3.9 Aquatic Biological Resources

3.9.1 Regulatory Background

Regulations that directly influence aquatic species and habitat management decisions within the analysis area are primarily implemented by the BLM, USFS, and state wildlife agencies, which consist of the WGFD, CPW (formerly CDOW), UDWR, and NDOW. The aquatic species and habitat regulations relevant to the proposed project are presented in **Table 3.9-1**. Regulations and statutes related to special status aquatic species are provided in Section 3.10, Special Status Aquatic Species.

Table 3.9-1 Relevant Regulations for Aquatic Species

Topic	Regulation
Aquatic Species Jurisdiction	• Wyoming Statutes 23-1-103; • Colorado Revised Statutes 33-1-101; • Utah Code 23-15-2; and • Nevada Administrative Code 503-020 and Nevada Revised Statutes 501.097.
Aquatic Species Protection	• Wyoming Game and Fish Commission, Chapter 52, Section 9; • Colorado Revised Statutes 33-1-101; • Utah Code 23-14-1, 23-14-18, and 23-14-19 and Rules R657-3, R657-13, and R657-16; and • Nevada Administrative Code 503 (503.270 through 503.430) – Fishing and Miscellaneous Protective Measures.
Prevent Invasive Species Infestation	• Wyoming Game and Fish Commission, Chapter 62 • Colorado Revised Statutes 33-1-101, 33-2-104; • Utah Code 23-27-301 and 23-27-401 and Rules R657-60; and • Nevada Administrative Code 503-030, 503-050, 503-075, 503-080.

The analysis for aquatic biological resources assumed the BLM and the USFS would continue to assist in managing aquatic habitats in coordination with the USFWS and applicable state wildlife agencies (i.e., WGFD, CPW, UDWR, and NDOW). State agencies would manage aquatic species. The USFWS would have jurisdiction over the management of ESA-listed aquatic species.

3.9.2 Data Sources

Information regarding aquatic species and their habitat within the analysis area was obtained from a review of existing published sources, BLM resource management plans, USFS forest management plans, BLM, USFS, WGFD, CPW, UDWR, NDOW, and USFWS file information, as well as WYNDD, CNHP, UNHP, and NNHP database information. In addition, information as a result of correspondence with agency fishery biologists was incorporated as appropriate.

3.9.3 Analysis Area

The analysis area for aquatic biological resources consists of all alternative routes, and includes a buffer of 1-mile (2-mile width centered on each alternative route); specifically including a one-mile downstream reach of all waterways crossed by any potential route. This analysis area considers all aquatic habitats and species that may be present, based on available literature and data reviewed for the project. For

context, project-related impacts are also discussed in terms of a larger project analysis area comprised of the fifth-level Watersheds (HUC10) crossed by the alternative routes' 250-foot-wide transmission line ROW.

3.9.4 Baseline Description

3.9.4.1 Aquatic Habitats

Aquatic habitat in the analysis area includes a mixture of streams, springs, wetlands, and lakes/reservoirs that support aquatic species. Refer to Section 3.5, Vegetation for a description of wetlands. Stream habitats consist of perennial, intermittent, and ephemeral waterbodies. Perennial streams contain water continuously during a normal or average year, while intermittent (sporadic or periodic flows) and ephemeral (short-lived or transitory flow) provide temporary habitat during the year. Due to the presence of water throughout the year, perennial waterbodies provide key habitat for fish and other aquatic communities. Perennial streams represent the predominant type of aquatic habitat located within the analysis area. The highest number of perennial streams is crossed by the 2-mile transmission line corridors in Colorado and Utah. Lakes/reservoirs and springs also are located in the analysis area, although there are considerably fewer when compared to perennial streams.

Aquatic habitats are managed by the agency that owns or has jurisdiction for the land (e.g., BLM, USFS, and USFWS refuges). On lands with federally listed species, their habitat and species management is under the jurisdiction of the USFWS. Aquatic habitat quality is included in waterbody classifications that are used by the state agencies. The analysis area in Wyoming, Colorado, and Utah contains high quality trout habitat.

3.9.4.2 Fish

Within the analysis area, fish species are managed by the state agencies (WGFD, CPW, UDWR, and NDOW), with coordination and cooperation with federal agencies (BLM, USFS, and USFWS). Collectively, the state and federal agencies develop and implement management plans and strategies for both game and nongame fish species and determine management practices that involve fishing regulations and habitat protection. Management direction and guidance are provided through the implementation of management plans, agreements, and their wildlife plans (e.g., Colorado's Comprehensive Wildlife Conservation Strategy and Wildlife Action Plans [CDOW 2006], Wildlife Action Plan [2006], Utah Comprehensive Wildlife Conservation Strategy [Sutter et al. 2005], and Wyoming State Wildlife Action Plan [2012]).

As a result of their recreational value, game fish species are an important focus in the management of aquatic species within the analysis area. Recreational game fish species within the analysis area consist of coldwater (trout), cool water (pike, walleye, and smallmouth bass), and warm water species (sunfish, largemouth bass, yellow perch, and catfish). The three fishery categories are based on temperature tolerances, with warm water species having the highest temperature tolerance. In total, 26 game fish species, subspecies or hybrids occur within the analysis area (**Table 3.9-2**). The majority of the game fish species are represented by trout, which are distributed throughout the analysis area. Two of the trout species, Bonneville cutthroat trout and Colorado River cutthroat trout, are special status species, which are discussed in Section 3.10, Special Status Aquatic Species. Five additional families (catfish, sunfish, temperate bass, pike, and perch) with game fish species are present within the analysis area. General spawning periods and habitat for the more common game fish species within the analysis area are provided in **Table 3.9-3**. The spawning periods are approximate and could occur in only a portion of a particular month, and also could vary based on different temperature regimes within the northern and southern portions of the analysis area. Game fish species are summarized by Project region in Section 3.9.5, Regional Summary.

Table 3.9-2 Game Fish Species and General Habitat

Common Name	Scientific Name	General Habitat
Trout and Salmon	Salmonidae	
Bonneville cutthroat trout	*Oncorhynchus clarki utah*	Streams
Brook trout	*Salvelinus fontinalis*	Streams, lakes/reservoirs
Brown trout	*Salmo trutta*	Streams, lakes/reservoirs
Colorado River cutthroat trout	*Oncorhynchus clarki pleuriticus*	Streams
Cutthroat trout	*Oncorhynchus clarkii*	Streams
Grayling	*Thymallus thymallus*	Lakes and streams
Mountain whitefish	*Prosopium williamsoni*	Streams
Rainbow trout	*Oncorhynchus mykiss*	Streams, lakes/reservoirs
Snake River cutthroat trout	*Oncorhynchus clarkii bouvieri (form of Yellowstone cutthroat trout)*	Streams
Sockeye (kokanee)[1] salmon	*Oncorhynchus nerka*	Lakes/reservoirs
Tiger trout (brown x brook hybrid)	*Salmo trutta* x *Salvelinus fontinalis*	Streams, lakes/reservoirs
Catfish	Ictaluridae	
Black bullhead	*Ameiurus melas*	Streams, lakes/reservoirs
Channel catfish	*Ictalurus punctatus*	Streams, lakes/reservoirs
Sunfish	Centrarchidae	
Black crappie	*Pomoxis nigromaculatus*	Streams
Bluegill	*Lepomis macrochirus*	Lakes/reservoirs
Green sunfish	*Lepomis cyanellus*	Lakes/reservoirs
Largemouth bass	*Micropterus salmoides*	Streams, lakes/reservoirs
Rock bass	*Ambloplites rupestris*	Lakes/reservoirs
Smallmouth bass	*Micropterus dolomieu*	Streams, lakes/reservoirs
Temperate Bass	Percichthyidae	
White bass	*Morone chrysops*	Lakes/reservoirs
Wiper (striped x white bass hybrid)	*Morone saxatilis* x *Morone chrysops*	Lakes/reservoirs
Pike	Esocidae	
Northern pike	*Esox lucius*	Streams
Perch	Percidae	
Walleye	*Sander vitreus*	Streams, lakes/reservoirs
Yellow perch	*Perca flavescens*	Streams, lakes/reservoirs

[1] Kokanee is the name given to sockeye salmon that live in lake habitats.

Source: Unpublished occurrence data from WGFD (2011), CPW (2012-2011), UDWR (2013-2011), and NDOW (2011).

Table 3.9-3 Game Fish Spawning Periods and Habitat

Species or Group	Months												Spawning Habitat
	J	F	M	A	M	J	J	A	S	O	N	D	
Brook trout													Stream spawners that use gravel substrates and spring upwelling areas.
Brown trout													Stream spawners that use tributary streams with gravel substrates in riffle-run areas.
Cutthroat trout													Stream spawners that use tributary streams with gravel substrates in riffle areas.
Grayling													Stream spawners that use riffle areas with sand and gravel substrates.
Lake trout													Lake spawners that use areas with boulder, cobble, and gravel substrates.
Rainbow trout													Stream spawners that use gravel substrates at head of riffle or downstream portion of pool.
Walleye													Spawn in lakes and streams in shallow water over rock substrates.
Black bullhead													Usually spawn in weedy or muddy shallow areas by building nests.
Channel catfish													Prefers areas with structure such as rock ledges, undercut banks, logs, or other structure where it builds nests.
Largemouth bass													Shallow areas over clean gravel and sand bottoms.
Smallmouth bass													Builds nests in shallow areas over boulder, cobble, or gravel substrates.
Sunfishes													Nest builders in diverse substrates and shallow depths.
Temperate bass													Egg masses deposited over sand bars, submerged vegetation, or other instream debris.

Sources: Baxter and Simon 1970; Beauchamp 1990; Eddy and Underhill 1974; Hickman and Raleigh 1982; Raleigh et al. 1984; Raleigh et al. 1986; Raleigh 1982; and Sigler and Sigler 1996.

Waterbodies within the analysis area also support nongame fish species represented by suckers, minnows, and sculpins. Most of the sucker species occur in stream or river habitats and include species such as flannelmouth, bluehead, longnose, mountain, white, desert, and Meadow Valley Wash desert sucker. Minnow species known to occur in analysis area waterbodies include bigmouth shiner, brassy minnow, carp, creek chub, emerald shiner, fathead minnow, least chub, longnose dace, Meadow Valley

Wash speckled dace, redside shiner, roundtail chub, southern leatherside chub, speckled dace, Utah chub, and Virgin spinedace. Darter species include Iowa and Johnny. As a group, minnow species occupy all types of habitats within the analysis area. Numerous sucker and minnow species are considered special status species, which are discussed in Section 3.10, Special Status Aquatic Species.

