, and when the following vegetation development is achieved:

Table H.01-3 Range Readiness Indicators for Bell Meadow Allotment

Readiness Indicator Species:	Growth stage:
Bromus marginatus, mountain brome	when average height reaches 6 inches
Sitanion hystrix, squirrel tail	when average height reaches 6 inches
Elymus glaucus, blue wild rye	when average height reaches 6 inches
Carex integra, smooth beak sedge	when flowers mostly open, stamens showing

Forage Utilization Standards

Implementation of utilization standards monitoring will focus on key areas, but may occur in other locations within the Allotment as need dictates. Herbaceous utilization in key areas will be measured using one of the following methods: the Height Weight Curve method on key species, the Stubble Height method, and/or Landscape Appearance method. Repeated photographs may also be used.

Riparian Conservation Standards

Implementation of Riparian Conservation Standards will focus on sensitive stream reaches on this Allotment. Riparian Stubble Height, Streambank Alteration, and Streamside Browse Utilization will be determined using the Multiple Indicator Monitoring (MIM) method on streambanks accessible to cattle.

Aspen Browse Standards

Monitoring of aspen browse will occur in identified aspen stands on this Allotment. Effort will be made to monitor aspen browse prior to livestock entry on the Allotment to determine baseline browse levels. Hardwood browse in aspen stands will be measured using monitored at defined intervals using specified aspen browse protocol(s).

Compliance Monitoring

Permit administration by the Forest Service includes compliance monitoring. Items to be monitored as part of implementation monitoring may include, but are not limited to the following:

- Livestock counts
- Actual livestock use and movements (from permittees records).
- Improvement inspections to insure that maintenance is completed to standard and on time.
- Compliance with the Annual Operating Instructions.
- Determination of any unauthorized use.
- Livestock presence outside Allotment boundaries, in Bell Meadow RNA, in developed recreation sites or in the Dodge Ridge Ski Area.

Permit Non-Compliance

If permit non-compliance occurs, corrective action will be taken according to the Regional Forester's Grazing Permit Administration, Suspension & Cancellation Guidelines (R5 FSM 2231.62, 2002). The intent is to provide a consistent and fair approach for permit administration actions which provide the permittee opportunity to remedy the noncompliance. Actions may include suspension or cancellation of the permit or civil actions, as appropriate depending on if the problem is persistent or willful. The permittee will be billed for any excess use at the unauthorized use rate. The permittee is encouraged to monitor the Allotment continuously throughout the grazing season and coordinate with the Forest Officer to resolve any problems that arise in a timely manner.

Effectiveness Monitoring

The objective of effectiveness monitoring is to evaluate the degree and rate at which prescribed management practices are meeting Allotment objectives. If properly implemented practices are not effective in achieving Desired Conditions, they will be changed as necessary. Key Areas will receive effectiveness monitoring on the Bell Meadow Allotment. Range conditions and trend at specified key areas are assumed to be indicative of responses to management practices throughout the entire Allotment.

Effectiveness monitoring includes, but is not limited to, the following:

Meadow Ecological Status

Ecological Status of meadow vegetation will be determined in key areas using the Rooted Frequency Vegetation Sampling method. The Rooted Frequency protocol was developed and refined as part of an overall Regional rangeland monitoring program. The purpose of the United States Department of Agriculture (USDA) Forest Service Region 5 Range Monitoring Project was to establish permanent plots on key range sites across National Forest lands in Region 5 (California) in order to provide long-term monitoring of range condition. Established sites are generally located at Allotment key areas and are read every 5 years. This monitoring provides an ecological classification (vegetative, soils, and hydrologic) and quantitative condition scorecard for each meadow.

Special Aquatic Features

Special Aquatic Features (springs, seeps and fens) will be re-visited every 3-5 years. If cattle use is apparent, PFC methodology will be used to assess the condition of the feature. Monitoring may occur at any of the following known special aquatic features, or other features that are found during project implementation. Monitoring of special aquatic features will focus on determining PFC and trend and will prioritize the most at-risk special aquatic features. Soil ground cover measurements and photographs may also be used.

Meadow Hydrologic Function

In meadows where hydrologic function is already impaired, monitoring will determine whether livestock impacts are causing continued degradation of the hydrologic function of the meadows.

Where headcuts, knick points and/or small gullies were identified during project analysis, a qualified hydrologist will monitor the headcuts, knick points and/or small gullies to ensure that meadow hydrologic function is not compromised as a result of grazing

Best Management Practices Evaluation Program

BMPEP monitoring will be used to verify that BMPs are implemented and to evaluate the effectiveness of BMPs in protecting water quality. The Best Management Practices Effectiveness Program (BMPEP) is long-term monitoring that is conducted on key areas chosen at random from a sample pool. The USFS Region 5 grazing BMPEP protocol records herbaceous and woody utilization levels, streambank disturbance, ground cover, bank angle, riparian and upslope erosion, and riparian vegetation and seral condition information.

Permittee Monitoring

The permittee is responsible for ensuring that forage use is at or below the allowed levels and that standards and guidelines as listed in the Term Grazing Permit, Part 3 are met. The permittee is encouraged to participate in monitoring of the Allotment. At a minimum, the permittee will be invited to learn and participate in range monitoring activities performed by the Forest and District Range Staff.

Since meeting the standards and guidelines are a permittee responsibility, it is highly recommended that the permittee enter into a formal Partnership Agreement to conduct range monitoring. Standard protocols and instruction on their use will be provided. It is recommended that the Forest Service and the permittee work together to conduct formal mid and post season monitoring for permanent monitoring sites as listed in the Term Grazing Permit. The permittee is encouraged to maintain written documentation of monitoring conducted by him/her, and to share this information with the Forest Officer on a timely basis. Written results of any permittee performed monitoring and measurements should be provided to the District within 30 days of the end of the grazing season.

Evaluation

Data collected from both implementation and effectiveness monitoring will be used to evaluate management effectiveness and progress toward achieving desired conditions. Adaptive management will be used to set forage utilization standards based on vegetation condition; adjust management; and/or adjust livestock use levels or season of use.

The following criteria will be used as indicators that adaptive management adjustments are needed:

- Forage utilization and stubble height standards are not met on Key Areas and other areas of the Allotment.
- Meadow Ecological Status is determined to be moving in a downward trend.
- Livestock browse exceeds 20 percent of the annual leader growth of mature riparian shrubs and seedlings.

- Livestock browse exceeds 20 percent of annual growth of hardwood seedlings and advanced regeneration.
- Livestock disturbance to streambanks and natural lake and pond shorelines exceeds 20 percent of stream reach or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots.
- Special Aquatic Features are rated is Functional-at-Risk with a downward trend or Non-Functional.
- Livestock presence outside Allotment boundaries, in Bell Meadow RNA, in developed recreation sites or in the Dodge Ridge Ski Area becomes problematic.

ADAPTIVE MANAGEMENT

Adaptive management refers to the concept of allowing decisions, which are focused on desired outcomes, to be made with the best information available and to be adjusted during implementation to achieve desired conditions. Decision-making is expected to proceed using the best information available. Monitoring and evaluation are used to assess the effects of those decisions and to identify new information that may become available. Decisions are adapted, as needed, to respond to new information.

Data collected from both implementation and effectiveness monitoring will be used to evaluate management effectiveness and progress toward achieving desired conditions. Adaptive management actions will be used to achieve management objectives when monitoring indicates that adjustments are necessary in order to achieve defined desired conditions.

Management actions will be applied through the Annual Operating Instructions issued for the Bell Meadow Allotment. These possible management actions are designed to be used alone or in combinations in order to achieve management objectives.

- Adjust stocking rate (number of cow/calf pairs)
- Adjust grazing season (livestock turn-on and removal dates)
- Use of salt or supplement to draw livestock toward or away from specific areas
- Incorporate a range rider to move livestock from riparian areas (herding)
- Incorporate use of herding dogs to move livestock from riparian areas
- Rest from livestock grazing for one or more seasons
- Construct temporary electric fence to control livestock distribution patterns
- Construct permanent fence to control livestock distribution patterns
- Implement a high-intensity/short duration grazing system (by riding, herding, temp. fence, etc.)

Permittee and agency flexibility during adaptive management implementation will be needed. Flexibility is provided to adjust livestock grazing practices in response to unpredictable management situations caused by weather fluctuations (e.g., drought), livestock behavior, unexpected monitoring results or acts of nature such as wildfires. Adaptive actions would be constrained by Forest Plan direction, current Allotment NEPA decisions, regulations, policy and Term Grazing Permit terms and conditions.

In keeping with the adaptive management concept, Forest Plan Direction utilization standards would be adjusted if monitoring and evaluation determines that the current standards do not continue to meet or move towards attaining Forest Plan goals, objectives, standards and guidelines.

Continued monitoring of forage utilization in key use areas and of riparian and upland condition and trend as described in the Forest Plan will be used to determine if the grazing program continues to achieve desired future conditions and Forest Plan objectives for vegetation management. If monitoring shows that livestock grazing is not meeting or moving towards desired conditions, adaptive management would make it possible for management to review and correct the problems as described above. If monitoring shows that livestock grazing is meeting desired conditions, adaptive

management could allow for greater grazing flexibility through the Annual Operating Instruction process (reasonable adjustment in season of use, numbers, etc.).

MODIFICATION OF ALLOTMENT MANAGEMENT PLAN

This AMP provides management direction for the Bell Meadow Allotment. The direction in this AMP may be modified as appropriate based on the results of both annual and long term monitoring. As long as these modifications are consistent with the BEH Rangeland Allotments Record of Decision and the associated NEPA analysis, additional NEPA analyses may not be needed (FSH 1909.15, Section 18). Annual Operating Instructions (AOI) will be used to direct annual implementation of this AMP. AOIs may include variations in direction from this AMP for short term situations including drought, seasonal climatic variations, wild fire, insect or disease outbreaks, changes in base ranch operations, results from the previous year monitoring, etc. Where these situations are short term in nature, they will be dealt with through the AOI only. If these situations warrant long term changes, the AMP will be modified as appropriate following analysis and documentation.

MAP

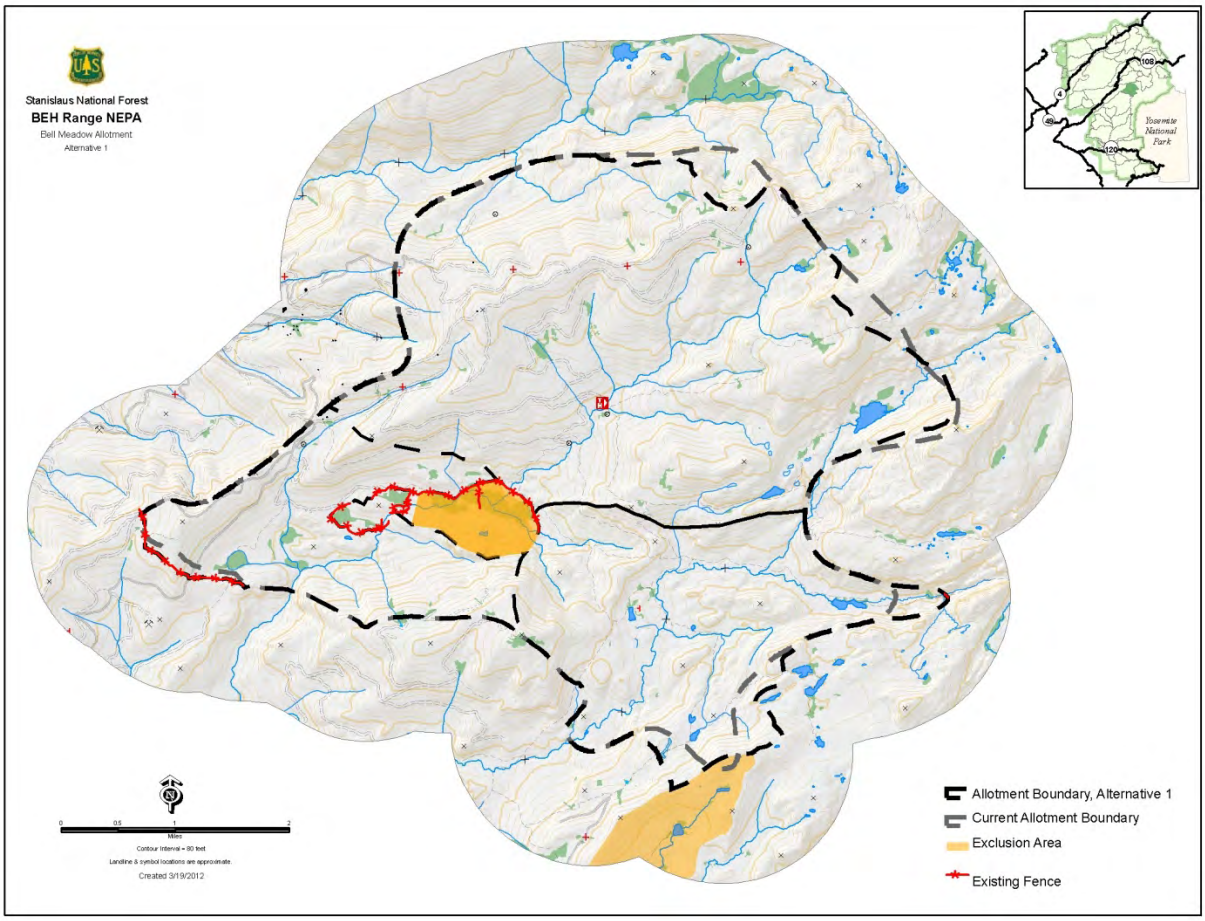

Figure H.01-1 Bell Meadow Allotment Map

I. Eagle Meadow Allotment Management Plan

INTRODUCTION

Forest Service regulations (36 CFR 221.1 and 222.2) allow Allotment Management Plans (AMPs) to be included in grazing permits consistent with the Federal Land Policy Management Act (FLMPA), as amended by the Public Rangelands Improvement Act (PRIA). An AMP is defined in FLPMA as a document outlining a specific program of action for livestock management. Included in the AMP is the authorized number of livestock and season of use, selected grazing strategy and range improvement plan and all other management objectives identified as a result of the environmental analysis process.