Aquatic invasive species and whirling disease are issues within streams and lakes/reservoirs in all four states. Numerous streams have tested positive for whirling disease in Wyoming, Colorado, and Utah, some of which are located within the analysis area. Aquatic invasive species of concern in the four states include zebra and quagga mussels, New Zealand mudsnail, and rusty crayfish. Management plans (e.g., UDWR 2009; WGFD 2010) or regulations (see **Table 3.9-1**) are being used by federal and state agencies to prevent the spread of these aquatic invasive species.

USFS Management Indicator Species

Management Indicator Species (MIS) are selected because their status is believed to: 1) be indicative of the status of a larger group of species; 2) be reflective of the status of a key habitat type; or 3) act as an early warning of an anticipated stressor to ecological integrity. The key characteristics of a MIS are that its status and trend provide insights to the integrity of the larger ecological system to which it belongs. Aquatic species that have been selected as MIS for the NFS lands crossed by the project are presented in **Table 3.9-4**. Two MIS (Bonneville cutthroat trout and Colorado River cutthroat trout) are also categorized as Forest Sensitive (FS) species and are presented in Section 3.10, Special Status Aquatic Species. Specific MIS occurrence in waterbodies crossed by the 250-foot-wide transmission line ROW is discussed in the Region II and III impact sections.

Table 3.9-4 USFS Management Indicator Aquatic Species for National Forests Crossed by the Project[1]

Species	Ashley National Forest Region II	Dixie National Forest Region III	Fishlake National Forest Region II	Manti-LaSal National Forest Region II	Uintah National Forest Region II
Fish					
Bonneville cutthroat trout				FS[1] and MIS	FS[1] and MIS
Brown trout			MIS		
Colorado River cutthroat trout				FS[1] and MIS	FS[1] and MIS
Cutthroat trout			MIS	MIS	
Rainbow trout			MIS	MIS	
Southern leatherside chub			FS[1]		FS[1]
Virgin spinedace		MIS	FS[1]		
Aquatic macroinvertebrates	MIS		MIS	MIS	

[1]FS – Species also is classified as Forest Sensitive status and is addressed in Section 3.10, Special Status Aquatic Species.

3.9.4.3 Invertebrates

The characterization of invertebrate communities for this EIS is based on general information rather than specific survey results for waterbodies in the analysis area. The basis for this approach is that species composition and abundance information is not required for the impact analysis of invertebrate

communities. The exception would be the potential occurrence of special status invertebrate species, which are discussed in Section 3.10, Special Status Aquatic Species.

Invertebrate communities that occur in waterbodies located within the 2-mile transmission line corridors include a mixture of worms, immature and adult insect groups, crustaceans, snails, and numerous other groups. The composition and abundance of the invertebrate community can vary depending on the type of habitat (perennial stream, intermittent or ephemeral stream, wetland, pond, lake, or spring) and the physical characteristics of the waterbody such as flow, substrate, presence of submerged vegetation, depth, extent of riparian vegetation, elevation, gradient, and other factors. Invertebrate communities are present throughout the year in all perennial waterbodies within the analysis area. In contrast, invertebrate occurrence in intermittent or ephemeral waterbodies would be limited to the period when water is present.

Invertebrates serve important roles in the aquatic environment through their food web dynamics. They represent food sources for fish and also are used as indicators of water quality conditions (Barbour et al. 1999; Wallace and Webster 1996).

As a group, macroinvertebrates are considered USFS MIS in the Ashley and Manti-LaSal National Forests. The definition for MIS is provided in Section 3.9.4.2, Fish. This group of MIS is discussed in the Region II impact section.

3.9.4.4 Amphibians

Waterbodies located within the analysis area also provide habitat for amphibians (salamanders, toads, and frogs) and aquatic reptiles (turtles). Many of the toad species such as plains spadefoot toad, Great Basin spadefoot toad, and salamanders occur in terrestrial habitats throughout most of the year, but move to aquatic habitats for breeding in the spring or early summer. The types of habitats used for breeding include perennial streams, reservoirs, ponds, wetlands, or seasonal flooded areas. Salamander and toad species overwinter in burrows and other moist areas in terrestrial habitat. Most frog species are associated with permanent wet areas including streams, ponds, and wetlands (Cerovski et al. 2004; Hammerson 1999). Breeding typically occurs in the spring or early summer for frogs and aquatic reptiles. Most frog species overwinter in the bottom substrate of their occupied aquatic habitats. The potential occurrence for special status amphibian species such as Arizona toad, boreal toad, Columbia spotted frog, and northern leopard frog are discussed in Section 3.10, Special Status Aquatic Species.

3.9.5 Regional Summary of Aquatic Biological Resources

A summary of game fish occurrence by project region is provided in **Table 3.9-5**. The highest number of game fish species occurs in Regions I and II. Invertebrate and amphibian species are present in all four regions. A list of basins and watersheds that are located within the four regions is provided in **Table 3.4-2** in Water Resources. A summary of special status aquatic species is discussed in Section 3.10.5.

Table 3.9-5 Game Fish Species Occurrence by Project Analysis Area and Region

Fish Species	Region			
	I	II	III	IV
Trout and Salmon				
Bonneville cutthroat trout		X		
Brook trout	X	X		
Brown trout	X	X		
Colorado River cutthroat trout	X	X		
Cutthroat trout		X		

Table 3.9-5 Game Fish Species Occurrence by Project Analysis Area and Region

Fish Species	Region			
	I	II	III	IV
Mountain whitefish		X		
Rainbow trout	X	X	X	
Snake River cutthroat trout	X			
Sockeye (Kokanee) salmon	X	X		
Tiger trout (brown x brook hybrid)		X		
Catfishes				
Black bullhead	X	X		
Channel catfish	X	X		
Sunfishes				
Black crappie	X	X		
Bluegill	X	X		
Green sunfish	X	X	X	
Largemouth bass		X		X
Rock bass	X	X		
Smallmouth bass	X	X	X	X
Temperate Basses				
White bass	X	X	X	
Wiper (striped x white bass hybrid)			X	
Pike				
Northern pike	X	X		
Perches				
Walleye	X	X		
Yellow perch		X		

Sources: Unpublished occurrence data from WGFD (2011), CPW (2012-2011), UDWR (2013-2011), and NDOW (2011).

3.9.6 Impacts to Aquatic Biological Resources

Potential impacts to aquatic biological resources were identified based on feedback from federal and state agency biologists, public scoping, and literature related to surface disturbance effects on aquatic habitat and species. Potential effects from surface disturbance activities would include direct alteration of habitat or loss of individuals from equipment and vehicles. Habitat also could be affected by changes in water quality from increased sedimentation and potential fuel spills. The use of surface water for dust control and concrete foundations also was evaluated in terms of effects on aquatic habitat.

The methodology for evaluating impacts on aquatic biological resources involved comparisons of project activities within the analysis area to habitat that supports aquatic species with an emphasis on game and native fish species. The impact analysis area for aquatic biological resources included perennial streams and springs that are crossed by the alternative 250-foot-wide transmission line ROWs and contain game and native fish species. A downstream reach of approximately 1 mile also was considered part of the analysis area. The analysis area for roads focused on perennial streams, lakes, reservoirs, and springs

with game and native fish that are crossed by each alternative's 2-mile transmission line corridor. The larger analysis area for access roads was required because their locations have not been defined at this time. GIS analyses were conducted to identify perennial waterbodies and game fish occurrence within the proposed disturbance areas (i.e., 250-foot-wide transmission line ROWs and 2-mile transmission line corridors, terminals, electrode bed siting areas).

Impact issues and the analysis considerations for aquatic biological resources are listed in **Table 3.9-6**. Identification of aquatic habitat potentially affected by project activities focused on waterbodies that support aquatic species on a persistent basis throughout the year (perennial streams and springs). Lakes and reservoirs were included in the analysis to address potential sedimentation effects. However, construction traffic and equipment would not cross lake and reservoir habitats.

Table 3.9-6 Relevant Analysis Considerations for Aquatic Biological Resources

Impact Issues	Analysis Considerations and Relevant Assumptions
Potential direct and indirect effects of construction activities and roads on habitat and aquatic species	The analysis includes direct and indirect disturbance effects and potential water quality changes from sediment delivery and fuel spills.
Potential for introduction of invasive or nuisance aquatic species from construction equipment	The analysis considers the potential introduction or transfer of nuisance aquatic species resulting from vehicles crossing multiple drainages, based on nuisance species occurrence information.
Potential for increased fishing pressure on streams from construction work crews and the public from the construction area and access roads	The analysis evaluates the potential for increased fishing pressure on game fisheries, based on the presence of workers near streams.
Potential direct and indirect effects of construction water use on aquatic habitat and species	The analysis uses the results of the water resources impact analysis, which determines if water sources are linked to surface flows of streams crossed by the alternative 250-foot-wide transmission line ROWs. Flow reductions could detrimentally affect habitat for aquatic species.
Potential mortalities to amphibians from vehicle traffic during seasonal movement periods	The analysis evaluates the potential impacts of vehicle traffic within the ROW and access roads on amphibians.

Impact parameters were used in combination with effects information for the purpose of quantifying impacts. The impact parameters also allow comparisons among alternatives or alternative variations. The following impact parameters were used in this analysis:

- Number of perennial streams with game or native fish species crossed by the 250-foot-wide transmission line ROW associated with each of the alternatives.
- Number of perennial streams with game or native fish species crossed by 2-mile transmission line corridor widths (access road analysis).
- Potential loss of aquatic habitat (feet^2) due to culverts or low water construction.
- Acres of riparian area disturbance from roads.

3.9.6.1 Impacts from Terminal Construction and Operation

The Northern and Southern terminals would be constructed regardless of alternative route or design option.

Northern Terminal

Construction of the Northern Terminal would not result in direct disturbance effects on aquatic habitat and species, since no perennial waterbodies are located within the proposed disturbance area. In addition, road access would not affect special status aquatic species because existing or new roads would not cross waterbodies inhabited by these species.

Water use for substation/converter station construction would require approximately 1.8 acre-feet for dust control and concrete. Water would be obtained from municipal sources, commercial sources, or a temporary water use agreement with landowners holding existing water rights. The effect determination of new and existing water depletions in Wyoming would be made by the Wyoming State Engineer after the water sources are identified and an evaluation of their potential connection to surface flows is completed. Water use for the terminals would not affect surface flows or reduce habitat for aquatic species.

Southern Terminal

Construction of the Southern Terminal would disturb previously developed upland areas in the Eldorado Valley watershed near Boulder, Nevada. Waterbodies located adjacent to the area include playa lakes. No perennial waterbodies are located in this area. No special status species habitat is located within the playa lakes. Surface disturbance and use of access roads would not affect aquatic species, since habitat is not located within the proposed disturbance area for the Southern Terminal.

Water required for dust control and concrete during construction of the Southern Terminal is estimated to be 1.2 acre-feet. The source of the water would be existing rights. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed. The evaluation would determine if water use could affect surface water quantity or habitat used by aquatic species.

Design Option 2 – DC from Wyoming to IPP; AC from IPP to Marketplace Hub

Impacts to aquatic biological resources would be the same as discussed in Section 3.9.6.1, Impacts from Terminal Construction and Operation, and Section 3.9.6.2, Impacts Common to All Alternative Routes and Associated Components. No additional impacts would occur at the southern terminal or ground electrode site near IPP.

Design Option 3 – Phased Build Out

Impacts to aquatic biological resources would be the same as discussed in Section 3.9.6.1, Impacts from Terminal Construction and Operation, and Section 3.9.6.2, Impacts Common to All Alternative Routes and Associated Components. The only difference resulting from this option is that impacts would occur at later time frames due to the phased build out schedule.

3.9.6.2 Impacts Common to All Alternative Routes and Associated Components

Potential direct and indirect effects of Project construction, operation, and decommissioning on aquatic habitat and species are discussed below for each of the resource issues listed in **Table 3.9-6**. After impacts are identified, relevant agency BMPs and design features are discussed in terms of reducing impacts. If impacts of concern remain after application of BMPs and design features, additional mitigation is recommended to further reduce impact levels.

Construction Impacts

Direct Disturbance Effects on Habitat and Species

Equipment and vehicle traffic within the ROW and access roads could cross small and moderate-size streams (generally less than 100 feet in wetted width) or springs. The number of game fish streams crossed by the 250-foot-wide transmission line ROWs and 2-mile transmission line corridors are provided in the region sections.

Two types of crossings would be used for flowing streams: fords and culverts. The estimated disturbance per crossing for these two methods include 1,250 feet^2 (25-foot width X 50-foot length) for the ford technique, and 7,500 feet^2 (50-foot width X 150-foot length) for culverts. Flow would be maintained during construction involving stream crossings. If needed, culverts would be installed under the direction of a qualified engineer in coordination with hydrologists and aquatic biologists from the BLM, USFS, and state agencies. Compliance with necessary permits also would be required. For streams that contain fish, culverts would be designed to maintain or improve passage by aquatic species. Vehicle crossings would result in mortalities to macroinvertebrates and possibly early life stages of fish. Juvenile and adult fish would likely move from the disturbed area. Stream crossings also would alter bottom substrates. Habitat alteration could affect various activities or values for fish such as cover, feeding, or life stage functions for spawning or early life stage development. The disturbed area including bottom substrates would be restored to pre-construction conditions after construction is completed.

Construction at stream crossings also would remove riparian vegetation. Vegetative cover along streambanks provides cover for fish, shading, bank stability, and increased food and nutrient supply as a result of deposition of insect and vegetative matter into the watercourse. Riparian vegetation also contributes woody material to streams that are used for fish cover and can be part of forming habitat features such as pools. Disturbance to the streambank areas at stream crossings would represent a relatively small width (portion of 250-foot-wide transmission line ROW on each streambank). Given the relatively small width of the disturbance area associated with an individual stream crossing, impacts would be considered low in relation to the entire stream system. Potential ground disturbance effects to riparian habitat are provided in the region sections.

BMPs that would reduce impacts to aquatic habitat include the following: ECO-2 (develop a habitat restoration plan), ECO-3 (minimize stream crossings by roads), and WAT-11 (avoid alteration of existing drainages). Design features would be applied that would comply with federal, state, and local regulations, minimize disturbance to drainage channels, vegetation, and stream banks, and restore the disturbed area to equal or better conditions (TWE-8). This design feature also would restrict structures from being sited within 200 feet from streams. Design feature TWE-12 would avoid structures being placed near riparian areas. Examples of state regulations include the Stream Alteration Permit that would be required by the Utah Division of Water Rights in Regions II and III for each stream crossing. This permit would require that construction activities have minimal impacts both individually and cumulatively on the aquatic environment. In conclusion, when considering the relatively small disturbance area at stream crossings and the use of BMPs and design features, stream crossing construction would alter and permanently remove a relatively small amount of stream habitat. Construction could alter flow conditions and game fish spawning habitat depending on the timing of construction. Two additional mitigation measures are recommended for culvert construction if proposed for road crossing of streams.

AB-1 *(Fish Passage): When avoidance of perennial streams with fish populations is not feasible and a culvert is required during construction, flow would be maintained in a portion of the stream to allow unrestricted fish passage. Any plan for dewatering the stream at the culvert site must be approved by the appropriate federal and state agencies. Culvert size and type would be selected to facilitate the continued and long-term connectivity and movement of target aquatic species. If the culvert is proposed to be in place during project operation, approval must be obtained from the federal or state agency management authority. An alternative crossing method may be required.*

Effectiveness: This measure would be highly effective in maintaining fish movement through the construction area.

AB-2 *(Avoid Game Fish Spawning Periods): If spawning areas for game fish species are known to occur at streams proposed for vehicle crossing or culvert construction, instream disturbance would be scheduled to avoid the spawning period. The exact dates for avoidance would be determined through discussions with WGFD, CPW, or UDWR. All disturbed areas would be restored to pre-construction conditions prior to the next spawning season.*

Effectiveness: This measure would be highly effective in avoiding impacts on game fish spawning.

Through the implementation of BMPs, design measures, and additional mitigation measures, stream crossing construction would not permanently remove habitat and detrimentally affect fish population numbers. There could be temporary reductions in macroinvertebrate numbers at stream crossings; however, their composition and numbers would recover during subsequent colonization of the construction area by invertebrates. The installation of culverts would result in a permanent loss of aquatic habitat.

Water Quality Effects on Habitat and Species

Vehicle and equipment disturbance within or near waterbodies also would cause sedimentation. Road density estimates are provided as an indication of sediment effects by watershed in the region sections. Sediment entering the water column would be redeposited in areas downstream of the disturbed area. The extent of the sedimentation effect would depend on the flow conditions, substrate composition, stream configuration, and types of aquatic communities located within the affected areas. The indirect effects of sedimentation could range from potential detrimental effects on species behavior, physiological functions, or spawning (Waters 1995). In general, salmonid (trout) species are more sensitive to increased turbidity compared to many of the warmwater fish species. Sediment deposition in substrates used for spawning could detrimentally affect successful egg development. The impact level would be determined by fish species presence, the timing of the construction in relation to spawning periods, and the closest spawning areas to the disturbance area. The duration of sediment impacts could last for several months to approximately one year depending on the timing of construction in relation to spring flows and other precipitation events that would flush sediments. The recovery period for biological communities could range from several months for macroinvertebrates to one year for fish (Waters 1995). The recovery period could be less if sediment levels were at relatively low concentrations. BMPs that would reduce sedimentation impacts to aquatic habitat include WAT-9 (implement erosion control measures). Design feature TWE-13 would be applied to control erosion input to streams.

Vehicle and equipment use within or near waterbodies also would pose a risk to aquatic biota from fuel or lubricant spills. If fuel reached a waterbody, aquatic species could be exposed to toxic conditions. Spills also would result in chemical residues within or on substrate in waterbodies. Impacts could include direct mortalities or reduced health of aquatic organisms. The magnitude of impacts would depend on the volume of spilled fuel, flow conditions, channel configuration, and presence of aquatic species. Impacts from fuel spills would be avoided or minimized by design feature TWE-24 that restricts refueling within 100 feet of wetlands and streams. TWE-24 also would implement spill prevention and containment measures in the event that a spill occurred during construction. In conclusion, the use of design features would reduce potential detrimental water quality changes involving increased sediment and fuel spills to a level that would not affect aquatic habitat or fish population viability on a long-term basis.

Through the implementation of BMPs and design features related to erosion control and fuel spills, impacts to water quality and aquatic habitat and species would be minor or low magnitude. Impacts on aquatic habitat and species would be temporary and at a level that would not detrimentally affect fish and other aquatic species populations.

Invasive Species

Stream crossings by vehicles and equipment pose a risk of transferring invasive aquatic species between drainages during construction. Aquatic invasive species of concern in the four states include whirling disease, zebra and quagga mussels, New Zealand mudsnail, and rusty crayfish. Various life stages of these invasive species could attach to vehicles or equipment and be introduced to a waterbody during the waterbody crossings associated with construction and maintenance activities. Management plans (e.g., UDWR 2009; WGFD 2010) or regulations (see **Table 3.9-1**) are being used by federal and state agencies to prevent the spread of these aquatic invasive species. No BMPs or design features have been defined to require equipment or vehicle washings prior to crossing waterbodies. As a result of the potential risk of introducing or spreading invasive aquatic species, the following mitigation measure is recommended.

AB-3 *(Invasive Aquatic Species Protection): It is assumed that any waterbody could contain aquatic invasive species and invasive weed species. If work occurs in or near a waterbody, all equipment would be decontaminated. Decontamination would occur before arrival at a project site to avoid the transfer of aquatic invasive species from a previous work site in or near water. Decontamination would consist of either of these actions: 1) Drain all water from equipment and compartments; clean equipment of all mud, plants, debris, and aquatic organisms; and dry equipment for specified time by season (5 days in June through August, 18 days in March through May, and 3 days in December through February when temperatures are at or below freezing); or 2) Use a high pressure (2,500 psi) hot water (140°F) pressure washer to thoroughly clean equipment and flush all compartments that may hold water. A field monitor would be present to ensure that the cleaning was completed prior to vehicle and equipment moving to other streams and drainages.*

Effectiveness: This measure would be highly effective in avoiding the transfer of invasive aquatic species due to the cleaning technique.

By implementing mitigation measure **AB-3**, the introduction or transfer of invasive aquatic species would not occur.

Water Use Effects on Habitat and Species

The estimated water use required per mile of transmission line construction is approximately 3,400 gallons for foundation concrete and 240,000 gallons for dust control. Water would be obtained from municipal sources, commercial sources, or a temporary water use agreement with landowners or irrigation companies holding existing water rights. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed.

Existing water rights would be used for concrete production and dust control during construction of project transmission line and associated facilities. The determination of potential depletions would be made after specific water sources are identified. The evaluation would determine if water use could affect surface water quantity or habitat used by aquatic species.