The Eagle Meadow AMP outlines the management decisions of the BEH Rangeland Allotments EISand documented in the Record of Decision (ROD) signed by the Responsible Official, the Forest Supervisor, on DATE, YEAR. The decision authorizes continued livestock grazing on the Bell Meadow, Eagle Meadow, and Herring Creek Allotments. This Allotment Management Plan is intended to guide on-the-ground management of the Eagle Meadow Allotment for the next 10 or more years. Additional analysis is not required to implement this management plan. This plan may be modified as part of the adaptive management strategy, as long as modifications are consistent with the decision and with applicable management direction.

The BEH Rangeland Allotments Record of Decision prescribes implementation of specific design criteria, including an Adaptive Management Strategy (AMS) that would be implemented to achieve defined desired conditions through ongoing monitoring and adjustments to livestock management, as necessary to implement management direction and to continue improving resource conditions on this Allotment.

Allotment Location and Description

The Eagle Meadow Allotment is located on the Summit Ranger District in Tuolumne County, California (Figure I.01-1). It is bounded on the west and north by Highway 108 and the Middle Fork Stanislaus River; on the east by Kennedy Meadows and Relief Reservoir; and, on the south by Eagle Pass. The location is generally described as Townships 5 and 6 North and Ranges 19 and 20 East. The Allotment ranges in elevation from about 6400 to 9900 feet. Annual precipitation averages 50 to 65 inches. The Eagle Meadow Allotment encompasses about 25070 acres, about 870 acres of which are National Forest System (NFS) lands.

GOALS AND OBJECTIVES

Goals and Objectives for the Eagle Meadow Allotments are based on current Forest Plan Direction, which presents management direction from original Forest Plan as modified through the Forest Plan appeals and amendment processes (USDA 2010). Goals and objectives are also based on the management decisions of the BEH Rangeland Allotments EISas documented in the Record of Decision signed by the Responsible Official, the Forest Supervisor, on DATE, YEAR. The decision is intended to guide on-the-ground management of the Eagle Meadow Allotment for the next 10 or more years. The goals and objectives of this Allotment Management Plan are:

1. To meet multiple-use objectives by allowing continued livestock grazing on forage-producing National Forest System lands in this Allotment.
2. To ensure consistency with all applicable management direction, including Forest Plan objectives, standards and guidelines.

3. To move resource conditions toward desired conditions. Gaps between existing conditions and desired conditions indicate a need to change grazing management by updating AMPs.
4. To implement an adaptive management strategy that will allow decisions to be made with the best information available and will adjust management during implementation to achieve desired conditions in a manner that is timely and consistent with Forest Plan Direction.

Stanislaus National Forest Goal for Range

Manage livestock to utilize available forage while avoiding adverse impacts on soil, vegetation, water quality, wildlife, fisheries and riparian zones.

Desired Conditions

Desired conditions are land or resource conditions expected to result if planning goals and objectives are fully achieved. The following desired conditions were identified during planning for the BEH Rangeland Allotments project and are consistent with Stanislaus National Forest Management Direction.

Aspen Regeneration

A diversity of age classes of hardwood shrubs is present and regeneration is occurring.

Meadow Hydrologic Function

Meadows are hydrologically functional: streams have floodplain connectivity to dissipate high flow energy, stream morphology is suitable for optimizing ground water retention, and the water table supports desired plant species composition and structural diversity.

Yosemite toad Populations

Provide habitat for diverse and viable populations of all native and desired non-native species.

Great Gray Owl

Meadow vegetation in great grey owl PACs supports a sufficiently large meadow vole population to provide a food source for GGO through the reproductive period.

Ecological Status of Meadows

Species composition and structural diversity of plant and animal communities in riparian areas, wetlands, and meadows provide desired habitat conditions and ecological functions.

Special Aquatic Features

Maintain and restore the distribution and health of biotic communities in special aquatic habitats (springs, seeps, vernal pools, fens, bogs, and marshes) to perpetuate their unique functions and biological diversity.

Water Quality

Water quality meets the goals of the Clean Water Act and Safe Drinking Water Act; it is fishable, swimmable, and suitable for drinking after normal treatment.

Developed and Dispersed Recreation

Minimize conflicts between recreational users and grazing operations.

Wilderness Character

Minimize conflicts between recreational users and grazing operations.

Sensitive and Watchlist Plants

Provide for protection and habitat needs of sensitive plants and watchlist species, so that Forest activities will not jeopardize their continued existence.

Invasive Weeds

Manage weeds using an integrated weed management approach.

Need for Change

Following is a description of resources and locations where a wherever existing conditions do not meet desired conditions as specified in the Forest Plan Direction (USDA 2010):

Aspen Regeneration

Locations: Barn Meadow, Eagle Meadow and Niagara Creek

Need for Change: Protect aspen regeneration by ensuring Forest Plan standards and guidelines are met. Additional monitoring of aspen populations will facilitate better understanding of timing and patterns of livestock/wildlife aspen browse.

Meadow Hydrologic Function

Locations: East Eagle Meadow, Long Valley, Lower Eagle Meadow, Red Rock Meadow and Shell Meadow.

Need for Change: For meadows/areas that are hydrologically functional, ensure that grazing is not causing new headcuts, causing accelerated advancement of headcuts and/or contributing to bank instability or channel incision. Monitor identified headcuts, knick points and small gullies and report any changes to district hydrologist. Ensure standards for streambank disturbance are not exceeded.

Yosemite toad Populations

Locations: Shell Meadow and other small meadows in the vicinity of Shell Meadow.

Need for Change: Implement standards and guidelines for the protection of Yosemite toad and its habitat. Ensure consistency with management direction using site-specific measures for conservation of Yosemite toad.

Great Gray Owl

Locations: Lower Eagle Meadow.

Need for Change: Implement standards and guidelines for Great Gray Owl. Replace temporary fence at Lower Eagle Meadow with permanent fence.

Ecological Status of Meadows

Locations: Red Rock Meadow

Need for Change: Increase abundance of late-seral species in meadow. Forest Plan standards and guidelines are designed to maintain meadows in satisfactory condition and improve condition of meadows where unsatisfactory.

Special Aquatic Features

Locations: Springs, seeps, and fens located throughout Allotment.

Need for Change: Reduce impacts of livestock to Special Aquatic Features by improving livestock distribution and minimizing time spent near Special Aquatic features. Update AMPs to incorporate and implement an adaptive strategy to improve the condition of Special Aquatic Features that are Functioning At-Risk

Water Quality

Locations: All streams, lakes and rivers

Need for Change: Implement grazing BMPs to protect water quality. Implement adaptive management actions if necessary to protect water quality.

Developed and Dispersed Recreation

Locations: dispersed camping areas near Barn Meadow.

Need for Change: Herd livestock away from developed recreation areas and high-use dispersed camping areas. Use adaptive management actions (fencing) if needed to prevent livestock drift into developed recreation areas.

Invasive Weeds

Locations: Eagle Meadow Gathering Pasture and throughout Allotment

Need for Change: Forest Service encourages use of certified weed free hay and straw for all pack and saddle stock used by the permittee.

MANAGEMENT REQUIREMENTS

Standards and Guidelines

Livestock will be removed from an area when any standard or guideline is reached or exceeded or by the scheduled off date, whichever occurs first. Where more than one standard is applicable to a given key area (example: forage utilization and streambank disturbance in a meadow with a sensitive stream reach), the standard reached first will dictate livestock removal. The following standards were developed by the Forest Service with the goal of achieving desired conditions, and are applicable to livestock grazing on this Allotment:

Stanislaus National Forest, Forest Plan Direction 2010, Range Standards and Guidelines

- Improve ecological condition of rangelands, where currently unsatisfactory, through improved management, and structural and nonstructural improvements.
- Develop range resources to their reasonably attainable potential and manage them on a sustained yield basis. Manage grazed lands to achieve a stable or upward vegetative trend, except in specified areas of transitory range. Use management strategies that protect the soil and vegetative resources and other resources in a cost effective manner. Consider all vegetation dependent uses when developing Allotment management plans.
- Revise range Allotment management plans to be consistent with law, regulations, Executive Orders, Forest Service direction and Forest Standards and Guidelines, by 1997. Revise and develop Allotment management plans in consultation with all involved parties, including permittees, State or other agencies, and any other involved entities.
- On any Allotment or unit of Allotment, grazing management will be based on the vegetative type or soil type contained which is most susceptible to damage through improper grazing management. Examples: a riparian drainage through annual grassland; meadows within transitory range. Allowable use standards will be established in the Allotment management plans and annual operating plans for each unit of each Allotment. The standards will be based on Regional standards in R5 FSH 2209.21. Priority will be given to range improvement on Allotments with a high percentage of primary range land in unsatisfactory condition, or high conflicts between livestock grazing and other resources and uses.
- On Allotments where discontinuous grazing systems are not in effect, adjust permitted Animal Unit Months to achieve allowable use on the primary range. Transportation systems in established range Allotments will include fences and cattle guards where new roads open up natural livestock barriers. Reduce or eliminate livestock grazing from ranges in unsatisfactory range condition which cannot be improved through better management or treatment at the current level of grazing.
- Standards and Guidelines for Perennial Range. Includes meadows, perennial grassland, sagebrush, broadleaf and riparian vegetative types. When grazing management is extensive and is based on perennial range the following apply:

- Under extensive or maintenance management where continuous season-long grazing is allowed, remove livestock when grazing reaches the allowable use level specified for the designated key areas.
- Under all management strategies base on-dates for livestock on the phenological development of key forage or indicator species. Refer to R5 FSH 2209.21 for range readiness standards or use comparable criteria for species not listed. One exception is where an intensive management system limits early grazing to that which the range can withstand.
- When primary range occurs within riparian areas: Allowable herbaceous forage utilization levels will be set according to Regional methods at standards that will contribute to the achievement of good to excellent vegetative and soil conditions.
- Allowable uses limit the extent to which one or a group of key species may be grazed in key areas. The allowable use level must provide for sufficient herbage residue to ensure favorable plant vigor and soil protection on good and excellent condition range, or to contribute to improvement in lower condition range. Allowable use levels for specific areas will be set at or below these maximums to conform to local range condition, soil stability, or special circumstances. Allowable use levels will be detailed in the Allotment management plan for each Allotment. Pastures receiving periodic full growing season rest can have higher allowable use levels, as shown. If condition classes of vegetation and soil vary, use the lower class to establish the allowable level.
- Monitor ecological condition and trend using Regionally established methods and standards (R5 FSH 2209.21) on a ten year schedule.

Weed Free Hay

Encourage use of certified weed free hay and straw. Cooperate with other agencies and the public in developing a certification program for weed free hay and straw. Phase in the program as certified weed free hay and straw becomes available. This standard and guideline applies to pack and saddle stock used by the public, livestock permittees, outfitter guide permittees, and local, State, and Federal agencies.

Streambank Standards

Prevent disturbance to streambanks and natural lake and pond shorelines caused by resource activities (for example, livestock, off-highway vehicles, and dispersed recreation) from exceeding 20 percent of stream reach or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots. This standard does not apply to developed recreation sites; sites authorized under Special Use Permits and designated off-highway vehicle routes.

Special Aquatic Features

Assess the hydrologic function of meadow habitats and other special aquatic features during range management analysis. Ensure that characteristics of special features are, at a minimum, at Proper Functioning Condition, as defined in the appropriate Technical Reports (or their successor publications): (1) “Process for Assessing PFC” TR 1737-9 (1993), “PFC for Lotic Areas” USDI TR 1737-15 (1998) or (2) “PFC for Lentic Riparian-Wetland Areas” USDI TR 1737-11 (1994).

Fen Ecosystems

Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map, and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans, and wheeled vehicles. Criteria for defining bogs and fens include, but are not limited to, presence of: (1) sphagnum moss (Sphagnum spp.), (2) mosses belonging to the genus Meessia, and (3) sundew

(Drosera spp.) Complete initial plant inventories of bogs and fens within active grazing Allotments prior to re-issuing permit.

Meadow Utilization Standards

Under season-long grazing:

- For meadows in early seral status: limit livestock utilization of grass and grass-like plants to 30 percent (or minimum 6-inch stubble height).
- For meadows in late seral status: limit livestock utilization of grass and grass-like plants to a maximum of 40 percent (or minimum 4-inch stubble height).

Meadow Ecological Status

Determine ecological status on all key areas monitored for grazing utilization prior to establishing utilization levels. Use Regional ecological scorecards and range plant list in regional range handbooks to determine ecological status. Analyze meadow ecological status every 3 to 5 years. If meadow ecological status is determined to be moving in a downward trend, modify or suspend grazing. Include ecological status data in a spatially explicit Geographical Information System database.

Riparian Browse Standards

Limit browsing to no more than 20 percent of the annual leader growth of mature riparian shrubs and no more than 20 percent of individual seedlings. Remove livestock from any area of an Allotment when browsing indicates a change in livestock preference from grazing herbaceous vegetation to browsing woody riparian vegetation.

Hardwood Regeneration

To protect hardwood regeneration in grazing Allotments, allow livestock browse on no more than 20 percent of annual growth of hardwood seedlings and advanced regeneration. Modify grazing plans if hardwood regeneration and recruitment needs are not being met.

Threatened and Endangered and Sensitive Species

Threatened, endangered, or sensitive species are known to exist on this Allotment. Sensitive species on this Allotment include Great Gray Owl and Willow Flycatcher. Habitat for Great Gray Owl occurs in Lower Eagle Meadow. Historically occupied Willow Flycatcher Habitat occurs in Long Valley. Species that have been Federally listed as threatened or endangered on this Allotment include Yosemite toad. Habitat for Yosemite toad occurs in Shell Meadow and in another small meadow in the vicinity of Shell Meadow. Meeting the following standards is a priority for protecting these species.

Great Gray Owl

In meadow areas of great gray owl Protected Activity Centers (PAC), maintain herbaceous vegetation at a height commensurate with site capability and habitat needs of prey species.

Willow Flycatcher

For historically occupied willow flycatcher sites, assess willow flycatcher habitat suitability within the meadow. If habitat is degraded, develop restoration objectives and take appropriate actions (such as physical restoration of hydrological components, limiting or re-directing grazing activity, and so forth) to move the meadow toward desired conditions. Evaluate site condition of historically occupied willow flycatcher sites. Those sites that no longer contain standing water on June 1 and a deciduous shrub component and cannot be reasonably restored may be removed from the willow flycatcher site database.

Yosemite toad

Exclude livestock from standing water and saturated soils in wet meadows and associated streams and springs occupied by Yosemite toads or identified as “essential habitat” in the conservation assessment for the Yosemite toad during the breeding and rearing season (through metamorphosis). Wet meadow habitat for Yosemite toad is defined as relatively open meadows with low to moderate amounts of woody vegetation that have standing water on June 1 or for more than 2 weeks following snow melt. Specific breeding and rearing season dates will be determined locally. If physical exclusion of livestock is impractical, then exclude grazing from the entire meadow. Exclusions in this standard and guideline may be waived if an interdisciplinary team has developed a site-specific management plan to minimize impacts to Yosemite toad and its habitat by managing the movement of stock around wet areas. Such plans are to include a requirement for systematically monitoring a sample of occupied Yosemite toad sites within the meadow to: (1) assess habitat conditions and (2) assess Yosemite toad occupancy and population dynamics. Every 3 years from the date of the plan, evaluate monitoring data. Modify or suspend grazing if Yosemite toad conservation is not being accomplished. Plans must be approved by the authorized officer and incorporated into all Allotment plans and/or special use permits governing use within the occupied habitat.

Other Applicable Management Requirements

Water Quality

Implement the following Pacific Southwest Region BMPs applicable to grazing:

- Practice 8-1. Rangeland Management Planning: Use the Allotment Management Plan (AMP) planning process to develop measures to avoid, minimize, mitigate and/or restore adverse impacts to water, aquatic and riparian resources during rangeland management activities.
- Practice 8-2. Rangeland Permit Administration: Manage rangeland vegetation and grazing to protect water, aquatic and riparian resources through administration and monitoring of Grazing Permits and Annual Operating Instructions (AOI).
- Practice 8-3. Rangeland Improvements: Implement range improvements to protect, maintain or improve water, aquatic and riparian resources and associated beneficial uses.

Salting

Salt and supplemental feeds will be placed in lightly used areas and at least one quarter mile from riparian areas, other water sources, and livestock concentration points.

Dead Livestock

As soon as possible, dead animals must be taken at least 100 feet from streams or lakes and out of sight of trails, roads, and campgrounds.

Age of Calves

Forest Service regulations require that any calf over 6 months old at time of entry onto the Allotment count as and be billed as an adult.

Private Lands

The permittees are responsible for keeping their livestock off private land unless they have permission of the landowner to graze. The Forest Service permit only applies to National Forest land and land waived to the Forest Service for grazing.

Noxious and Invasive Weed Prevention

Forest Service encourages use of certified weed free hay and straw for all pack and saddle stock used by the permittee.

Livestock Distribution and Move Dates

Livestock distribution and movements between units as established by this Allotment Management Plan are necessarily flexible. Actual moves will be determined, to the extent practical, by on-the-ground inspections. Livestock will be removed from specific areas when any standard or guideline is reached or exceeded on any of the key areas. Permittees are encouraged to maintain a current knowledge of the status of the key use areas with regard to allowable use standards and current use levels.

Allotment/Pasture Exit

No livestock should be on the Allotment after the end of the authorized off date. Any remaining livestock on the forest more than five days after the end of the season, without range staff authorization, will be billed for excess use. The off-date may be modified due to range conditions with an agreement between the Forest Service and the permittee. Any extensions of the grazing season must be requested in writing at least 15 days in advance of the scheduled off-date, and are subject to inspections by Supervisor's Office Range staff as well as District Ranger approval. If an emergency situation, beyond the permittee's control, making it impossible to remove all livestock by the end of the permitted season, then the authorized Forest Officer will be contacted immediately.

Areas Closed to Grazing

Livestock are not permitted within the permanent exclosure located in Lower Eagle Meadow, the fenced exclosure around the Bennett Juniper, and the fenced exclosure (deer habitat) located in Township 5N, Range 20E, Section 17. The Eagle Unit is also excluded from livestock grazing. Livestock are excluded from Shell Meadow (exclusion may be waived with annual approval). Livestock trespass into areas excluded from livestock grazing will be addressed promptly. Repeated livestock trespass will be addressed using the adaptive management process (reconstruct fence to ensure effective exclusion of livestock) or through regular permit administration.

Riding and Herding

Riding and herding are needed to improve distribution of livestock throughout the grazing season. The permittee will ride the Allotment as necessary to keep all livestock within the appropriate grazing unit(s).

Pack and Saddle Stock

Pack and saddle stock can be ridden anywhere on the Stanislaus National Forest. To protect the forest, users are encouraged to pack in (certified weed free) supplemental feed for their animals. Only tether horses to trees for short periods as hooves can cause damage to tree roots and plants.

Motorized Travel Management and Off-Highway Vehicle Use Restrictions

The permittee may be authorized to use Off Highway vehicles (OHV) off designated routes, trails, or OHV use areas to conduct permitted activities. Permittee use of OHVs is subject to approval by the authorized officer. Restrictions apply, and permission for OHV use will be authorized annually in the AOI.

Heritage Resources

It is prohibited to disturb, collect, or in any way damage any known prehistoric, historic, or archaeological resource. New discoveries: If previously unidentified cultural resources are discovered, care shall be taken by the permittee and the Forest Service to ensure that such sites are not disturbed. The permittee shall notify the Forest Officer as soon as possible if a new site is found so that appropriate evaluation and mitigation measures can be made.

GRAZING SYSTEM

Permitted Livestock Numbers

Grazing of up to 150 cow/calf pairs (calves less than six months) is permitted on this allotment. The actual number of livestock will be allocated in Annual Operating Instructions (AOIs) each year, but will not exceed 599 Animal Unit Months (AUMs). Adjustments to annual authorized livestock numbers may occur during the grazing season, based on conditions, range inspections and/or monitoring results. Permitted livestock numbers will not be exceeded unless an adjustment in season occurs and overall AUMs (as calculated by the permitted numbers and season) are not exceeded. Up to 5 head of horses (18 AUMs) would also be authorized on each Allotment to be used for Allotment administration.

Season of Use

Livestock will graze in the Eagle Meadow Allotment between the estimated on-date of July 1 and the estimated off-date of September 30. On dates are approximate and will be based on range readiness (plant phenology, soil moisture level, annual climate variation, or other site-specific constraints for each key area). The season of use may be administratively adjusted by allowing livestock to enter the Allotments as much as two weeks early and/or remain on the Allotment as much as two weeks past the permitted date, as long as all applicable standards are not exceeded. If livestock graze all authorized areas, reaching allowable use in each area prior to the “off date”, they will be moved off NFS lands early. If, however, livestock graze through available areas and reach the end of the grazing season prior to reaching allowable use, an extension may be authorized, providing other Forest Plan guidelines and objectives are met. An extended season of use would only be authorized if it has been determined through field inspections that soil, water, vegetative and other resource conditions are suitable.

Grazing System

Eagle Meadow Allotment uses a deferred rotation grazing system with the option of using some of the units under a rest-rotation system. The cattle enter the Allotment around July 1 at the Niagara unit, depending on range readiness. The Niagara Unit is used first to facilitate deferred grazing in the higher elevation units. From the Niagara unit, cattle would be distributed through the Lower Eagle unit and remain there until allowable utilization standards are being approached and there is reduced risk of Larkspur poisoning in the other units. Cattle are then moved into the Sardine or Long Valley unit depending on the operating plan for the year. The Haypress unit is used in conjunction with the Sardine unit to improve livestock distribution on the east side of the Allotment. In years the Long Valley unit is grazed last, prior to gathering, the McCormick Pocket unit would be used for partial numbers in order to improve livestock distribution and to facilitate gathering into the Eagle Meadow unit. At the end of the season the cattle are gathered into the Eagle Meadow unit (gathering pasture) for up to two weeks and then trucked off the Allotment.

Livestock Distribution

Keep livestock distributed as evenly as possible throughout capable and suitable rangelands. Riding and herding is necessary to maintain the distribution pattern and prevent cattle from congregating or drifting off the Allotment. Herd cattle away from concentrated use areas and popular recreation areas. Cattle are excluded from developed recreation sites and from exclosures. Salting may be used in addition to herding to improve livestock distribution. Place salt in underutilized upland areas at least ¼ mile (about 1300 feet) from water. Disperse cattle away from riparian areas and special aquatic features as much as possible to minimize impacts to sensitive resources and water quality and to improve upland forage utilization.

ANNUAL OPERATING INSTRUCTIONS

Each year at the annual permittee meeting (or through correspondence if no meeting is held), the permittee(s) and the Forest Service will develop a set of Annual Operating Instructions (AOI) based on this Allotment Management Plan. The Annual Operating Instructions and permittee meetings are critical to successfully implementing the Allotment Management Plan. The AOI will provide annual instructions for the permittee to follow in order to implement all applicable management direction. The AOI will become an amendment to this AMP and as such, a part of the Term Grazing Permit. The AOI should include, at a minimum:

1. Authorized Use--the maximum permissible amount of grazing use, including numbers, class of livestock and season of use.
2. Grazing strategy--this is the planned grazing management schedule and may be modified during the grazing season depending on conditions. Changes can be made as long as the objectives will still be met. Changes in the original grazing strategy must be agreed upon by both the permittee and the FS or the FS must be notified before implementing any change. Any deviation in the grazing strategy must follow the prescriptions and meet the objectives in the plan.
3. Range Improvement Responsibilities--this includes a list of any improvements to be constructed or reconstructed during that grazing season. All improvements the permittee has responsibility for must be annually maintained.
4. Planned Monitoring--identify the key areas to be watched and go over the standards to be monitored. Monitoring needs to be done often enough to predict movement dates.
5. Additional instructions--may include travel restrictions, upcoming projects or other miscellaneous business.
6. Annual Reporting by the Permittee--a form for annual reporting will be included with the AOI. The permittee will complete the form to the best of his/her ability and return it to the Forest Service. Information to be provided annually should include actual livestock numbers grazed, time of grazing livestock, distribution, range improvement condition, and maintenance activities conducted.

RANGELAND IMPROVEMENTS

Existing range improvements, maintenance responsibilities, and maintenance standards are listed in Part 3 of the Term Grazing Permit for this Allotment and are included here for consistency. All existing improvements shall be maintained and operable to Forest Service standards. All new improvements shall be constructed according to Regional standards. Refer to FSH 2209.22 R5 and the 1988 USDA publication "Fences" for the standards.

Existing Improvements

Table I.01-1 Existing Improvements on the Eagle Meadow Allotment

ID	Description of Range Improvement	Location
7151A	Niagara Allotment Boundary Fence	T6N, R19E, Section 32; T5N, R19E, Sections 5 and 8
7151B	Niagara-Eagle Division Fence	T5N, R19E, Sections 2 and 35
7151D	Eagle Meadow Pasture Fence	T5N, R19E, Sections 13 and 24
7151DD	Long Valley Drift Fence	T5N, R20E, Sections 7 and 8
7151E	Long Valley Creek Division Fence	T5N, R20E, Sections 17 and 18
7151F	Sardine Division Fence	T5N, R20E, Sections 4 and 5
7151G	Haypress Allotment Boundary Fence	T5N, R20E, Sections 4 and 9
7151H	Enclosure Fence	T5N, R20E, Section 17
7151HH	Allot. Div. Fence E of Martin's Cow Camp	T5N, R20E, Sections 7, 8, and 18
7151K	Enclosure Fence – Private Land	T5N, R20E, Section 17
7151L	Fence at Lower Eagle Meadow	T5N, R19E, Section 12

ID	Description of Range Improvement	Location
7151FF	First Cattleguard on Road 5N01	T5N, R19E, Section 13
7151GG	Second Cattleguard on Road 5N01	T5N, R19E, Section 13
7151I	Cattleguard at 5N04	T6N, R19E, Section 32
7151J	Cattleguard at Sardine Meadow	T5N, R20E, Section 5
7934A	Cabin at Martin's Cow Camp	T5N, R19E, Section 13
7934B	New Corral at Crossroads (5N01 and 5N13Y)	T5N, R19E, Section 5
7934C	Barn at Martin's Cow Camp	T5N, R19E, Section 13

Planned Improvements

New range improvements are planned on the Eagle Meadow Allotment and are necessary for implementation of the BEH Rangeland Allotments decision. A new boundary fence will be constructed on the western edge of the Niagara addition area to keep livestock away from Highway 108. The temporary exclosure fencing at Lower Eagle Meadow will be replaced with permanent fencing. Existing abandoned fences in McCormick Pocket will be rebuilt as needed. A cattleguard will be installed on Forest Service road 5N01 at the edge of the Niagara Creek addition. The temporary electric fence exclosure at Shell Meadow will be replaced with standard barbed wire fence. A water trough will be installed in the Lower Eagle Unit near Indian Rock. A corral will be constructed at Forest Service Road 5N01 near 5N13Y.