Additional Fishing Pressure on Game Fish Streams / Fish Regulations

Fishing pressure on streams with game fish species could increase as a result of construction crews. The increased fishing pressure could result in higher numbers of fish harvested in some of the streams near the Project. However, the work crews would have limited time off; therefore, the anticipated impact level is considered to be low. Two design features also would contribute to low level impacts from potential fishing pressure. TWE-2 states that the applicant and its contractors would comply with applicable environmental laws and regulations including fishing regulations on harvest limits and purchase of state fishing licenses. TWE-4 requires that all personnel would be instructed on the protection of ecological resources including

fish species. In conclusion, impacts from potential increased fishing pressure would not violate fishing regulations and affect game fish populations.

By following design features for the Project, impacts from potential increased fishing pressure would not violate fishing regulations and affect game fish populations.

Vehicle Effects on Amphibians

Construction traffic within the ROW could result in amphibian mortalities during spring and summer breeding migrations to and from flooded areas, wetlands, streams, ponds, or lakes. Vehicle crossings of streams could cause frog mortalities, since they use these habitats throughout the year. Vehicle traffic also could result in toad mortalities in upland terrestrial habitat. This potential reduction in amphibian numbers is expected to be relatively low due to low traffic levels. Vehicle activity also could cause increased sediment on a temporary basis in stream disturbance areas. BLM stipulations would provide protection to aquatic habitat and buffer distances around perennial streams and wetlands. The buffer distance varies from 100 to 500 feet depending on the BLM field office. Some field offices require complete avoidance of the 100-year floodplain. To provide consistency in the protection of wetland habitat, additional mitigation is proposed in Section 3.5, Vegetation. Mitigation measures WET-2 and WET-4 would require no disturbance within 500 feet of wetlands.

Operation Impacts

The direct and indirect effects of operation of the Project would involve use of access roads and the ROW for repair and maintenance activities and vegetation management. Impacts associated with operation activities would involve several of the same types of effects discussed for construction activities.

Direct Disturbance to Habitat and Species

Direct disturbance to stream habitat would occur due to vehicle traffic during the annual transmission line inspection and vegetation clearing. In most situations, vehicles would use existing access roads. However, movement along the ROW may require crossings of small streams where access roads do not exist. It is assumed that fewer stream crossings may be required because the access road system would have been constructed. Project design would limit stream crossings if feasible. Some of the roads that cross streams would have culverts to protect the waterbody from future vehicle disturbance. The types of direct impacts would be the same as discussed for construction. Some riparian vegetation may be trimmed to maintain the buffer zones from wires. However, the applicant would retain as much riparian vegetation as possible at stream crossings. BLM stipulations would protect riparian areas on public lands by restricting surface distance in these areas. The buffer distance varies from 100 to 500 feet. However, riparian stipulations do not exist for the entire project area. The reduction of riparian vegetation at stream crossings would result in the same types of impacts on aquatic habitat, as discussed for construction.

The BMPs, design features, and additional mitigation measures (**AB-1** and **AB-2**) also would be applied to vehicle movements and vegetation maintenance during operation. Operation activities would not permanently remove habitat and affect fish population numbers. Temporary reductions in macroinvertebrate numbers could occur at stream crossings, but this community would recover as they recolonize aquatic areas.

Water Quality Effects on Habitat and Species

Vehicle traffic within the ROW and access roads near streams could result in increased sediment and fuel spill risks. The effects of these water quality changes on aquatic habitat and species would be the same as discussed for construction. The same BMPs and design features would be applied to minimize these types of impacts on aquatic biological resources. Herbicides may be used to control vegetation as part of maintenance activities in the ROW. VEG-3 requires that herbicide use should be limited to non-persistent, immobile formulations to avoid effects on aquatic habitats. Design features involving erosion control and

spill response and containment also would be implemented. In addition to the BMPs, the following mitigation measure is recommended to avoid potential herbicide effects on biological resources.

AB-4 *(Herbicide Use Plan): As part of vegetation management, the applicant would prepare an Herbicide Use Plan. The Plan would identify a list of approved herbicides that may be used as well as locations of areas that may be treated. Licensed herbicide applicators would be used in the treatment process. All herbicides would be used in accordance with label instructions for the chemical. The Plan also would discuss compliance with applicable federal, state, and local agencies.*

Effectiveness: This measure would be highly effective in avoiding toxic effects of herbicide use on special status aquatic species.

By implementing BMPs and design features related to erosion control and fuel spills, impacts to water quality and aquatic habitat and species would be minor or low magnitude. Mitigation measure **AB-4** would avoid effects of herbicides on water quality and aquatic species and their habitat. Impacts on aquatic habitat and species would be temporary and at a level that would not detrimentally affect fish and other aquatic species populations.

Invasive Species

Stream crossings by vehicles and equipment pose a risk of transferring invasive aquatic species between drainages during operation and maintenance activities. Impacts would be similar to construction activities except that fewer stream crossings may be required, since the road access system would be established during construction. Mitigation measure **AB-3** also would be applied to operation and maintenance activities. By implementing mitigation measure **AB-3**, the introduction or transfer of invasive aquatic species would not occur.

Decommissioning Impacts

Removal of project structures during decommissioning would result in the same types of impacts discussed for construction activities. Direct disturbance to aquatic habitat would occur as a result of vehicle traffic across streams. The Applicant would be responsible for reclamation of access roads following abandonment in accordance with landowner's or land agency's direction. Water quality changes involving increased sediment and fuel spill risks would occur as a result of vehicle traffic within or near waterbodies. The potential spread of invasive aquatic species also could result from vehicle crossings and movement between drainages. The same BMPs and design features would be applied to reduce impacts during decommissioning activities. Removal of riparian vegetation would not be required as part of decommissioning.

3.9.6.3 Region I

Table 3.9-7 provides a comparison of impacts associated with the alternative routes in Region I. BMPs, design features, and mitigation measures would be implemented to reduce impacts to aquatic biological resources in the potentially affected waterbodies. Game fish occurrences for Region I's 2-mile transmission line corridors are provided in **Appendix G**, **Table G-4** for streams and **Table G-5** for waterbodies (i.e., reservoirs, lakes, and springs).

A road density analysis was used as an indicator of potential sediment effects on perennial streams. The methodology for this analysis is provided in Section 3.4, Water Resources. The results of the road density analysis for Region I alternatives is provided in **Table 3.4-7**.

Table 3.9-7 Summary of Region I Alternative Route Impact Parameters for Aquatic Biological Resources

Parameter	Alternative I-A	Alternative I-B	Alternative I-C	Alternative I-D
Number of Named Perennial Streams[1] Crossed by 250-foot-wide transmission line ROW	2	2	18	2
Number of Game Fish Streams Crossed by 250-foot-wide ROW	2	2	8	2
Number of Game Fish Stream 250-foot-wide ROW Crossings	2	2	16	2
Potential Aquatic Habitat Alteration or Loss[2] (feet^2)	0	0	3,600	0
Potential Aquatic Habitat Alteration or Loss (acres)	0	0	0.08	0
Percent of Potentially Affected Habitat Compared to Perennial Habitat in Watersheds	0	0	<0.1	0
Number of Reservoirs/Lakes Located within the 2-mile Wide Transmission Line Corridor	7	4	3	5
Number of Springs Located within the 2-mile Wide Transmission Line Corridor	0	1	1	2

[1] Additional unnamed perennial streams may be crossed by the 250-foot-wide transmission line ROWs.

[2] Habitat loss represents area that could be permanently or temporarily removed due to the use of a culvert or low water crossing or temporarily disturbed from the instream use of equipment. The calculation excludes large rivers such as the Little Snake and Yampa.

Potential ground disturbance effects associated with the construction and operation of Region I alternative ROWs on riparian habitat at 100 and 300-foot buffer distances from streams and lakes, reservoirs, and springs are listed in **Table 3.9-8**. The highest level of potential disturbance is indicated for Alternative I-C. By following stipulations for BLM FOs involving no disturbance or a buffer protection of 300 to 500 feet depending on the BLM FO (see **Appendix C**), impacts on riparian vegetation would be avoided.

Table 3.9-8 Ground Disturbance (Acres) for Buffer Distances from Riparian Habitat, Region I

	Alternatives							
	I-A		I-B		I-C		I-D	
	100 feet	300 feet	100 feet	300 feet	100 feet	300 feet	100 feet	300 feet
Streams								
Construction	4	7	3	6	22	59	3	6
Operation	1	2	1	2	6	16	1	2
Reservoirs/Lakes/Springs								
Construction	1	2	<1	1	4	14	2	4
Operation	<1	1	<1	<1	1	3	<1	1

Alternative I-A (Applicant Proposed)

Key Parameters Summary

Alternative I-A would cross two named perennial streams (Little Snake and Yampa rivers), which contain two warmwater game fisheries. There would be no habitat loss or alteration since vehicle crossings or culverts would not occur for larger rivers. Seven reservoirs/lakes are located within Alternative I-A's 2-mile transmission line corridor. BMPs, design features, and mitigation measures involving herbicide use, erosion control, and refueling restrictions near streams would be implemented to minimize water quality effects on aquatic habitat at the perennial streams located within the construction ROW. Water use for

concrete foundations and construction dust control would be 116 acre-feet. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed for Region I, Alternative I-A. After implementing the BMPs, design features, and additional mitigation measures, there would be no long-term effects on aquatic habitat and species.

Alternative I-B

Key Parameters Summary

Alternative I-B would cross the same two named perennial streams (Little Snake and Yampa rivers), as discussed for Alternative I-A. There would be no habitat loss because culverts or direct disturbance would not occur in the Little Snake and Yampa rivers. Four reservoirs/lakes and one spring are located within the Alternative I-B 2-mile transmission line corridor. BMPs, design features, and mitigation measures involving herbicide use, erosion control, and refueling restrictions near streams would be implemented to minimize water quality effects on aquatic habitat at the perennial streams located within the construction ROW. Water use for concrete foundations and construction dust control would be 119 acre-feet. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed for Region I, Alternative I-B. After implementing the BMPs, design features, and additional mitigation measures, there would be no long-term effects on aquatic habitat and species.