Maintenance Responsibilities and Standards

The permittee is responsible for maintaining all assigned improvements before cattle are turned out and throughout the grazing season, so that each improvement is fully functioning and in good repair. If serious or repeated problems occur with an improvement, contact the District Range Technician and work cooperatively to find a long-term solution. The permittee is responsible for checking with adjoining permittees to find out when the livestock will come on. A permittee taking non-use is still responsible for maintaining the assigned Allotment boundary fences.

Fence Maintenance Standards

- All broken wires will be spliced and repaired in such a manner that tension can be maintained.
- Broken or rotten posts, jacks, poles, braces, and staples will be replaced on an annual basis to maintain the fence for its intended purpose. Wires will be re-stretched when needed.
- The top wire on all post and wire fences will be kept at 42 inches and the bottom wire at 18 inches if constructed to that standard.
- All gates should be closed when livestock enter the grazing units and opened and tied back when cattle have left the unit or Allotment.
- Wire gate tension should be sufficient to prevent the gate from sagging and still be easily opened and closed. Gate loops will be made of smooth wire and not barbed wire. Gate loop closers should be used whenever possible.
- Trees that have fallen on fences will be cut out and removed as needed. Loose or broken wire or poles will be repaired or replaced.
- Corrals will be kept clean of litter, in good repair and in usable condition.
- Tighten or replace wire on gateposts and braces as needed.

Water Development Maintenance Standards

- Maintain spring source exclosures by insuring livestock accessibility is prevented through replacement or shoring up of jacks, poles, wires, staples, or other materials as necessary.
- Headbox lids/covers shall be in place throughout the season to prevent dirt, rodents, or other refuse from getting into the headbox.
- All outlets, pipes and valves from the headbox shall be functioning and all leakage shall be kept to a minimum.
- All headboxes shall be checked and cleared of mud and other materials.

- Water troughs will be kept at heights that allow easy access by livestock. Troughs that have been elevated by trampling should be periodically backfilled or reset to a useable height.
- Water should not be allowed to overflow the sides of the troughs. Overflow pipes must be checked and kept functioning properly.
- Troughs that become uneven due to settling will be leveled and reset.
- Inlet/outlet pipes will be protected from livestock with line poles or posts. These will be checked to ensure effective protection.
- Troughs, storage tanks and pipelines will be drained annually to prevent moss and debris buildup and prevent damage from freezing.
- Poles, posts and trough framing material used in the construction of water development will be maintained or repaired as needed.
- Pipeline leaks will be repaired or the damaged sections replaced with materials similar to the original construction materials.

MONITORING AND EVALUATION

The Monitoring Plan for the BEH Rangeland Allotments decision is a part of this Allotment Management Plan and will be used to guide monitoring and evaluation on the Eagle Meadow Allotment. Three types of monitoring will be conducted on this Allotment. Implementation (Annual) Monitoring will be used to monitor implementation of the provisions of the Term Grazing Permit, including compliance with the Annual Operating Instructions. Effectiveness (Long-term) Monitoring tracks changes in vegetative conditions in response to livestock use and management. Permittee monitoring will ensure that standards and guidelines as listed in the Term Grazing Permit, Part 3 are met. Evaluation of monitoring data will determine if adaptive management adjustments are needed.

Monitoring Objectives

Specific objectives for monitoring on the Eagle Meadow Allotment are:

1. To determine compliance with the Term Grazing Permit and Annual Operating Instructions.
2. To evaluate the implementation of management practices to insure movement from the Existing Conditions towards achievement of Desired Conditions, and use Adaptive Management to adjust livestock management strategies as necessary to meet Desired Condition.
3. To evaluate the degree and rate at which prescribed management practices are meeting Allotment objectives. If properly implemented practices are not effective in achieving Desired Conditions, they will be changed as necessary.
4. To demonstrate to all interested parties and partners that implementation of the Allotment Management Plan is effective in achieving multiple use management and is sound resource management of Forest Service lands.

Allotment Key Areas and Monitoring Priorities

Key Areas for the Eagle Meadow Allotment are shown in Table I.01-2. Key areas will remain constant for the duration of this AMP unless changed after consultation, coordination and cooperation with the permittee and other interested parties. Monitoring priorities are indicated by the label “key”and other potential monitoring is indicated by an “X”. Monitoring priorities were determined based on discrepancies between existing resource conditions and desired conditions on this Allotment. Additional monitoring may occur, as needed.

Table I.01-2 Monitoring locations and methods for Eagle Meadow Allotment

Location	Aspen Browse	Forage Utilization	Meadow Hydrologic Function	Meadow Ecological Status	Riparian Standards (MIM)	Special Aquatic Feature(s)	TES Species
Barn Meadow (Key Area)	**Key**	**Key**	X	**Key**		X	
Eagle Meadow	**Key**	X	**Key**	X	X	**Key**	
Long Valley (Key Area)		X	**Key**	**Key**	X	X	
Lower Eagle Meadow		**Key**	**Key**	X			**Key**
McCormick Pocket		X	X		X	X	
Meadow at T1N, R6E, Sec. 35		X		X			X
Niagara Addition Area		X	X			X	
Niagara Creek	X				X		
Northwest Allotment		X				X	
Red Rock Meadow (Key Area)		X	**Key**	X	**Key**		
Sardine meadow		X		X			
Shell Meadow			X	X			X

Implementation Monitoring

Range Readiness

Range readiness is based on plant phenology, soil moisture level, annual climate variation, or other site-specific constraints for each key area. Readiness inspections may occur at Allotment key areas, but may also be determined at other locations with similar elevation, soil moisture, geomorphology and key species phenology. The range will be considered ready for grazing when soil is dry and firm enough to prevent compaction and displacement, and when the following vegetation development is achieved:

Table I.01-3 Range Readiness Indicators for Eagle Meadow Allotment

Readiness Indicator Species:	**Growth stage:**
Carex integra, smooth beak sedge	when flowers mostly open, stamens showing
Veratrum californicum, corn lily	when average height reaches 24 inches
Achillea millefolium, western yarrow	when average height reaches 4 inches

Forage Utilization Standards

Implementation of utilization standards monitoring will focus on key areas, but may occur in other locations within the Allotment as need dictates. Herbaceous utilization in key areas will be measured using one of the following methods: the Height Weight Curve method on key species, the Stubble Height method, and/or Landscape Appearance method. Repeated photographs may also be used.

Riparian Conservation Standards

Implementation of Riparian Conservation Standards will focus on sensitive stream reaches on this Allotment. Riparian Stubble Height, Streambank Alteration, and Streamside Browse Utilization will be determined using the Multiple Indicator Monitoring (MIM) method on streambanks accessible to cattle.

Aspen Browse Standards

Monitoring of aspen browse will occur in identified aspen stands on this Allotment. Effort will be made to monitor aspen browse prior to livestock entry on the Allotment to determine baseline browse levels. Hardwood browse in aspen stands will be measured using monitored at defined intervals using specified aspen browse protocol(s).

Compliance Monitoring

Permit administration by the Forest Service includes compliance monitoring. Items to be monitored as part of implementation monitoring may include, but are not limited to the following:

- Livestock counts
- Actual livestock use and movements (from permittees records).
- Improvement inspections to insure that maintenance is completed to standard and on time.
- Compliance with the Annual Operating Instructions.
- Determination of any unauthorized use.
- Livestock presence outside Allotment boundaries, in exclosures, in developed recreation sites or in other exclusion areas.

Permit Non-Compliance

If permit non-compliance occurs, corrective action will be taken according to the Regional Forester's Grazing Permit Administration, Suspension & Cancellation Guidelines (R5 FSM 2231.62, 2002). The intent is to provide a consistent and fair approach for permit administration actions which provide the permittee opportunity to remedy the noncompliance. Actions may include suspension or cancellation of the permit or civil actions, as appropriate depending on if the problem is persistent or willful. The permittee will be billed for any excess use at the unauthorized use rate. The permittee is encouraged to monitor the Allotment continuously throughout the grazing season and coordinate with the Forest Officer to resolve any problems that arise in a timely manner.

Effectiveness Monitoring

The objective of effectiveness monitoring is to evaluate the degree and rate at which prescribed management practices are meeting Allotment objectives. If properly implemented practices are not effective in achieving Desired Conditions, they will be changed as necessary. Key Areas will receive effectiveness monitoring on the Eagle Meadow Allotment. Range conditions and trend at specified key areas are assumed to be indicative of responses to management practices throughout the entire Allotment.

Effectiveness monitoring includes, but is not limited to, the following:

Meadow Ecological Status

Ecological Status of meadow vegetation will be determined in key areas using the Rooted Frequency Vegetation Sampling method. The Rooted Frequency protocol was developed and refined as part of an overall Regional rangeland monitoring program. The purpose of the United States Department of Agriculture (USDA) Forest Service Region 5 Range Monitoring Project was to establish permanent plots on key range sites across National Forest lands in Region 5 (California) in order to provide long-term monitoring of range condition. Established sites are generally located at Allotment key areas and are read every 5 years. This monitoring provides an ecological classification (vegetative, soils, and hydrologic) and quantitative condition scorecard for each meadow.

Special Aquatic Features

Special Aquatic Features (springs, seeps and fens) will be re-visited every 3-5 years. If cattle use is apparent, PFC methodology will be used to assess the condition of the feature. Monitoring may occur at any of the following known special aquatic features, or other features that are found during project implementation. Monitoring of special aquatic features will focus on determining PFC and trend and will prioritize the most at-risk special aquatic features. Soil ground cover measurements and photographs may also be used.

Meadow Hydrologic Function

In meadows where hydrologic function is already impaired, monitoring will determine whether livestock impacts are causing continued degradation of the hydrologic function of the meadows.

Where headcuts, knick points and/or small gullies were identified during project analysis, a qualified hydrologist will monitor the headcuts, knick points and/or small gullies to ensure that meadow hydrologic function is not compromised as a result of grazing

Best Management Practices Evaluation Program (BMPEP)

BMPEP monitoring will be used to verify that BMPs are implemented and to evaluate the effectiveness of BMPs in protecting water quality. The Best Management Practices Effectiveness Program (BMPEP) is long-term monitoring that is conducted on key areas chosen at random from a sample pool. The USFS Region 5 grazing BMPEP protocol records herbaceous and woody utilization levels, streambank disturbance, ground cover, bank angle, riparian and upslope erosion, and riparian vegetation and seral condition information.

Permittee Monitoring

The permittee is responsible for ensuring that forage use is at or below the allowed levels and that standards and guidelines as listed in the Term Grazing Permit, Part 3 are met. The permittee is encouraged to participate in monitoring of the Allotment. At a minimum, the permittee will be invited to learn and participate in range monitoring activities performed by the Forest and District Range Staff.

Since meeting the standards and guidelines are a permittee responsibility, it is highly recommended that the permittee enter into a formal Partnership Agreement to conduct range monitoring. Standard protocols and instruction on their use will be provided. It is recommended that the Forest Service and the permittee work together to conduct formal mid and post season monitoring for permanent monitoring sites as listed in the Term Grazing Permit. The permittee is encouraged to maintain written documentation of monitoring conducted by him/her, and to share this information with the Forest Officer on a timely basis. Written results of any permittee performed monitoring and measurements should be provided to the District within 30 days of the end of the grazing season.

Evaluation

Data collected from both implementation and effectiveness monitoring will be used to evaluate management effectiveness and progress toward achieving desired conditions. Adaptive management will be used to set forage utilization standards based on vegetation condition; adjust management; and/or adjust livestock use levels or season of use.

The following criteria will be used as indicators that adaptive management adjustments are needed:

- Forage utilization and stubble height standards are not met on Key Areas and other areas of the Allotment.
- Meadow Ecological Status is determined to be moving in a downward trend.
- Livestock browse exceeds 20 percent of the annual leader growth of mature riparian shrubs and seedlings.
- Livestock browse exceeds 20 percent of annual growth of hardwood seedlings and advanced regeneration.
- Livestock disturbance to streambanks and natural lake and pond shorelines exceeds 20 percent of stream reach or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots.
- Special Aquatic Features are rated is Functional-at-Risk with a downward trend or Non-Functional.
- Livestock presence outside Allotment boundaries, in livestock exclosures, in developed recreation sites or in other exclusion areas becomes problematic.

ADAPTIVE MANAGEMENT

Adaptive management refers to the concept of allowing decisions, which are focused on desired outcomes, to be made with the best information available and to be adjusted during implementation to achieve desired conditions. Decision-making is expected to proceed using the best information available. Monitoring and evaluation are used to assess the effects of those decisions and to identify new information that may become available. Decisions are adapted, as needed, to respond to new information.

Data collected from both implementation and effectiveness monitoring will be used to evaluate management effectiveness and progress toward achieving desired conditions. Adaptive management actions will be used to achieve management objectives when monitoring indicates that adjustments are necessary in order to achieve defined desired conditions.

Management actions will be applied through the Annual Operating Instructions issued for the Eagle Meadow Allotment. These possible management actions are designed to be used alone or in combinations in order to achieve management objectives.

- Adjust stocking rate (number of cow/calf pairs)
- Adjust grazing season (livestock turn-on and removal dates)
- Use of salt or supplement to draw livestock toward or away from specific areas
- Incorporate a range rider to move livestock from riparian areas (herding)
- Incorporate use of herding dogs to move livestock from riparian areas
- Rest from livestock grazing for one or more seasons
- Construct temporary electric fence to control livestock distribution patterns
- Construct permanent fence to control livestock distribution patterns
- Implement a high-intensity/short duration grazing system (by riding, herding, temp. fence, etc.)

Permittee and agency flexibility during adaptive management implementation will be needed. Flexibility is provided to adjust livestock grazing practices in response to unpredictable management situations caused by weather fluctuations (e.g., drought), livestock behavior, unexpected monitoring results or acts of nature such as wildfires. Adaptive actions would be constrained by Forest Plan direction, current Allotment NEPA decisions, regulations, policy and Term Grazing Permit terms and conditions.

In keeping with the adaptive management concept, Forest Plan Direction utilization standards would be adjusted if monitoring and evaluation determines that the current standards do not continue to meet or move towards attaining Forest Plan goals, objectives, standards and guidelines.

Continued monitoring of forage utilization in key use areas and of riparian and upland condition and trend as described in the Forest Plan will be used to determine if the grazing program continues to achieve desired future conditions and Forest Plan objectives for vegetation management. If monitoring shows that livestock grazing is not meeting or moving towards desired conditions, adaptive management would make it possible for management to review and correct the problems as described above. If monitoring shows that livestock grazing is meeting desired conditions, adaptive management could allow for greater grazing flexibility through the Annual Operating Instruction process (reasonable adjustment in season of use, numbers, etc.).

MODIFICATION OF ALLOTMENT MANAGEMENT PLAN

This AMP provides management direction for the Eagle Meadow Allotment. The direction in this AMP may be modified as appropriate based on the results of both annual and long term monitoring. As long as these modifications are consistent with the BEH Rangeland Allotments Record of Decision and the associated NEPA analysis, additional NEPA analyses may not be needed (FSH 1909.15, Section 18). Annual Operating Instructions (AOI) will be used to direct annual implementation of this AMP. AOIs may include variations in direction from this AMP for short term

situations including drought, seasonal climatic variations, wild fire, insect or disease outbreaks, changes in base ranch operations, results from the previous year monitoring, etc. Where these situations are short term in nature, they will be dealt with through the AOI only. If these situations warrant long term changes, the AMP will be modified as appropriate following analysis and documentation.

MAP

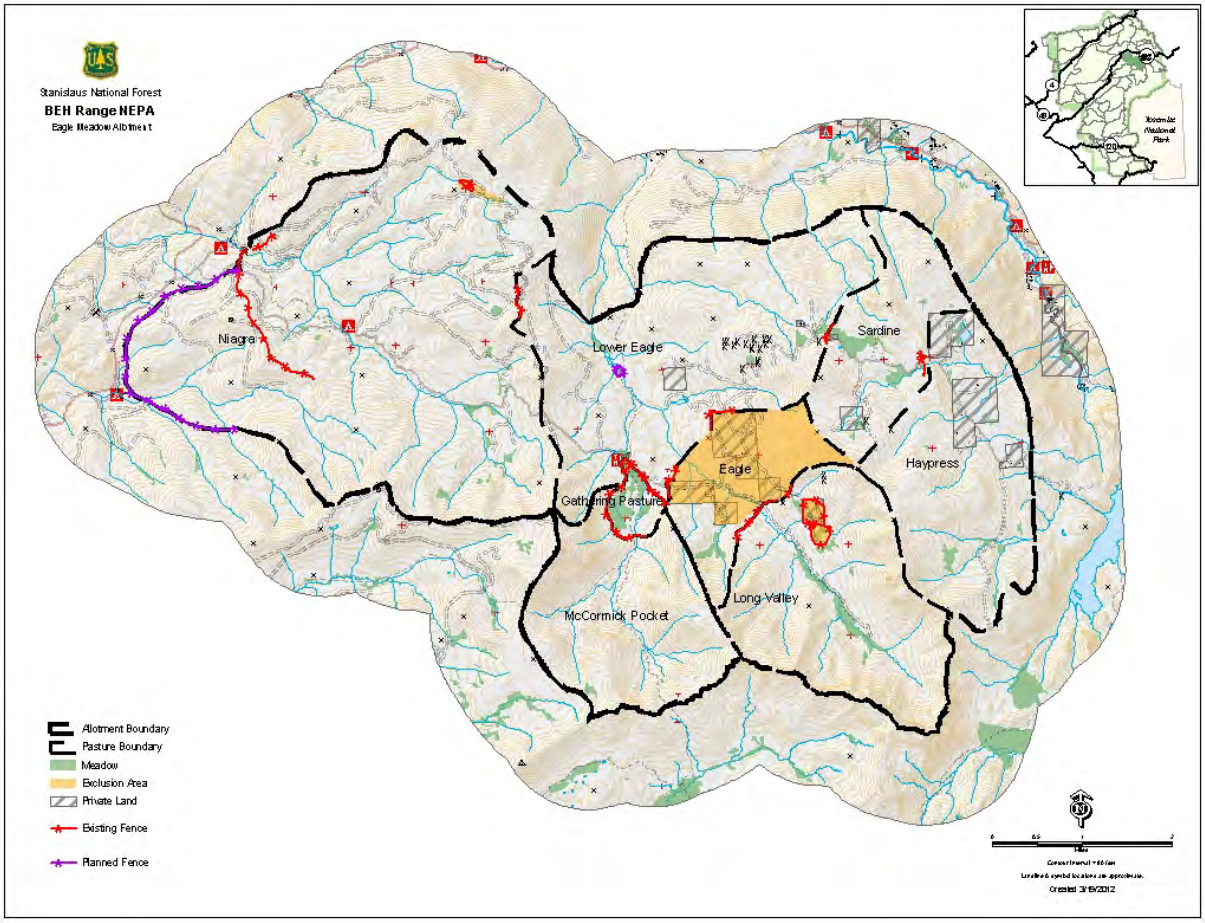

Figure I.01-1 Eagle Meadow Allotment Map

J. Herring Creek Allotment Management Plan

INTRODUCTION

Forest Service regulations (36 CFR 221.1 and 222.2) allow Allotment Management Plans (AMPs) to be included in grazing permits consistent with the Federal Land Policy Management Act (FLMPA), as amended by the Public Rangelands Improvement Act (PRIA). An AMP is defined in FLPMA as a document outlining a specific program of action for livestock management. Included in the AMP is the authorized number of livestock and season of use, selected grazing strategy and range improvement plan and all other management objectives identified as a result of the environmental analysis process.

The Herring Creek AMP outlines the management decisions of the BEH Rangeland Allotments EISand documented in the Record of Decision (ROD) signed by the Responsible Official, the Forest Supervisor, on DATE, YEAR. The decision authorizes continued livestock grazing on the Bell Meadow, Eagle Meadow, and Herring Creek Allotments. This Allotment Management Plan is intended to guide on-the-ground management of the Herring Creek Allotment for the next 10 or more years. Additional analysis is not required to implement this management plan. This plan may be modified as part of the adaptive management strategy, as long as modifications are consistent with the decision and with applicable management direction.

The BEH Rangeland Allotments Record of Decision prescribes implementation of specific design criteria, including an Adaptive Management Strategy (AMS) that would be implemented to achieve defined desired conditions through ongoing monitoring and adjustments to livestock management, as necessary to implement management direction and to continue improving resource conditions on this Allotment.

Allotment Location and Description

The Herring Creek Allotment is located on the Summit Ranger District in Tuolumne County, California (FigureJ.01-1). It is bounded on the west by Highway 108 and Leland Creek; on the north by Pikes Peak and Eagle Peak; on the east by Horse and Cow Meadow and McCormick Pocket; and on the south by the South Fork of the Stanislaus River. The location is generally described as Townships 4 and 5 North and Ranges 18 and 19 East. The Allotment ranges in elevation from about 5700 to 9500 feet. Annual precipitation averages 50 - 60 inches. The Herring Creek Allotment encompasses about 18,150 acres, all of which are National Forest System (NFS) lands.

GOALS AND OBJECTIVES

Goals and objectives for the Herring Creek Allotment are based on current Forest Plan Direction, which presents management direction from original Forest Plan as modified through the Forest Plan appeals and amendment processes (USDA 2010). Goals and objectives are also based on the management decisions of the BEH Rangeland Allotments EIS as documented in the Record of Decision signed by the Responsible Official, the Forest Supervisor, on DATE, YEAR. The decision is intended to guide on-the-ground management of the Herring Creek Allotment for the next 10 or more years. The goals and objectives of this Allotment Management Plan are:

1. To meet multiple-use objectives by allowing continued livestock grazing on forage-producing National Forest System lands in this Allotment.
2. To ensure consistency with all applicable management direction, including Forest Plan objectives, standards and guidelines.
3. To move resource conditions toward desired conditions. Gaps between existing conditions and desired conditions indicate a need to change grazing management by updating AMPs.

4. To implement an adaptive management strategy that will allow decisions to be made with the best information available and will adjust management during implementation to achieve desired conditions in a manner that is timely and consistent with Forest Plan Direction.

Stanislaus National Forest Goal for Range

Manage livestock to utilize available forage while avoiding adverse impacts on soil, vegetation, water quality, wildlife, fisheries and riparian zones.

Desired Conditions

Desired conditions are land or resource conditions expected to result if planning goals and objectives are fully achieved. The following desired conditions were identified during planning for the BEH Rangeland Allotments project and are consistent with Stanislaus National Forest Management Direction.

Aspen Regeneration

A diversity of age classes of hardwood shrubs is present and regeneration is occurring.

Meadow Hydrologic Function

Meadows are hydrologically functional: streams have floodplain connectivity to dissipate high flow energy, stream morphology is suitable for optimizing ground water retention, and the water table supports desired plant species composition and structural diversity.

Yosemite toad Populations

Provide habitat for diverse and viable populations of all native and desired non-native species.

Great Gray Owl

Meadow vegetation in great grey owl PACs supports a sufficiently large meadow vole population to provide a food source for GGO through the reproductive period.

Ecological Status of Meadows

Species composition and structural diversity of plant and animal communities in riparian areas, wetlands, and meadows provide desired habitat conditions and ecological functions.

Special Aquatic Features

Maintain and restore the distribution and health of biotic communities in special aquatic habitats (springs, seeps, vernal pools, fens, bogs, and marshes) to perpetuate their unique functions and biological diversity.

Water Quality

Water quality meets the goals of the Clean Water Act and Safe Drinking Water Act; it is fishable, swimmable, and suitable for drinking after normal treatment.

Developed and Dispersed Recreation

Minimize conflicts between recreational users and grazing operations.

Wilderness Character

Minimize conflicts between recreational users and grazing operations.

Sensitive and Watchlist Plants

Provide for protection and habitat needs of sensitive plants and watchlist species, so that Forest activities will not jeopardize their continued existence.

Invasive Weeds

Manage weeds using an integrated weed management approach.

Need For Change

Following is a description of resources and locations where a wherever existing conditions do not meet desired conditions as specified in the Forest Plan Direction (USDA 2010):

Aspen Regeneration

Locations: Bull Run, Fiddler's Green, Hammill Canyon, and Punch Bowl

Need for Change: Protect aspen regeneration by ensuring Forest Plan standards and guidelines are met. Additional monitoring of aspen populations will facilitate better understanding of timing and patterns of livestock/wildlife aspen browse.

Meadow Hydrologic Function

Locations: Bluff Meadow, Burt Reed Meadow, Castle Meadow, Coyote Meadow, Groundhog Meadow, Hammill Canyon, Upper Willow Meadow.

Need for Change: For meadows/areas that are hydrologically functional, ensure that grazing is not causing new headcuts, causing accelerated advancement of headcuts and/or contributing to bank instability or channel incision. Monitor identified headcuts, knick points and small gullies and report any changes to district hydrologist. Ensure standards for streambank disturbance are not exceeded.

Ecological Status of Meadows

Locations: Hammill Canyon meadow (R5 monitoring location)

Need for Change: Increase abundance of late-seral species in these meadows. Forest Plan standards and guidelines are designed to maintain meadows in satisfactory condition and improve condition of meadows where unsatisfactory.

Special Aquatic Features

Locations: Springs, seeps, and fens located throughout Allotment.

Need for Change: Reduce impacts of livestock to Special Aquatic Features by improving livestock distribution and minimizing time spent near Special Aquatic features. Update AMPs to incorporate and implement an adaptive strategy to improve the condition of Special Aquatic Features that are Functioning At-Risk

Water Quality

Locations: All streams, lakes and rivers

Need for Change: Implement grazing BMPs to protect water quality. Implement adaptive management actions if necessary to protect water quality.

Developed and Dispersed Recreation

Locations: Developed Campgrounds near Herring Creek Reservoir

Need for Change: Herd livestock away from developed recreation areas and high-use dispersed camping areas. Use adaptive management actions (fencing) if needed to prevent livestock drift into developed recreation areas.