Alternative I-C

Key Parameters Summary

Alternative I-C would cross 18 named perennial streams. Eight of the perennial streams contain game fisheries: Muddy Creek (3 crossings), Elkhead Creek (2 crossings), Fortification Creek, Fourmile Creek, Little Bear Creek, Little Cottonwood Creek, Little Snake River, and Yampa River (6 crossings). Three reservoirs/lakes and one spring are located within the Alternative I-C 2-mile transmission line corridor. Potential habitat loss due to possible use of culverts, low water crossing, or temporary disturbance from instream use of equipment could be 3,600 feet^2 (0.08 acre). Large river crossings such as the Green, Little Snake, and Yampa were excluded from the habitat loss estimate because vehicle crossings or culverts would not occur as part of construction. Mitigation measures **AB-1** and **AB-2** would avoid effects on fish passage and game fish spawning. BMPs, design features, and mitigation measures involving herbicide use would be implemented to minimize water quality effects on aquatic habitat at all perennial stream crossings. There could be temporary reductions in macroinvertebrates at stream crossings. Water use for concrete foundations and construction dust control would be 139 acre-feet. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed for Region I, Alternative I-C. After implementing the BMPs, design features, and additional mitigation measures, there would be no long-term effects on aquatic habitat and species other than the small area associated with a culvert. Construction traffic could result in reductions in amphibian numbers if the schedule coincides with amphibian movements.

Alternative I-D (Agency Preferred)

Key Parameters Summary

Alternative I-D would cross two named perennial streams (Little Snake and Yampa rivers), both of which contain game fish species. In addition, five reservoirs/lakes and two springs are located within the Alternative I-D 2-mile transmission line corridor. There would be no habitat loss because culverts or direct disturbance would not occur in the Little Snake and Yampa rivers. The same BMPs, design features, and mitigation measures involving herbicide use, erosion control, and refueling restrictions near streams would be implemented to minimize water quality effects on aquatic habitat at perennial streams located within the construction ROW. Water use for concrete foundations and construction dust control would be 128 acre-feet. The effect determination of new and existing water depletions would be made after the

water sources are identified and an evaluation of their potential connection to surface flows is completed for Region I, Alternative I-D. After implementing the BMPs, design features, and additional mitigation measures, there would be no long-term effects on aquatic habitat and species.

If the Tuttle Easement micro-siting options were implemented, no additional perennial waterbodies would be crossed or impacted by this portion of Alternative I-D.

Alternative Connectors in Region I

The Fivemile Point North, Mexican Flats, and Baggs alternative connectors would include minimal increases of total crossed waterbodies, disturbed areas, and water use if they were to be utilized. The Mexican Flats and Fivemile Point North alternative connectors would cross one impaired waterbody; Muddy Creek would be crossed on the same reach as Alternative I-C. The Baggs Alternative Connector would cross one large floodplain. **Table 3.9-9** summarizes impacts and advantages associated with the alternative connectors in Region I.

Table 3.9-9 Summary of Region I Alternative Connector Impacts for Aquatic Biological Resources

Alternative Connector	Analysis	Impact Conclusion
Fivemile Point North, Fivemile Point South, and Mexican Flats Alternative Connectors	One additional perennial stream (Muddy Creek) is located within the 2-mile transmission line corridor for the Fivemile Point North and Mexican Flats connectors, and could be impacted by vehicle traffic on access roads. No streams are crossed by the Fivemile Point South Alternative Connector.	The disadvantage of using these alternative connectors would be potential increased disturbance to Muddy Creek and aquatic species (invertebrates and possibly nongame fish).
Baggs Alternative Connector	Two additional perennial streams (Little Snake River and Muddy Creek) are located within the 2-mile transmission line corridor. Muddy Creek is located within the ROW and 2-mile wide transmission line corridor.	The disadvantage of using this alternative connector would be potential increased disturbance to habitat in two streams and aquatic species (invertebrates and game and nongame fish).

Alternative Ground Electrode Systems in Region I

The northern ground electrode system would be necessary within 100 miles of the northern terminal as discussed in Chapter 2.0. Although the location for this system has not been determined, conceptual locations and connections to the alternative routes have been provided by the proponent. The impacts associated with constructing and operating these alternative systems are related to predominance of intermittent streams within the boundaries for these areas. All of the electrode system alternatives contain intermittent streams and no perennial waterbodies. Potential impacts to intermittent streams would only affect aquatic species if water is present. Short-term impacts could affect macroinvertebrates in 2 to 68 intermittent streams (**Table 3.9-10**). Surface disturbance near Eight Mile Lake (Eight Mile Basin Alternative) would represent a risk for sedimentation on water quality. Erosion control measures would be implemented as part of construction to reduce sediment impact to the lake.

Table 3.9-10 Summary of Region I Alternative Ground Electrode System Impact Indicators

Electrode System	Perennial Crossings	Intermittent Crossings	Total Stream Crossings	Water Use (Acre-Ft)
Separation Flat (All Alterative Routes)	0	25	25	10
Shell Creek (Alternatives I-A and I-D)	0	68	68	25
Little Snake East (Alternatives I-A, I-B, and I-D)	0	16	16	7

Table 3.9-10 Summary of Region I Alternative Ground Electrode System Impact Indicators

Electrode System	Perennial Crossings	Intermittent Crossings	Total Stream Crossings	Water Use (Acre-Ft)
Little Snake West (Alternative I-A)	0	15	15	7
Shell Creek (Alternative I-B)	0	62	62	20
Pio Springs (Alternative I-D)	0	12	12	4
Eight Mile Basin (All Alternatives)	0	7	7	3
Separation Creek (All Alternatives)	0	2	2	10

Region I Conclusion

Based on a comparison of impact parameters for Region I alternatives, potential impacts to aquatic biological resources would be greatest for Alternative I-C. Potential effects for Alternatives I-A, I-B, and I-D (Agency Preferred) would be similar and relatively low compared to Alternative I-C (**Table 3.9-7**). Alternative I-C could result in the greatest alteration or loss of habitat (3,600 feet^2 or 0.08 acre) compared to no loss or alternation of habitat for the other three alternatives. Even though there are differences in potential habitat effects, less than 0.1 percent of available game fish species habitat would be affected for each of the four alternatives. Alternative I-C could result in the highest potential construction disturbance to riparian areas near perennial streams (22 acres at a 100-foot buffer distance and 59 acres at a 300-foot buffer distance) compared to the other three alternatives (3 to 4 acres at the 100-foot buffer distance and 6 to 7 acres at the 300-foot buffer distance) (**Table 3.9-8**). Even though the greatest level of impacts are associated with Alternative I-C, project effects on aquatic species and their habitat would be avoided or considered to be low magnitude and short-term in duration after applying BMPs, design features, and additional mitigation (Sections 3.9.6.2 and 3.9.6.3 and **Appendix C**). The only potential long-term impacts would be in streams where a culvert would displace stream bottom habitat. In comparison with available stream habitat, the relatively small long-term impacts of all alternatives are unlikely to impact the population viability of aquatic species inhabiting these streams.

3.9.6.4 Region II

Tables 3.9-11 and **3.9-12** provide a summary of impact parameters used to describe impacts for alternative routes in Region II. Game fish occurrences for Region II's 2-mile transmission line corridors are provided in **Appendix G**, **Table G-6** for streams and **Table G-7** for waterbodies.

The road density analysis for Region II alternatives is discussed in Section 3.4, Water Resources, with results provided in **Table 3.4-11**. These results would apply to perennial streams as aquatic habitat for game fish and other aquatic species.

Table 3.9-11 Summary of Region II Alternative Route Impact Parameters for Aquatic Biological Resources

Parameter	Alternative II-A	Alternative II-B	Alternative II-C	Alternative II-D	Alternative II-E	Alternative II-F
Number of Named Perennial Streams[1] Crossed by 250-foot-wide transmission line ROW	26	27	29	26	39	30
Number of Game Fish Streams Crossed by 250-foot-wide ROW	14	11	13	17	13	12
Number of Game Fish Stream 250-foot-wide ROW Crossings	14	16	13	18	21	18

Table 3.9-11 Summary of Region II Alternative Route Impact Parameters for Aquatic Biological Resources

Parameter	Alternative II-A	Alternative II-B	Alternative II-C	Alternative II-D	Alternative II-E	Alternative II-F
Potential Aquatic Habitat Alteration or Loss[2] (feet^2)	10,000	19,600	22,000	7,200	17,600	7,200
Potential Aquatic Habitat Alteration or Loss (acres)	0.23	0.45	0.51	0.17	0.40	0.17
Percent of Potentially Affected Habitat Compared to Perennial Habitat in Watersheds	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Number of Reservoirs/Lakes Located within the 2-mile Transmission Line Corridors	4	4	3	5	3	4
Number of Springs Located within the 2-mile Transmission Line Corridors	6	7	5	2	7	5

[1] Additional unnamed perennial streams may be crossed by the 250-foot-wide transmission line ROWs.

[2] Habitat loss represents area that could be permanently or temporarily removed due to the use of a culvert or low water crossing or temporarily disturbed from the instream use of equipment. The calculation excludes large rivers such as the Duchesne, Green, Price, Sevier, and White.

Table 3.9-12 Ground Disturbance (Acres) for Buffer Distances from Riparian Habitat, Region II

	Alternatives											
	II-A		II-B		II-C		II-D		II-E		II-F	
	100 feet	300 feet	100 feet	300 feet	100 feet	300 feet	100 feet	300 feet	100 feet	300 feet	100 feet	300 feet
Streams												
Construction	40	102	53	126	39	105	33	110	99	273	46	126
Operation	14	38	15	38	10	28	11	34	26	72	18	51
Reservoirs/Lakes/Springs												
Construction	7	19	3	8	7	15	1	2	8	21	1	6
Operation	2	5	1	3	2	4	<1	1	1	4	<1	2

Potential ground disturbance effects associated with the construction and operation of Region II alternative ROWs on riparian habitat at 100 and 300-foot buffer distances from streams and lakes, reservoirs, and springs are listed in **Table 3.9-12**. The highest level of potential riparian disturbance is indicated for Alternative II-E. By following stipulations for BLM FOs and USFS restrictions involving no disturbance or a buffer protection of 100 to 500 feet (see **Appendix C**), impacts on riparian vegetation would be avoided.