Sensitive and Watchlist Plants

Locations: Yuba Pass Willowherb (*Epilobium howellii*) occurrences located in middle three meadows and in small meadow at the top of Fiddler's Green.

Need for Change: Minimize or avoid cattle trailing in small uppermost meadow at Fiddler's Green.

Invasive Weeds

Locations: potential for introduction of invasive weeds throughout Allotment.

Need for Change: Forest Service encourages use of certified weed free hay and straw for all pack and saddle stock used by the permittee.

MANAGEMENT REQUIREMENTS

Standards and Guidelines

Livestock will be removed from an area when any standard or guideline is reached or exceeded or by the scheduled off date, whichever occurs first. Where more than one standard is applicable to a given key area (example: forage utilization and streambank disturbance in a meadow with a sensitive stream reach), the standard reached first will dictate livestock removal. The following standards were developed by the Forest Service with the goal of achieving desired conditions, and are applicable to livestock grazing on this Allotment:

Stanislaus National Forest, Forest Plan Direction 2010, Range Standards and Guidelines

- Improve ecological condition of rangelands, where currently unsatisfactory, through improved management, and structural and nonstructural improvements.
- Develop range resources to their reasonably attainable potential and manage them on a sustained yield basis. Manage grazed lands to achieve a stable or upward vegetative trend, except in specified areas of transitory range. Use management strategies that protect the soil and vegetative resources and other resources in a cost effective manner. Consider all vegetation dependent uses when developing Allotment management plans.
- Revise range Allotment management plans to be consistent with law, regulations, Executive Orders, Forest Service direction and Forest Standards and Guidelines, by 1997. Revise and develop Allotment management plans in consultation with all involved parties, including permittees, State or other agencies, and any other involved entities.
- On any Allotment or unit of Allotment, grazing management will be based on the vegetative type or soil type contained which is most susceptible to damage through improper grazing management. Examples: a riparian drainage through annual grassland; meadows within transitory range. Allowable use standards will be established in the Allotment management plans and annual operating plans for each unit of each Allotment. The standards will be based on Regional standards in R5 FSH 2209.21. Priority will be given to range improvement on Allotments with a high percentage of primary range land in unsatisfactory condition, or high conflicts between livestock grazing and other resources and uses.
- On Allotments where discontinuous grazing systems are not in effect, adjust permitted Animal Unit Months to achieve allowable use on the primary range. Transportation systems in established range Allotments will include fences and cattle guards where new roads open up natural livestock barriers. Reduce or eliminate livestock grazing from ranges in unsatisfactory range condition which cannot be improved through better management or treatment at the current level of grazing.
- Standards and Guidelines for Perennial Range. Includes meadows, perennial grassland, sagebrush, broadleaf and riparian vegetative types. When grazing management is extensive and is based on perennial range the following apply:
- Under extensive or maintenance management where continuous season-long grazing is allowed, remove livestock when grazing reaches the allowable use level specified for the designated key areas.
- Under all management strategies base on-dates for livestock on the phenological development of key forage or indicator species. Refer to R5 FSH 2209.21 for range readiness standards or use comparable criteria for species not listed. One exception is where an intensive management system limits early grazing to that which the range can withstand.
- When primary range occurs within riparian areas: Allowable herbaceous forage utilization levels will be set according to Regional methods at standards that will contribute to the achievement of good to excellent vegetative and soil conditions.

- Allowable uses limit the extent to which one or a group of key species may be grazed in key areas. The allowable use level must provide for sufficient herbage residue to ensure favorable plant vigor and soil protection on good and excellent condition range, or to contribute to improvement in lower condition range. Allowable use levels for specific areas will be set at or below these maximums to conform to local range condition, soil stability, or special circumstances. Allowable use levels will be detailed in the Allotment management plan for each Allotment. Pastures receiving periodic full growing season rest can have higher allowable use levels, as shown. If condition classes of vegetation and soil vary, use the lower class to establish the allowable level.
- Monitor ecological condition and trend using Regionally established methods and standards (R5 FSH 2209.21) on a ten year schedule.

Weed Free Hay

Encourage use of certified weed free hay and straw. Cooperate with other agencies and the public in developing a certification program for weed free hay and straw. Phase in the program as certified weed free hay and straw becomes available. This standard and guideline applies to pack and saddle stock used by the public, livestock permittees, outfitter guide permittees, and local, State, and Federal agencies.

Streambank Standards

Prevent disturbance to streambanks and natural lake and pond shorelines caused by resource activities (for example, livestock, off-highway vehicles, and dispersed recreation) from exceeding 20 percent of stream reach or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots. This standard does not apply to developed recreation sites; sites authorized under Special Use Permits and designated off-highway vehicle routes.

Special Aquatic Features

Assess the hydrologic function of meadow habitats and other special aquatic features during range management analysis. Ensure that characteristics of special features are, at a minimum, at Proper Functioning Condition, as defined in the appropriate Technical Reports (or their successor publications): (1) “Process for Assessing PFC” TR 1737-9 (1993), “PFC for Lotic Areas” USDI TR 1737-15 (1998) or (2) “PFC for Lentic Riparian-Wetland Areas” USDI TR 1737-11 (1994).

Fen Ecosystems

Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map, and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans, and wheeled vehicles. Criteria for defining bogs and fens include, but are not limited to, presence of: (1) sphagnum moss (Sphagnum spp.), (2) mosses belonging to the genus Meessia, and (3) sundew (Drosera spp.) Complete initial plant inventories of bogs and fens within active grazing Allotments prior to re-issuing permit.

Meadow Utilization Standards

Under season-long grazing:

- For meadows in early seral status: limit livestock utilization of grass and grass-like plants to 30 percent (or minimum 6-inch stubble height).
- For meadows in late seral status: limit livestock utilization of grass and grass-like plants to a maximum of 40 percent (or minimum 4-inch stubble height).

Meadow Ecological Status

Determine ecological status on all key areas monitored for grazing utilization prior to establishing utilization levels. Use Regional ecological scorecards and range plant list in regional range handbooks to determine ecological status. Analyze meadow ecological status every 3 to 5 years. If meadow ecological status is determined to be moving in a downward trend, modify or suspend grazing. Include ecological status data in a spatially explicit Geographical Information System database.

Riparian Browse Standards

Limit browsing to no more than 20 percent of the annual leader growth of mature riparian shrubs and no more than 20 percent of individual seedlings. Remove livestock from any area of an Allotment when browsing indicates a change in livestock preference from grazing herbaceous vegetation to browsing woody riparian vegetation.

Hardwood Regeneration

To protect hardwood regeneration in grazing Allotments, allow livestock browse on no more than 20 percent of annual growth of hardwood seedlings and advanced regeneration. Modify grazing plans if hardwood regeneration and recruitment needs are not being met.

Threatened and Endangered and Sensitive Species

Threatened, endangered, or sensitive species are known to exist on this Allotment. Sensitive species on this Allotment include Willow Flycatcher. Historically occupied Willow Flycatcher Habitat occurs in Willow Meadow. Species that are Federally listed as threatened or endangered on this Allotment include Yosemite toad (threatened) and Sierra Nevada Yellow-Legged Frog (endangered). Habitat for Yosemite toad occurs in Bluff Meadow, Castle Meadow, Bloomer Lake, Groundhog Meadow and Wire Corral. Habitat for Sierra Nevada Yellow-Legged Frog occurs in Willow Creek. Meeting the following standards is a priority for protecting these species.

Willow Flycatcher

For historically occupied willow flycatcher sites, assess willow flycatcher habitat suitability within the meadow. If habitat is degraded, develop restoration objectives and take appropriate actions (such as physical restoration of hydrological components, limiting or re-directing grazing activity, and so forth) to move the meadow toward desired conditions. Evaluate site condition of historically occupied willow flycatcher sites. Those sites that no longer contain standing water on June 1 and a deciduous shrub component and cannot be reasonably restored may be removed from the willow flycatcher site database.

Yosemite toad

Exclude livestock from standing water and saturated soils in wet meadows and associated streams and springs occupied by Yosemite toads or identified as “essential habitat” in the conservation assessment for the Yosemite toad during the breeding and rearing season (through metamorphosis). Wet meadow habitat for Yosemite toad is defined as relatively open meadows with low to moderate amounts of woody vegetation that have standing water on June 1 or for more than 2 weeks following snow melt. Specific breeding and rearing season dates will be determined locally. If physical exclusion of livestock is impractical, then exclude grazing from the entire meadow. Exclusions in this standard and guideline may be waived if an interdisciplinary team has developed a site-specific management plan to minimize impacts to Yosemite toad and its habitat by managing the movement of stock around wet areas. Such plans are to include a requirement for systematically monitoring a sample of occupied Yosemite toad sites within the meadow to: (1) assess habitat conditions and (2) assess Yosemite toad occupancy and population dynamics. Every 3 years from the date of the plan, evaluate monitoring data. Modify or suspend grazing if Yosemite toad conservation is not being accomplished. Plans must be approved by the authorized officer and incorporated into all Allotment plans and/or special use permits governing use within the occupied habitat.

Other Applicable Management Requirements

Water Quality

Implement the following Pacific Southwest Region BMPs applicable to grazing:

- Practice 8-1. Rangeland Management Planning: Use the Allotment Management Plan (AMP) planning process to develop measures to avoid, minimize, mitigate and/or restore adverse impacts to water, aquatic and riparian resources during rangeland management activities.
- Practice 8-2. Rangeland Permit Administration: Manage rangeland vegetation and grazing to protect water, aquatic and riparian resources through administration and monitoring of Grazing Permits and Annual Operating Instructions (AOI).
- Practice 8-3. Rangeland Improvements: Implement range improvements to protect, maintain or improve water, aquatic and riparian resources and associated beneficial uses.

Salting

Salt and supplemental feeds will be placed in lightly used areas and at least one quarter mile from riparian areas, other water sources, and livestock concentration points.

Dead Livestock

As soon as possible, dead animals must be taken at least 100 feet from streams or lakes and out of sight of trails, roads, and campgrounds.

Age of Calves

Forest Service regulations require that any calf over 6 months old at time of entry onto the Allotment count as and be billed as an adult.

Private Lands

The permittees are responsible for keeping their livestock off private land unless they have permission of the landowner to graze. The Forest Service permit only applies to National Forest land and land waived to the Forest Service for grazing.

Noxious and Invasive Weed Prevention

Forest Service encourages use of certified weed free hay and straw for all pack and saddle stock used by the permittee.

Livestock Distribution and Move Dates

Livestock distribution and movements between units as established by this Allotment Management Plan are necessarily flexible. Actual moves will be determined, to the extent practical, by on-the-ground inspections. Livestock will be removed from specific areas when any standard or guideline is reached or exceeded on any of the key areas. Permittees are encouraged to maintain a current knowledge of the status of the key use areas with regard to allowable use standards and current use levels.

Allotment/Pasture Exit

No livestock should be on the Allotment after the end of the authorized off date. Any remaining livestock on the forest more than five days after the end of the season, without range staff authorization, will be billed for excess use. The off-date may be modified due to range conditions with an agreement between the Forest Service and the permittee. Any extensions of the grazing season must be requested in writing at least 15 days in advance of the scheduled off-date, and are subject to inspections by Supervisor’s Office Range staff as well as District Ranger approval. If an emergency situation, beyond the permittee’s control, making it impossible to remove all livestock by the end of the permitted season, then the authorized Forest Officer will be contacted immediately.

Areas Closed to Grazing

The Three Meadows fenced area is excluded from livestock grazing. Livestock are also not permitted within the temporary aspen exclosures or in the gully restoration area exclosure located at Fiddler's green. The exclosure fence at Fiddler's Green will be removed when restoration work is complete and the site is able to support livestock grazing. Livestock trespass into areas excluded from livestock grazing will be addressed promptly. Repeated livestock trespass will be addressed using the adaptive management process (reconstruct fence to ensure effective exclusion of livestock) or through regular permit administration.

Riding and Herding

Riding and herding are needed to improve distribution of livestock throughout the grazing season. The permittee will ride the Allotment as necessary to keep all livestock within the appropriate grazing unit(s).

Pack and Saddle Stock

Pack and saddle stock can be ridden anywhere on the Stanislaus National Forest. To protect the forest, users are encouraged to pack in (certified weed free) supplemental feed for their animals. Only tether horses to trees for short periods as hooves can cause damage to tree roots and plants.

Motorized Travel Management and Off-Highway Vehicle Use Restrictions

The permittee may be authorized to use Off Highway vehicles (OHV) off designated routes, trails, or OHV use areas to conduct permitted activities. Permittee use of OHVs is subject to approval by the authorized officer. Restrictions apply, and permission for OHV use will be authorized annually in the AOI.

Heritage Resources

It is prohibited to disturb, collect, or in any way damage any known prehistoric, historic, or archaeological resource. New discoveries: If previously unidentified cultural resources are discovered, care shall be taken by the permittee and the Forest Service to ensure that such sites are not disturbed. The permittee shall notify the Forest Officer as soon as possible if a new site is found so that appropriate evaluation and mitigation measures can be made.

GRAZING SYSTEM

Permitted Livestock Numbers

Grazing of up to 156 cow/calf pairs (calves less than six months) is permitted on this Allotment. The actual number of livestock will be allocated in Annual Operating Instructions (AOIs) each year, but will not exceed 623 Animal Unit Months (AUMs). Adjustments to annual authorized livestock numbers may occur during the grazing season, based on conditions, range inspections and/or monitoring results. Permitted livestock numbers will not be exceeded unless an adjustment in season occurs and overall AUMs (as calculated by the permitted numbers and season) are not exceeded. Up to 5 head of horses (18 AUMs) would also be authorized on each Allotment to be used for Allotment administration.

Season of Use

Livestock will graze in the Herring Creek Allotment between the estimated on-date of July 1 and the estimated off-date of September 30. On dates are approximate and will be based on range readiness (plant phenology, soil moisture level, annual climate variation, or other site-specific constraints for each key area). The season of use may be administratively adjusted by allowing livestock to enter the Allotments as much as two weeks early and/or remain on the Allotment as much as two weeks past the permitted date, as long as all applicable standards are not exceeded. If livestock graze all authorized areas, reaching allowable use in each area prior to the "off date", they will be moved off

NFS lands early. If, however, livestock graze through available areas and reach the end of the grazing season prior to reaching allowable use, an extension may be authorized, providing other Forest Plan guidelines and objectives are met. An extended season of use would only be authorized if it has been determined through field inspections that soil, water, vegetative and other resource conditions are suitable.

Grazing System

The Herring Creek Allotment is divided into 4 pastures and is operated under a deferred rotation grazing system. This is achieved through intensive herding and dispersal. Livestock enter the Allotment at Burt Reed meadow on or about July 1, depending on range readiness, and from there are dispersed evenly throughout the Bull Run and then Cascade units, which are used first to facilitate deferred grazing in the upper units. When allowable use in the Bull Run and Cascade units is approached (around August 1), livestock are moved to the Hammill Canyon unit. To reduce grazing pressure on the meadows in Hammill Canyon the permittee is encouraged to herd cattle toward the permanent uphill watering troughs and supplement in approved locations with a salt or protein block to hold and increase distribution of cattle in the upland vegetation until allowable use is reached. When allowable use and/or other standards (streambank disturbance) is approached (mid- to late-August), livestock are removed from the Hammill Canyon unit and placed in the Willow unit. Cattle will be managed in meadows occupied by Yosemite toad according to Forest Plan Standards and Guidelines listed below. At the end of the season cattle are gathered near and into Bluff Meadow for a period of about one to two weeks, and from there they are shipped off the Allotment.

Livestock Distribution

Keep livestock distributed as evenly as possible throughout capable and suitable rangelands. Riding and herding is necessary to maintain the distribution pattern and prevent cattle from congregating or drifting off the Allotment. Herd cattle away from concentrated use areas and popular recreation areas. Cattle are excluded from developed recreation sites, Three Meadows, and exclosures at Fiddler's Green. Salting may be used in addition to herding to improve livestock distribution. Place salt in underutilized upland areas at least ¼ mile (about 1300 feet) from water. Disperse cattle away from riparian areas and special aquatic features as much as possible to minimize impacts to sensitive resources and water quality and to improve upland forage utilization.

ANNUAL OPERATING INSTRUCTIONS

Each year at the annual permittee meeting (or through correspondence if no meeting is held), the permittee(s) and the Forest Service will develop a set of Annual Operating Instructions (AOI) based on this Allotment Management Plan. The Annual Operating Instructions and permittee meetings are critical to successfully implementing the Allotment Management Plan. The AOI will detail the authorized use, current season's grazing strategy, improvement maintenance responsibilities, allowable use standards, key areas, and other additional instructions. The AOI will become an amendment to this AMP and as such, a part of the Term Grazing Permit. The AOI should include, at a minimum:

1. Authorized Use--the maximum permissible amount of grazing use, including numbers, class of livestock and season of use.
2. Grazing strategy--this is the planned grazing management schedule and may be modified during the grazing season depending on conditions. Changes can be made as long as the objectives will still be met. Changes in the original grazing strategy must be agreed upon by both the permittee and the FS or the FS must be notified before implementing any change. Any deviation in the grazing strategy must follow the prescriptions and meet the objectives in the plan.
3. Range Improvement Responsibilities--this includes a list of any improvements to be constructed or reconstructed during that grazing season. All improvements the permittee has responsibility for must be annually maintained.

4. Planned Monitoring--identify the key areas to be watched and go over the standards to be monitored. Monitoring needs to be done often enough to predict movement dates.
5. Additional instructions--may include travel restrictions, upcoming projects or other miscellaneous business.
6. Annual Reporting by the Permittee--a form for annual reporting will be included with the AOI. The permittee will complete the form to the best of his/her ability and return it to the Forest Service. Information to be provided annually should include actual livestock numbers grazed, time of grazing livestock, distribution, range improvement condition, and maintenance activities conducted.

RANGELAND IMPROVEMENTS

Existing range improvements, maintenance responsibilities, and maintenance standards are listed in Part 3 of the Term Grazing Permit for this Allotment and are included here for consistency. All existing improvements shall be maintained and operable to Forest Service standards. All new improvements shall be constructed according to Regional standards. Refer to FSH 2209.22 R5 and the 1988 USDA publication "Fences" for the standards.

Existing Improvements

Table J.01-1 Existing Improvements on the Herring Creek Allotment

ID	Description of Range Improvement	Location
7149A	Bert Reed Pasture Fence	T4N, R18E, Section 3
7149B	Southwest Boundary Fence	T4N, R18E, Sections 9, 10, and 16
7149C	Cattleguard 1 on 4N12	T4N, R18E, Section 9
7149D	Leland Drift Fence	T4N, R18E, Section 2
7149E	West Boundary Fence	T5N, R18E, Sections 26, 34, and 35
7149F	Unit Division Fence	T5N, R18E, Section 36
7149G	Cattleguard 2 on 4N12	T5N, R18E, Section 36
7149GG	Allotment Boundary Fence at Bert Reed	T4N, R18E, Sections 3 and 9
7149H	Northwest Boundary Fence	T5N, R19E, Sections 19 and 30
7149J	Bluff Meadow Fence	T5N, R19E, Sections 32 and 33
7149K	Three Meadows Fence	T5N, R19E, Sections 33 and 34
7149P	Leland Drift Fence Extension	T5N, R18E, Section 34
7149Q	Horse Pen at Lower Cow Camp	T4N, R18E, Section 9
7932AA	Corral near Bluff Meadow	T5N, R19E, Section 33
7932B	Unloading Corral	T4N, R18E, Section 9
7381F	Herring Creek Water Development 1	T5N, R19E, Section 28
7381G	Herring Creek Water Development 2	T5N, R19E, Section 30
7381H	Water Development in Bluff Meadow	T5N, R19E, Section 33

Planned Improvements

There are range-related improvements planned on this Allotment as part of the BEH Rangeland Allotments decision. Additional fencing may be needed if implementation of the specified grazing strategy cannot be achieved through herding alone. The following are planned and potential improvements for this Allotment

- Fence along west side of Cascade Creek addition to keep livestock away from Highway 108 and developed recreation facilities (about 1.2 miles).
- Cattleguards on Forest Service Roads 5N21 and 5N31 at Cascade Creek addition
- Small drift fence between the Hammill Canyon and Willow Creek units, along Herring Creek at the top of Hammill Canyon, to the west of Bloomer Lake (about 400 feet).

- Additional fencing may be needed to divide the Hammill Canyon and Willow Creek units, if deferred rotation cannot be achieved through intensive herding alone.

Maintenance Responsibilities and Standards

The permittee is responsible for maintaining all assigned improvements before cattle are turned out and throughout the grazing season, so that each improvement is fully functioning and in good repair. If serious or repeated problems occur with an improvement, contact the District Range Technician and work cooperatively to find a long-term solution. The permittee is responsible for checking with adjoining permittees to find out when the livestock will come on. A permittee taking non-use is still responsible for maintaining the assigned Allotment boundary fences.

Fence Maintenance Standards

- All broken wires will be spliced and repaired in such a manner that tension can be maintained.
- Broken or rotten posts, jacks, poles, braces, and staples will be replaced on an annual basis to maintain the fence for its intended purpose. Wires will be re-stretched when needed.
- The top wire on all post and wire fences will be kept at 42 inches and the bottom wire at 18 inches if constructed to that standard.
- All gates should be closed when livestock enter the grazing units and opened and tied back when cattle have left the unit or Allotment.
- Wire gate tension should be sufficient to prevent the gate from sagging and still be easily opened and closed. Gate loops will be made of smooth wire and not barbed wire. Gate loop closers should be used whenever possible.
- Trees that have fallen on fences will be cut out and removed as needed. Loose or broken wire or poles will be repaired or replaced.
- Corrals will be kept clean of litter, in good repair and in usable condition.
- Tighten or replace wire on gateposts and braces as needed.

Water Development Maintenance Standards

- Maintain spring source exclosures by insuring livestock accessibility is prevented through replacement or shoring up of jacks, poles, wires, staples, or other materials as necessary.
- Headbox lids/covers shall be in place throughout the season to prevent dirt, rodents, or other refuse from getting into the headbox.
- All outlets, pipes and valves from the headbox shall be functioning and all leakage shall be kept to a minimum.
- All headboxes shall be checked and cleared of mud and other materials.
- Water troughs will be kept at heights that allow easy access by livestock. Troughs that have been elevated by trampling should be periodically backfilled or reset to a useable height.
- Water should not be allowed to overflow the sides of the troughs. Overflow pipes must be checked and kept functioning properly.
- Troughs that become uneven due to settling will be leveled and reset.
- Inlet/outlet pipes will be protected from livestock with line poles or posts. These will be checked to ensure effective protection.
- Troughs, storage tanks and pipelines will be drained annually to prevent moss and debris buildup and prevent damage from freezing.
- Poles, posts and trough framing material used in the construction of water development will be maintained or repaired as needed.
- Pipeline leaks will be repaired or the damaged sections replaced with materials similar to the original construction materials.

MONITORING AND EVALUATION

The Monitoring Plan for the BEH Rangeland Allotments decision is a part of this Allotment Management Plan and will be used to guide monitoring and evaluation on the Herring Creek

Allotment. Three types of monitoring will be conducted on this Allotment. Implementation (Annual) Monitoring will be used to monitor implementation of the provisions of the Term Grazing Permit, including compliance with the Annual Operating Instructions. Effectiveness (Long-term) Monitoring tracks changes in vegetative conditions in response to livestock use and management. Permittee monitoring will ensure that standards and guidelines as listed in the Term Grazing Permit, Part 3 are met. Evaluation of monitoring data will determine if adaptive management adjustments are needed.

Monitoring Objectives

Specific objectives for monitoring on the Herring Creek Allotment are:

1. To determine compliance with the Term Grazing Permit and Annual Operating Instructions.
2. To evaluate the implementation of management practices to insure movement from the Existing Conditions towards achievement of Desired Conditions, and use Adaptive Management to adjust livestock management strategies as necessary to meet Desired Condition.
3. To evaluate the degree and rate at which prescribed management practices are meeting Allotment objectives. If properly implemented practices are not effective in achieving Desired Conditions, they will be changed as necessary.
4. To demonstrate to all interested parties and partners that implementation of the Allotment Management Plan is effective in achieving multiple use management and is sound resource management of Forest Service lands.

Allotment Key Areas and Monitoring Priorities

Key Areas for the Herring Creek Allotment are shown in Table J.01-2. Key areas will remain constant for the duration of this AMP unless changed after consultation, coordination and cooperation with the permittee and other interested parties. Monitoring priorities are indicated by the label “key”and other potential monitoring is indicated by an “X”. Monitoring priorities were determined based on discrepancies between existing resource conditions and desired conditions on this Allotment. Additional monitoring may occur, as needed.

Table J.01-2 Monitoring locations and methods for Herring Creek Allotment

Location	Aspen Browse	Forage Utilization	Meadow Hydrologic Function	Meadow Ecological Status	Riparian Standards (MIM)	Special Aquatic Feature(s)	TES Species
Bloomer Lake		X	X	X	X	X	X
Bluff Meadow		X	X	X	X	X	X
Bull Run Meadow	X	X	X	X	X	X	
4N12 Meadow (Key Area)	X		**Key**				
Burt Reed Meadow	X	X	X	X		X	
Cascade Addition Area		X	X	X	X	X	
Castle Meadow		X	**Key**	X	X		X
Coyote Meadow		X	X	X			X
Fiddler's Green	**Key**	X		X	X		
Groundhog Meadow		X	X	X	X		X
North Allotment Ridge						X	
Herring Creek Reservoir			X			X	
Hammill Canyon (Key Area)	X	**Key**	**Key**	**Key**	**Key**		
Leland Meadow		X	X	X	X		X
Pinecrest Peak Area						X	
Punch Bowl	X	X	X	X	X	X	
Three Meadows			X	X			X
Willow Meadow		X	**Key**	X	X	X	X
Wire Corral (Key Area)		X	X	**Key**		X	X

Implementation Monitoring

Range Readiness

Range readiness is based on plant phenology, soil moisture level, annual climate variation, or other site-specific constraints for each key area. Readiness inspections may occur at Allotment key areas, but may also be determined at other locations with similar elevation, soil moisture, geomorphology and key species phenology. The range will be considered ready for grazing when soil is dry and firm enough to prevent compaction and displacement, and when the following vegetation development is achieved:

Table J.01-3 Range Readiness Indicators for Herring Creek Allotment

Readiness Indicator Species:	Growth stage:
Carex nebraskensis, Nebraska sedge	when flowers mostly open, stamens showing
Carex integra, smooth beak sedge	when flowers mostly open, stamens showing
Veratrum californicum, corn lily	when average height reaches 24 inches
Achillea millefolium, western yarrow	when average height reaches 4 inches

Forage Utilization Standards

Implementation of utilization standards monitoring will focus on key areas, but may occur in other locations within the Allotment as need dictates. Herbaceous utilization in key areas will be measured using one of the following methods: the Height Weight Curve method on key species, the Stubble Height method, and/or Landscape Appearance method. Repeated photographs may also be used.