Alternative II-A (Applicant Proposed)

Key Parameters Summary

Alternative II-A would cross 26 named perennial streams. Fourteen of these streams contain game fish species: Bennie Creek, Currant Creek (3 crossings – one each in Duchesne, Juab, and Wasatch counties), Duchesne River, Green River, Hop, Lake Fork, Nebo Creek, Red Creek, Salt Creek (2 crossings), Soldier Creek (2 crossings), Strawberry River (2 crossings), Thistle Creek, Tie Fork, and

Willow Creek. The Strawberry River has been designated a Blue Ribbon Fishery. Potential habitat loss due to possible use of culverts, low water crossings, or temporary disturbance from instream use of equipment would be 10,000 ft^2 (0.23 acre). Large rivers such as the Green were excluded from the habitat loss estimate. Four reservoirs/lakes (Box Elder Reservoir, Box Elder Reservoir 2, and Box Elder 3 in Moffat County, Colorado; and Starvation Reservoir in Duchesne County, Utah) and six springs are located within the Alternative II-A 2-mile transmission line corridor. All four reservoirs contain game fish species. Mitigation measures **AB-1** and **AB-2** would avoid effects on fish passage and game fish spawning in the game fish streams. BMPs, design features, and mitigation measures involving herbicide use, erosion control, and refueling restrictions near streams would be implemented to minimize water quality effects on aquatic habitat at all 26 perennial stream crossings. There could be temporary reductions in macroinvertebrates in streams where vehicle crossings or culverts are required. Water use for concrete foundations and construction dust control would be 192 acre-feet. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed for Region II, Alternative II-A. After implementing the BMPs, design features, and additional mitigation measures, there would be no long-term effects on aquatic habitat and species other than the small area associated with a culvert.

The Strawberry IRA (segments 320.101 through 320.103) micro-siting options 1 through 3 would not substantially affect aquatic biological resources in comparison to segment 320.10. Similarly, the Cedar Knoll IRA (segments 320.151 and 320.152) micro-siting options 1 and 2 would not substantially affect aquatic biological resources in comparison to segment 320.15.

USFS MIS

In total, six perennial streams (Sheep, Soldier [2 crossings], Tie Fork, Willow, and Salt creeks and the Strawberry River) are located within the Alternative II-A 2-mile transmission line corridor in one National Forest (Uinta-Wasatch-Cache) (**Appendix G**, **Table G-13**). Four of these streams (Soldier, Tie Fork, and Willow creeks and the Strawberry River) contain MIS (Bonneville cutthroat trout and Colorado River cutthroat trout).Three of the streams are crossed by the 250-foot-wide transmission line ROW, which could result in a direct loss of aquatic habitat of 1,200 ft^2 (0.03 acre), if culverts or low water construction is required.

<u>Alternative II-B</u>

Key Parameters Summary

Alternative II-B would cross 27 named perennial streams. Eleven of these streams contain game fish species: Bitter Creek, Dry Pole Creek, Green River (2 crossings), Huntington Creek (2 crossings), Lowry River, North Fork Pleasant Creek, Pleasant Creek, Price River, San Pitch River, Sevier River (2 crossings), and the White River. Potential aquatic habitat loss would be 19,600 ft^2 (0.45 acre). Large rivers such as the Green Price, Sevier, and White were excluded from the habitat loss estimate. Mitigation measures **AB-1** and **AB-2** would avoid effects on fish passage and game fish spawning in the 11 game fish streams. Four reservoirs/lakes (Cactus Reservoir in Rio Blanco County, Colorado; Huntington Reservoir and Potters Pond in Emery County, Utah; and Dog Valley Reservoir in Juab County, Utah) and seven springs are located within the Alternative II-B 2-mile transmission line corridor. Except for Dog Valley Reservoir, these reservoirs or ponds contain game fish species. BMPs, design features, and mitigation measures involving herbicide use, erosion control, and refueling restrictions near streams would be implemented to minimize water quality effects on aquatic habitat at all 27 perennial stream crossings. There could be temporary reductions in macroinvertebrates in streams where vehicle crossings or culverts are required. Water use for concrete foundations and construction dust control would be 258 acre-feet. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed for Region II, Alternative II-B. After implementing the BMPs, design features, and additional mitigation measures, there

would be no long-term effects on aquatic habitat and species other than the small area associated with a culvert.

USFS MIS

In total, six perennial streams (Deer, Dry Pole, Indian, North Fork Coal, and Straight Fork creeks and the Lowry River), one spring, and one pond are located within the Alternative II-B 2-mile transmission line corridor in one National Forest (Manti-LaSal) (**Appendix G**, **Table G-13**). The MIS group, macroinvertebrates, occurs in all of these waterbodies. Two streams contain fish MIS (Bonneville cutthroat trout in Dry Pole Creek and Colorado River cutthroat trout in the Lowry River). Based on four 250-foot-wide transmission line ROW crossings of streams, there could be a direct loss of aquatic habitat of 1,600 ft^2 (0.04 acre), if culverts or low water construction is required.

The Strawberry IRA and Cedar Knolls IRA micro-siting adjustments would not substantially affect the impact analysis for aquatic biological resources.

Alternative II-C

Key Parameters Summary

Alternative II-C would cross 29 named perennial streams. Thirteen of these streams contain game fish species: Blackham Creek, Bitter Creek, Gooseberry Creek, Green River (2 crossings), Ivie Creek, Meadow Creek, Little Creek, Lost Creek, Niotche Creek, Sevier River (2 crossings), White River, Willow Creek, and Yogo Creek. Potential aquatic habitat loss would be 22,000 ft^2 (0.51 acre). Large rivers such as the Green and White were excluded from the habitat loss estimate. Three reservoirs/lakes (Cactus Reservoir in Rio Blanco County, Colorado; Saleratus Reservoir in Sevier County, Utah; and Scipio Lake in Millard County, Utah) and five springs are located within the Alternative II-C 2-mile transmission line corridor. Game fish are present in these three reservoirs/lakes. Mitigation measures **AB-1** and **AB-2** would avoid adverse effects on fish passage and game fish spawning in the game fish streams. BMPs, design features, and mitigation measures involving herbicide use, erosion control, and refueling restrictions near streams would be implemented to minimize water quality effects on aquatic habitat at all 29 perennial stream crossings. There could be temporary reductions in macroinvertebrates at streams with substrate disturbance. Water use for concrete foundations and construction dust control would be 272 acre-feet. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed for Region II, Alternative II-C. After implementing the BMPs, design features, and additional mitigation measures, there would be no long-term effects on aquatic habitat and species other than the small area of disturbance associated with a culvert.

The Strawberry IRA micro-siting adjustments would not substantially affect the impact analysis for aquatic biological resources.

USFS MIS

In total, six perennial streams (Ivie, Little, Meadow, Niotche, Phara, and Saleratus creeks), one reservoir, and four springs are located within the Alternative II-C 2-mile transmission line corridor in one national forest (Fishlake) (**Appendix G**, **Table G-13**). Four of these streams (Ivie, Little, Meadow, and Niotche creeks) contain MIS (brown, cutthroat, or rainbow trout). Two of the streams are crossed by the 250-foot-wide transmission line ROW, which could result in a direct loss of aquatic habitat of 800 ft^2, if culverts or low water construction is required.

Alternative II-D

Key Parameters Summary

Alternative II-D would cross 26 named perennial streams, with 17 streams containing game fish species. Each of these streams would be crossed once by the ROW: Argyle Creek, Gooseberry Creek, Cottonwood Creek (Emery County, Utah), Green River, Hop Creek, Huntington Creek, North Fork Gordon Creek, Minnie Maud Creek, Mud Creek, Oak Creek, Price River, Salt Creek, San Pitch River, Soldier Creek, Upper Huntington Creek, White River, and Willow Creek. Potential aquatic habitat loss would be 7,200 ft^2 (0.17 acre). Large rivers such as the Green and White were excluded from the habitat loss estimate. Five reservoirs/lakes and two springs are located within the Alternative II-D 2-mile transmission line corridor. The reservoir/lakes include Box Elder, Box Elder 2, and Box Elder 3 in Moffat County, Colorado; Boulger Reservoir in Sanpete County, Utah; and Electric Lake in Emery County, Utah. Game fish are present in all five of these reservoirs/lakes. Mitigation measures **AB-1** and **AB-2** would avoid adverse effects on fish passage and game fish spawning in the game fish streams. BMPs, design features, and mitigation measures involving herbicide use, erosion control, and refueling restrictions near streams would be implemented to minimize water quality effects on aquatic habitat at all 26 perennial stream crossings. There could be temporary reductions in macroinvertebrates at streams with substrate disturbance. Water use for concrete foundations and construction dust control would be 195 acre-feet. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed for Region II, Alternative II-D. After implementing the BMPs, design features, and additional mitigation measures, there would be no long-term effects on aquatic habitat and species other than the small area of disturbance associated with a culvert.

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Seven streams (Cottonwood, Dry, Gooseberry, Huntington, Maple Fork, Upper Huntington, and White Pine Fork) and two reservoirs (Boulger Reservoir and Electric Lake) in the Manti-LaSal NF occur within the Alternative II-D 2-mile transmission line corridor (**Appendix G**, **Table G-13**). All of these waterbodies contain the MIS group, macroinvertebrates. Two streams (Huntington and Cottonwood creeks) contain fish MIS, Bonneville cutthroat trout and Colorado River cutthroat trout, respectively. Six streams are crossed by the 250-foot-wide transmission line ROW, which could result in direct loss of aquatic habitat of 2,400 ft^2, if culverts or low water construction is required.

Alternative II-E

Key Parameters Summary

Alternative II-E would cross 39 named perennial streams, with 13 streams containing game fish species. Several of these streams would be crossed multiple times, with a total of 21 ROW crossings for this alternative. The number of ROW crossings by game fish stream would include Argyle Creek (3), Beaver Creek (1), Duchesne River (1), Green River (1), Hop Creek (1), Lake Fork Creek (1), Lake Fork River (1), Price River (2), Soldier Creek (5), Tabbyune Creek (1), Thistle Creek (1), Tie Fork Creek (1), and Willow Creek (2). Four additional streams (Bennie, Nebo, Tabbyune, and the White River) are located within the 2-mile transmission line corridor. Potential aquatic habitat loss would be 17,600 ft^2 (0.4 acre). Large rivers such as the Duchesne, Green, Price, and White were excluded from the habitat loss estimate. Three reservoirs/lakes (Box Elder Reservoir, Box Elder Reservoir 2, and Box Elder Reservoir 3 in Moffat County, Colorado) and seven springs are located within the Alternative II-E 2-mile transmission line corridor. Game fish occur in these three reservoirs. The same BMPs, design features, and mitigation measures discussed for other Region II alternatives would be applied to Alternative II-E. Water use for concrete foundations and construction dust control would be 199 acre-feet. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed for Region II, Alternative II-E. After implementing the BMPs, design features, and additional mitigation measures, there would be no long-term effects on aquatic habitat and species, other than the small area of disturbance associated with a culvert.

The Strawberry IRA and Cedar Knoll IRA micro-siting options would not substantially affect aquatic biological resources in comparison to the comparable segments of Alternative II-E.