Riparian Conservation Standards

Implementation of Riparian Conservation Standards will focus on sensitive stream reaches on this Allotment. Riparian Stubble Height, Streambank Alteration, and Streamside Browse Utilization will be determined using the Multiple Indicator Monitoring (MIM) method on streambanks accessible to cattle.

Aspen Browse Standards

Monitoring of aspen browse will occur in identified aspen stands on this Allotment. Effort will be made to monitor aspen browse prior to livestock entry on the Allotment to determine baseline browse levels. Hardwood browse in aspen stands will be measured using monitored at defined intervals using specified aspen browse protocol(s).

Compliance Monitoring

Permit administration by the Forest Service includes compliance monitoring. Items to be monitored as part of implementation monitoring may include, but are not limited to the following:

- Livestock counts
- Actual livestock use and movements (from permittees records).
- Improvement inspections to insure that maintenance is completed to standard and on time.
- Compliance with the Annual Operating Instructions.
- Determination of any unauthorized use.
- Livestock presence outside Allotment boundaries, in Bell Meadow RNA, in developed recreation sites or in the Dodge Ridge Ski Area.

Permit Non-Compliance

If permit non-compliance occurs, corrective action will be taken according to the Regional Forester's Grazing Permit Administration, Suspension & Cancellation Guidelines (R5 FSM 2231.62, 2002). The intent is to provide a consistent and fair approach for permit administration actions which provide the permittee opportunity to remedy the noncompliance. Actions may include suspension or cancellation

of the permit or civil actions, as appropriate depending on if the problem is persistent or willful. The permittee will be billed for any excess use at the unauthorized use rate. The permittee is encouraged to monitor the Allotment continuously throughout the grazing season and coordinate with the Forest Officer to resolve any problems that arise in a timely manner.

Effectiveness Monitoring

The objective of effectiveness monitoring is to evaluate the degree and rate at which prescribed management practices are meeting Allotment objectives. If properly implemented practices are not effective in achieving Desired Conditions, they will be changed as necessary. Key Areas will receive effectiveness monitoring on the Herring Creek Allotment. Range conditions and trend at specified key areas are assumed to be indicative of responses to management practices throughout the entire Allotment.

Effectiveness monitoring includes, but is not limited to, the following:

Meadow Ecological Status

Ecological Status of meadow vegetation will be determined in key areas using the Rooted Frequency Vegetation Sampling method. The Rooted Frequency protocol was developed and refined as part of an overall Regional rangeland monitoring program. The purpose of the United States Department of Agriculture (USDA) Forest Service Region 5 Range Monitoring Project was to establish permanent plots on key range sites across National Forest lands in Region 5 (California) in order to provide long-term monitoring of range condition. Established sites are generally located at Allotment key areas and are read every 5 years. This monitoring provides an ecological classification (vegetative, soils, and hydrologic) and quantitative condition scorecard for each meadow.

Special Aquatic Features

Special Aquatic Features (springs, seeps and fens) will be re-visited every 3-5 years. If cattle use is apparent, PFC methodology will be used to assess the condition of the feature. Monitoring may occur at any of the following known special aquatic features, or other features that are found during project implementation. Monitoring of special aquatic features will focus on determining PFC and trend and will prioritize the most at-risk special aquatic features. Soil ground cover measurements and photographs may also be used.

Meadow Hydrologic Function

In meadows where hydrologic function is already impaired, monitoring will determine whether livestock impacts are causing continued degradation of the hydrologic function of the meadows.

Where headcuts, knick points and/or small gullies were identified during project analysis, a qualified hydrologist will monitor the headcuts, knick points and/or small gullies to ensure that meadow hydrologic function is not compromised as a result of grazing

Best Management Practices Evaluation Program (BMPEP)

BMPEP monitoring will be used to verify that BMPs are implemented and to evaluate the effectiveness of BMPs in protecting water quality. The Best Management Practices Effectiveness Program (BMPEP) is long-term monitoring that is conducted on key areas chosen at random from a sample pool. The USFS Region 5 grazing BMPEP protocol records herbaceous and woody utilization levels, streambank disturbance, ground cover, bank angle, riparian and upslope erosion, and riparian vegetation and seral condition information.

Permittee Monitoring

The permittee is responsible for ensuring that forage use is at or below the allowed levels and that standards and guidelines as listed in the Term Grazing Permit, Part 3 are met. The permittee is encouraged to participate in monitoring of the Allotment. At a minimum, the permittee will be invited

to learn and participate in range monitoring activities performed by the Forest and District Range Staff.

Since meeting the standards and guidelines are a permittee responsibility, it is highly recommended that the permittee enter into a formal Partnership Agreement to conduct range monitoring. Standard protocols and instruction on their use will be provided. It is recommended that the Forest Service and the permittee work together to conduct formal mid and post season monitoring for permanent monitoring sites as listed in the Term Grazing Permit. The permittee is encouraged to maintain written documentation of monitoring conducted by him/her, and to share this information with the Forest Officer on a timely basis. Written results of any permittee performed monitoring and measurements should be provided to the District within 30 days of the end of the grazing season.

Evaluation

Data collected from both implementation and effectiveness monitoring will be used to evaluate management effectiveness and progress toward achieving desired conditions. Adaptive management will be used to set forage utilization standards based on vegetation condition; adjust management; and/or adjust livestock use levels or season of use.

The following criteria will be used as indicators that adaptive management adjustments are needed:

- Forage utilization and stubble height standards are not met on Key Areas and other areas of the Allotment.
- Meadow Ecological Status is determined to be moving in a downward trend.
- Livestock browse exceeds 20 percent of the annual leader growth of mature riparian shrubs and seedlings.
- Livestock browse exceeds 20 percent of annual growth of hardwood seedlings and advanced regeneration.
- Livestock disturbance to streambanks and natural lake and pond shorelines exceeds 20 percent of stream reach or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots.
- Special Aquatic Features are rated is Functional-at-Risk with a downward trend or Non-Functional.
- Livestock presence outside Allotment boundaries, in developed recreation sites or in exclosures becomes problematic.

ADAPTIVE MANAGEMENT

Adaptive management refers to the concept of allowing decisions, which are focused on desired outcomes, to be made with the best information available and to be adjusted during implementation to achieve desired conditions. Decision-making is expected to proceed using the best information available. Monitoring and evaluation are used to assess the effects of those decisions and to identify new information that may become available. Decisions are adapted, as needed, to respond to new information.

Data collected from both implementation and effectiveness monitoring will be used to evaluate management effectiveness and progress toward achieving desired conditions. Adaptive management actions will be used to achieve management objectives when monitoring indicates that adjustments are necessary in order to achieve defined desired conditions.

Management actions will be applied through the Annual Operating Instructions issued for the Herring Creek Allotment. These possible management actions are designed to be used alone or in combinations in order to achieve management objectives.

- Adjust stocking rate (number of cow/calf pairs)
- Adjust grazing season (livestock turn-on and removal dates)

- Use of salt or supplement to draw livestock toward or away from specific areas
- Incorporate a range rider to move livestock from riparian areas (herding)
- Incorporate use of herding dogs to move livestock from riparian areas
- Rest from livestock grazing for one or more seasons
- Construct temporary electric fence to control livestock distribution patterns
- Construct permanent fence to control livestock distribution patterns
- Implement a high-intensity/short duration grazing system (by riding, herding, temp. fence, etc.)

Permittee and agency flexibility during adaptive management implementation will be needed. Flexibility is provided to adjust livestock grazing practices in response to unpredictable management situations caused by weather fluctuations (e.g., drought), livestock behavior, unexpected monitoring results or acts of nature such as wildfires. Adaptive actions would be constrained by Forest Plan direction, current Allotment NEPA decisions, regulations, policy and Term Grazing Permit terms and conditions.

In keeping with the adaptive management concept, Forest Plan Direction utilization standards would be adjusted if monitoring and evaluation determines that the current standards do not continue to meet or move towards attaining Forest Plan goals, objectives, standards and guidelines.

Continued monitoring of forage utilization in key use areas and of riparian and upland condition and trend as described in the Forest Plan will be used to determine if the grazing program continues to achieve desired future conditions and Forest Plan objectives for vegetation management. If monitoring shows that livestock grazing is not meeting or moving towards desired conditions, adaptive management would make it possible for management to review and correct the problems as described above. If monitoring shows that livestock grazing is meeting desired conditions, adaptive management could allow for greater grazing flexibility through the Annual Operating Instruction process (reasonable adjustment in season of use, numbers, etc.).

MODIFICATION OF ALLOTMENT MANAGEMENT PLAN

This AMP provides management direction for the Herring Creek Allotment. The direction in this AMP may be modified as appropriate based on the results of both annual and long term monitoring. As long as these modifications are consistent with the BEH Rangeland Allotments Record of Decision and the associated NEPA analysis, additional NEPA analyses may not be needed (FSH 1909.15, Section 18). Annual Operating Instructions (AOI) will be used to direct annual implementation of this AMP. AOIs may include variations in direction from this AMP for short term situations including drought, seasonal climatic variations, wild fire, insect or disease outbreaks, changes in base ranch operations, results from the previous year monitoring, etc. Where these situations are short term in nature, they will be dealt with through the AOI only. If these situations warrant long term changes, the AMP will be modified as appropriate following analysis and documentation.

MAP

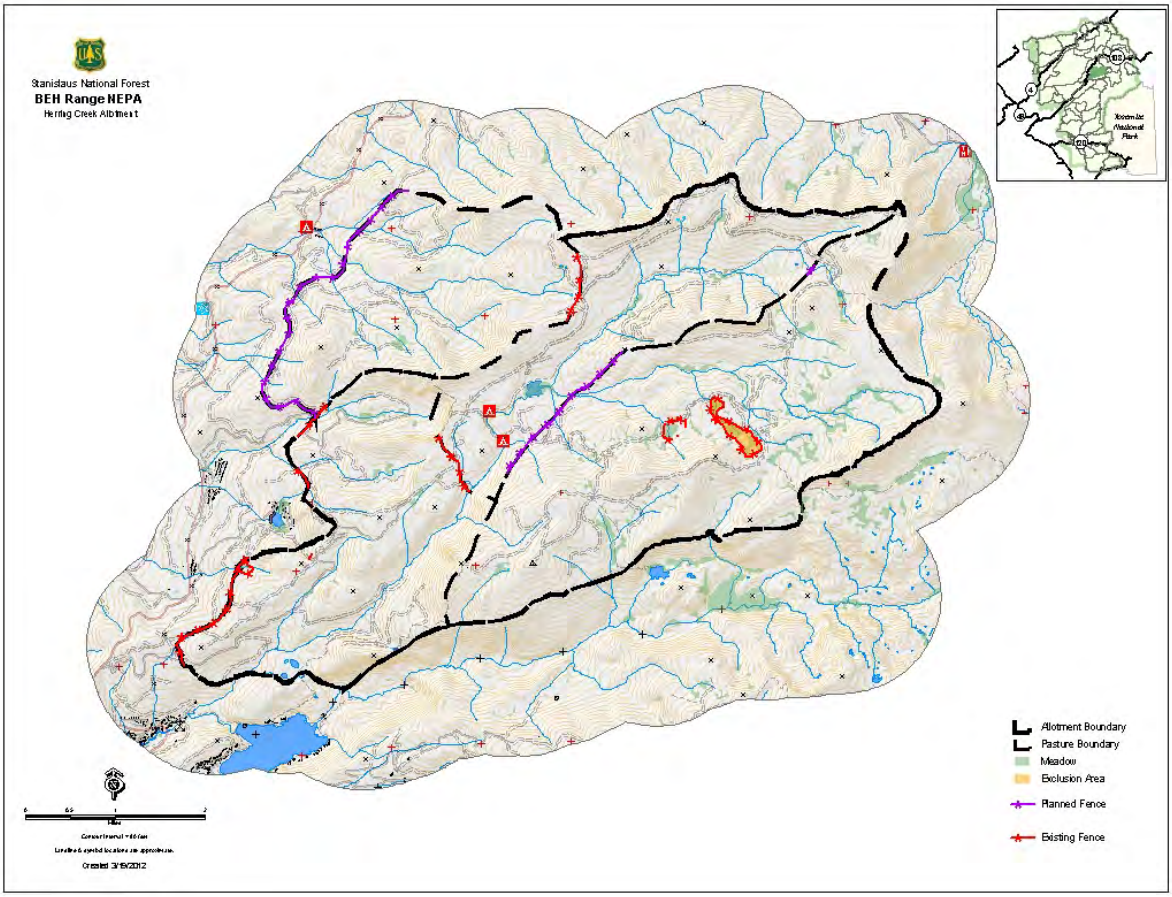

Figure J.01-1 Herring Creek Allotment Map

BEH Rangeland Allotments
Environmental Impact Statement

Stanislaus National Forest
19777 Greenley Road
Sonora, CA 95370

As the lead Federal agency in natural resource conservation, the USDA Forest Service provides leadership in the protection, management, and use of the Nation's forest, rangeland, and aquatic ecosystems. Our ecosystem approach to management integrates ecological, economic, and social factors to maintain and enhance the quality of the environment to meet current and future needs. Through implementation of land and resource management plans, the agency ensures sustainable ecosystems by restoring and maintaining species diversity and ecological productivity that helps provide recreation, water, timber, minerals, fish, wildlife, wilderness, and aesthetic values for current and future generations of people.

Caring for the Land and Serving People