USFS MIS

The Alternative II-E 2-mile transmission line corridor overlaps with waterbodies in the following national forests: Uinta-Wasatch-Cache (Indian, Sheep, and Tie Fork creeks), Manti-LaSal (Long Hollow, Lookout, and Sky High springs), and Ashley (Sowers Creek). MIS occurrence includes Bonneville cutthroat trout in Tie Fork Creek and macroinvertebrates in Sowers Creek. Potential direct loss of aquatic habitat includes 1,200 ft^2 (0.03 acre) in the Uinta-Wasatch-Cache National Forest and 400 ft^2 (0.01 acre) in the Ashley National Forest, if culverts or low water construction is required. No habitat loss would occur in the Manti-LaSal National Forest, since the 250-foot-wide transmission line ROW does not cross the three springs.

Alternative II-F (Agency Preferred)

Key Parameters Summary

A total of 30 named perennial streams are located within the Alternative II-F 2-mile transmission line corridor. Game fish species occur in 21 of the streams located within the 2-mile transmission line corridor. Three reservoirs and eight springs also are located within the 2-mile transmission line corridor. The reservoirs contain game fish species (Box Elder, Box Elder Number 2, and Box Elder Number 3). Twelve game fish streams are crossed by the 250-foot-wide transmission line ROW, with a total of 18 crossings when considering multiple stream crossings. The number of ROW crossings by stream would include Argyle Creek (2), Green River (1), Hop Creek (1), Lake Fork Creek (1), Sevier River (2), Soldier Creek (5), Tabbyune Creek (1), Thistle Creek (1), Tie Fork Creek (1), White River (1), White River Right Fork (1), and Willow Creek (1). Potential habitat loss due to the addition of a culvert or equipment disturbance during low water construction would be approximately 9,600 ft^2 (0.22 acre). Large rivers such the Green, Sevier, and White were excluded from this estimate. Three reservoirs (Box Elder, Box Elder #2, and Box Elder #3 in Moffat County, Colorado) and five springs are located within the 2-mile transmission line corridor. All three reservoirs contain game fish species. Mitigation measures **AB-1** and **AB-2** would avoid effects on fish passage and game fish spawning periods in the game fish streams. The same BMPs, design features, and mitigation measures discussed for the other alternatives would be implemented to minimize water quality effects on aquatic habitat and species. Water use for concrete foundations and construction dust control would be 199 acre-feet. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed. After implementing the BMPs, design features, and additional mitigation measures, there would be no long-term effects other than the small area of disturbance associated with a culvert.

The Strawberry IRA and Cedar Knoll IRA micro-siting options would not substantially affect aquatic biological resources in comparison to the comparable segments of Alternative II-F.

USFS MIS

The Alternative II-F transmission line corridor crosses five streams in the Uinta-Wasatch-Cache NF (Indian, Sheep, Tie Fork, Soldier, and Salt creeks) and three springs (Long Hollow, Lookout, and Sky High) in the Manti-LaSal National Forest (**Appendix G**, **Table G-13**). The MIS, Bonneville cutthroat trout, occurs in two streams: Tie Fork and Soldier creeks. Both streams are crossed by the 2-mile transmission line corridor, while Tie Fork Creek is also crossed by the 250-foot-wide transmission line ROW. Potential direct loss of habitat would be 400 ft^2 (0.01 acre), if a culvert or low water construction is required.

Alternative Variation in Region II

Emma Park Alternative Variation

Potential impacts of constructing the Emma Park Alternative Variation on aquatic biological resources would be similar to the comparable portion of Alternative II-F, based on the number of perennial streams located within the 2-mile transmission line corridors. In total, seven streams (Horse, Kyune, Kyune Right Fork, Tabbyune, Willow, and Bear creeks and White River Fork) are located within the 2-mile transmission line corridor compared to six streams (same as Emma Park Alternative Variation except for Horse Creek) for the comparable portion of Alternative II-F. Five of the streams contain game fish species (Kyune, Kyune Right Fork, Tabbyune, and Willow creeks and White River Right Fork) for both the Emma Park Alternative Variation and Alternative II-F comparable portion. There would be a slightly greater risk of sediment input to Kyune and Tabbyune creeks as a result of the 250-foot-wide transmission line ROW crossings by the Emma Park Alternative Variation. However, erosion control measures would be implemented to reduce sediment-related impacts for the Emma Park Alternative Variation and Alternative II-F.

Alternative Connectors in Region II

The Castle Dale and IPP East alternative connectors do not cross perennial streams. **Table 3.9-13** summarizes impacts and advantages associated with the Price and Highway 191 alternative connectors in Region II.

Table 3.9-13 Summary of Region II Alternative Connector Impacts for Aquatic Biological Resources

Alternative Connector	Analysis	Advantage
Price	There are two perennial streams (Miller and South Gordon creeks) within the 250-foot-wide transmission line ROW. These streams do not support game fish species.	There are no apparent unique opportunities or constraints for aquatic biological resources by utilizing this connector.
Highway 191	One perennial stream (Willow Creek) is crossed by this connector's 250-foot-wide transmission line ROW. This stream contains brown trout.	There is no apparent unique opportunities or constraints for aquatic biological resources by utilizing this connector.

USFS MIS

No National Forest System lands are crossed by the variations in Region II.

Region II Conclusion

Based on a comparison of potential habitat disturbance for Region II alternatives, potential impacts to aquatic biological resources would be greatest for Alternatives II-B, II-C, and II-E. Potential effects for Alternatives II-A, II-D, and II-F (Agency Preferred) would be similar and lower compared to Alternatives II-B, II-C, and II-E (**Table 3.9-11**). Alternatives II-B, II-C, and II-E could result in the greatest potential alteration or loss of habitat (17,600 to 22,000 ft^2 or 0.4 to 0.51 acre) compared to 7,200 to 10,000 ft^2 or 0.17 to 0.23 acre for Alternatives II-A, II-D, and II-F. Even though there are differences in potential habitat effects, less than 0.1 percent of the available game fish species habitat would be affected for each of the six alternatives. Alternative II-E could result in the highest potential construction disturbance to riparian areas near perennial streams (99 acres at a 100-foot buffer distance and 273 acres at a 300-foot buffer distance) (**Table 3.9-12**). Potential disturbance to riparian habitat for the other five alternatives were similar and less compared to Alternative II-E. Alternative II-F (Agency Preferred) ranked in the middle portion of the riparian disturbance estimates. Even though the greatest level of impacts are

associated with Alternatives II-B, II-C, and II-E, project effects on aquatic species and their habitat would be avoided or considered to be low magnitude and short-term in duration after applying BMPs, design features, and additional mitigation (Sections 3.9.6.2 and 3.9.6.4 and **Appendix C**). The only potential long-term impacts would be in streams where a culvert would displace stream bottom habitat. In comparison with available stream habitat, the relatively small long-term impacts of all alternatives are unlikely to impact the population viability of aquatic species inhabiting these streams.

3.9.6.5 Region III

Tables 3.9-14 and **3.9-15** provide a summary of impact parameters used to describe impacts for alternative routes in Region III. Game fish occurrences for Region III's 2-mile transmission line corridors are provided in **Appendix G**, **Table G-8** for streams and **Table G-9** for waterbodies.

Table 3.9-14 Summary of Region III Alternative Route Impacts for Aquatic Biological Resources

Parameter	Alternative III-A	Alternative III-B	Alternative III-C
Number of Named Perennial Streams[1] Crossed by 250-foot-wide transmission line ROW	4	3	1
Number of Game Fish Streams Crossed by 250-foot-wide ROW	0	2	1
Number of Game Fish Stream 250-foot-wide ROW Crossings	0	2	1
Potential Aquatic Habitat Alteration or Loss[2] (ft^2)	1,600	1,200	400
Potential Aquatic Habitat Alteration or Loss (acres)	0.04	0.03	0.01
Percent of Potentially Affected Habitat Compared to Perennial Habitat in Watersheds	<0.1	<0.1	<0.1
Number of Reservoirs/Lakes Located within the 2-mile Transmission Line Corridors	3	7	4
Number of Springs Located within the 2-mile Transmission Line Corridors	16	9	10

[1] Additional unnamed perennial streams may be crossed by the 250-foot-wide transmission line ROWs.

[2] Habitat loss represents area that could be permanently or temporarily removed due to the use of a culvert or low water crossing or temporarily disturbed from the instream use of equipment.

Table 3.9-15 Ground Disturbance (Acres) for Buffer Distances from Riparian Habitat, Region III

	Alternatives					
	III-A		III-B		III-C	
	100 feet	300 feet	100 feet	300 feet	100 feet	300 feet
Streams						
Construction	5	17	3	8	<1	<1
Operation	2	5	1	2	<1	<1
Reservoirs/Lakes/Springs						
Construction	3	5	3	4	3	5
Operation	1	1	1	1	1	1

The road density analysis for Region III alternatives is discussed in Water Resources, Section 3.4, with results provided in **Table 3.4-14**. These results would apply to perennial streams as aquatic habitat for game fish and other aquatic species.

Potential ground disturbance effects associated with the construction and operation of Region III alternative ROWs on riparian habitat at 100- and 300-foot buffer distances from streams and lakes, reservoirs, and springs are listed in **Table 3.9-15**. The highest level of potential riparian disturbance is indicated for Alternatives III-A and III-B. By complying with stipulations for BLM FOs that prohibit surface disturbance within 328 feet of streams and lakes (see **Appendix C**), impacts on riparian vegetation would be avoided.

Alternative III-A (Applicant Proposed)

Key Parameters Summary

Alternative III-A would cross four named perennial streams. None of the perennial streams crossed by this alternative contain game fish species. Potential habitat loss due to possible use of culverts, low water crossing, or temporary disturbance from instream use of equipment would be 1,600 ft^2 (0.04 acre), if culverts or low water construction is required. Three reservoirs/lakes (Smelter Knolls Reservoir in Millard County, Utah; Lower Big Wash Reservoir in Beaver County, Utah; and Newcastle Reservoir in Iron County, Utah) and sixteen springs are located within the Alternative III-A 2-mile transmission line corridor. One of these waterbodies (Newcastle Reservoir) contains game fish species. BMPs, design features, and mitigation measures involving herbicide use, erosion control, and refueling restrictions near streams would be implemented to minimize water quality effects on aquatic habitat in the stream crossings. There could be temporary reductions in macroinvertebrates in streams with substrate disturbance. Water use for concrete foundations and construction dust control would be 206 acre-feet. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed for Region III, Alternative III-A. After implementing the BMPs, design features, and additional mitigation measures, there would be no long-term effects on aquatic habitat and species other than the small area associated with a culvert.

USFS MIS

In total, two perennial streams (Magotsu and Spring creeks) and six springs are located within the Alternative III-A 2-mile transmission line corridor in the Dixie National Forest (**Appendix G, Table G-13**). Both streams (Magotsu and Spring creeks) contain MIS Virgin spinedace. No MIS occur in the springs. Both streams are crossed by the 250-foot-wide transmission line ROW, which could result in a direct loss of aquatic habitat of 800 ft^2 (0.02 acre), if culverts or low water construction is required.

Alternative III-B (Agency Preferred)

Key Parameters Summary

Alternative III-B would cross three named perennial streams. Two of the perennial streams (Clover Creek and Meadow Valley Wash) are crossed by the 2-mile transmission line corridor and the 250-foot-wide ROW. Meadow Valley Wash also is crossed by the 250-foot-wide transmission line ROW. These streams contain game fish species (rainbow trout) and nongame native fish species. Potential habitat loss would be 1,200 ft^2 (0.03 acre), if culverts or low water construction is required. Seven reservoirs/lakes and nine springs are located within the Alternative III-B 2-mile transmission line corridor. The reservoirs/lakes include Smelter Knolls, West Clay Knoll, and West Marshall Tract reservoirs in Millard County, Utah; Lower Big Wash Reservoir in Beaver County, Utah; and Rolling Hills, Jacks Canyon, and Lafes reservoirs in Lincoln County, Nevada. None of the waterbodies contain game fish species. Mitigation measures **AB-1** and **AB-2** would avoid effects on fish passage and game fish spawning in the two game fish streams. BMPs, design features, and mitigation measures involving herbicide use, erosion control, and refueling restrictions near streams would be implemented to minimize water quality effects on aquatic habitat in the stream crossings. There could be temporary reductions in macroinvertebrates in streams with substrate

disturbance. Water use for concrete foundations and construction dust control would be 212 acre-feet. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed for Region III, Alternative III-B. After implementing the BMPs, design features, and additional mitigation measures, there would be no long-term effects on aquatic habitat and species other than a small area associated with a culvert.

USFS MIS

No National Forest System lands are crossed by the Alternative III-B 2-mile transmission line corridor or 250-foot-wide transmission line ROW (**Appendix G**, **Table G-13**).

Alternative III-C

Key Parameters Summary

Alternative III-C would cross one named perennial stream, Meadow Valley Wash, which contains game fish species (rainbow trout). Potential habitat loss would be 400 ft^2 (0.01 acre). Four reservoirs/lakes (Smelter Knolls, West Clay Knoll, and West Marshall Tract reservoirs in Millard County, Utah; and Lower Big Wash Reservoir in Beaver County, Utah) and 10 springs are located within the Alternative III-C 2-mile transmission line corridor. None of these waterbodies contain game fish species. Mitigation measures **AB-1** and **AB-2** would avoid effects on fish passage and game fish spawning in the one game fish stream. BMPs, design features, and mitigation measures involving herbicide use, erosion control, and refueling restrictions near streams would be implemented to minimize water quality effects on aquatic habitat in the stream crossings. There could be temporary reductions in macroinvertebrates in streams with substrate disturbance. Water use for concrete foundations and construction dust control would be 230 acre-feet. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed for Region III, Alternative III-C. After implementing the BMPs, design features, and additional mitigation measures, there would be no long-term effects on aquatic habitat and species other than the small area associated with a culvert.

USFS MIS

No National Forest System lands are crossed by the Alternative III-C 2-mile transmission line corridor or 250-foot-wide transmission line ROW.

Alternative Variations in Region III

Table 3.9-16 provides a comparison of impacts associated with the alternative variations in Region III. The number of perennial streams crossed by the Ox Valley East and West Variations is one compared to one perennial stream by the comparable portion of Alternative III-A. These streams (Spring and Magotsu creeks) do not contain game fish species. Potential road crossings of these streams could result in habitat alteration and potential water quality impacts. Five perennial streams (South Fork Pinto, Little Pinto, Magotsu, and Pinto creeks, and the Santa Clara River) are located within the 2-mile transmission line corridor, with 8 crossings of the 250-foot-wide transmission line ROW. Three of these streams (South Pinto Creek, Pinto Creek, and the Santa Clara River) contain game fish. The comparable portion of the Alternative III-A Alternative crosses one perennial stream (Spring Creek). BMPs and design features would minimize impacts to aquatic habitat and species. There would be slightly higher risk to amphibian mortalities during construction for the two variations due to the higher ROW mileage. These potential impacts to amphibians would be short-term in duration and expected to cause relatively low mortality numbers.

Table 3.9-16 Summary of Region III Alternative Variation Impacts for Aquatic Biological Resources

Parameter	Ox Valley East Alternative Variation	Comparable Portion of Alternative III-A	Ox Valley West Alternative Variation	Comparable Portion of Alternative III-A	Pinto Alternative Variation	Comparable Portion of Alternative III-A
Number of Named Perennial Streams[1] Crossings by 250-foot-wide transmission line ROW	1	1	1	1	8	1
Number of Game Fish Streams Crossed by 250-foot-wide transmission line ROW	0	0	0	0	1	0
Number of Game Fish Streams Crossed by 2-mile Transmission Line Corridors	0	0	0	0	1	0

[1]Additional unnamed perennial streams are crossed by the 250-foot-wide transmission line ROWs.

USFS MIS

Waterbodies that occur within Region III variations on Dixie National Forest lands are listed in **Appendix G**, **Table G-14**. The following alternative variations overlap with waterbodies in the Dixie National Forest:

- Ox Valley East – 2 streams and 6 springs with MIS (Virgin spinedace) in Spring Creek;
- Ox Valley West – 1 stream with MIS (Virgin spinedace) in Spring Creek;
- Ox Valley East and West – 1 stream and 3 springs with no MIS; and
- Pinto – 5 streams and 4 springs with MIS in Magotsu Creek (Virgin spinedace), South Fork Pinto Creek (rainbow trout), Pinto Creek (rainbow trout), and Santa Clara River (brook, brown, and rainbow trout).

Alternative Connectors in Region III

The Avon and Moapa Alternative Connectors does not cross perennial streams.

Alternative Ground Electrode Systems in Region III

The southern ground electrode system would be necessary within 100 miles of the southern terminal. Conceptual locations and connections are analyzed. Impacts associated with the construction and operation of this system would be the same as discussed for Alternative I-A. **Table 3.9-17** provides a comparison of alternative electrode bed locations proposed near the southern terminal. Some locations might serve multiple alternative routes, while others could only be associated with a certain alternative route. Impacts on aquatic biological resources would be limited to intermittent streams. Macroinvertebrate communities could be affected on a short-term basis if water is present.

Table 3.9-17 Summary of Region III Alternative Ground Electrode System Location Impacts for Aquatic Biological Resources

	Number of Perennial	Number of Intermittent	Number of Reservoirs/ Lakes	Total Number of Waterbodies	Water Use (acre-feet)
Mormon Mesa- Carp Elgin Rd (Alternative III-A)	0	4	8	12	4
Halfway Wash- Virgin River (Alternative III-A)	0	3	0	3	3

Table 3.9-17 Summary of Region III Alternative Ground Electrode System Location Impacts for Aquatic Biological Resources

	Number of Perennial	Number of Intermittent	Number of Reservoirs/ Lakes	Total Number of Waterbodies	Water Use (acre-feet)
Halfway Wash E (Alternative III-A)	0	12	0	12	6
Mormon Mesa- Carp Elgin Rd (Alternative III-B)	0	5	8	13	6
Halfway Wash-Virgin River (Alternative III-B)	0	3	0	3	4
Halfway Wash E (Alternative III-B)	0	1	0	1	6
Meadow Valley 2 (Alternative III-C)	0	27	0	27	16
Delta (Design Option 2)	0	16	0	16	14

[1] Estimation of water use based on assumptions provided for construction of 500-kV DC transmission line.

Region III Conclusion

Based on a comparison of impact parameters for Region III alternatives, potential impacts to aquatic biological resources would be slightly higher for Alternatives III-A (Applicant Proposed) and III-B (Agency Preferred) compared to Alternative III-C (**Table 3.9-14**). Alternatives III-A and III-B could result in the greatest potential alteration or loss of habitat (1,200 ft^2 to 1,600 ft^2 or 0.03 to 0.04 acre) compared to 400 ft^2 or 0.01 acre for Alternative III-C. Even though there are differences in potential habitat effects, less than 0.1 percent of the available aquatic habitat would be affected for each of the three alternatives. Alternatives III-A and III-B also could result in the highest potential construction disturbance to riparian areas near perennial streams (3 to 5 acres at a 100-foot buffer distance and 8 to 17 acres at a 300-foot buffer distance) compared to Alternative III-C (<1 acre for both buffer distances) (**Table 3.9-15**). Even though the greatest level of impacts are associated with Alternatives III-A and III-B, project effects on aquatic species and their habitat would be avoided or considered to be low magnitude and short-term in duration after applying BMPs, design features, and additional mitigation (Sections 3.9.6.2 and 3.9.6.5 and **Appendix C**). The only potential long-term impacts would be in streams where a culvert would displace stream bottom habitat. In comparison with available stream habitat, the relatively small long-term impacts of all alternatives are unlikely to impact the population viability of aquatic species inhabiting these streams.

3.9.6.6 Region IV

Tables 3.9-18 provide a list of impact parameters associated with alternative routes in Region IV. Game fish occurrences for Region IV's 2-mile transmission line corridors are provided in **Appendix G**, **Table G-10** for streams and **Table G-11** for waterbodies.

Table 3.9-18 Summary of Region IV Alternative Route Impacts for Aquatic Biological Resources

Parameter	Alternative IV-A (Applicant Proposed)	Alternative IV-B	Alternative IV-C
Number of Named Perennial Streams[1] Crossed by 250-foot-wide transmission line ROW	1	4	3
Number of Game Fish Streams Crossed by 250-foot-wide ROW	1	1	1
Number of Game Fish Stream 250-foot-wide ROW Crossings	1	0	0
Potential aquatic habitat alteration or loss[2] (ft^2)	400	1,600	1,200
Potential Aquatic Habitat Alteration or Loss (acres)	0.01	0.04	0.03

Table 3.9-18 Summary of Region IV Alternative Route Impacts for Aquatic Biological Resources

Parameter	Alternative IV-A (Applicant Proposed)	Alternative IV-B	Alternative IV-C
Percent of Potentially Affected Habitat Compared to Perennial Habitat in Watersheds	<0.1	<0.1	<0.1
Number of Reservoirs/Lakes Located within the 2-mile Transmission Line Corridors	1	1	4
Number of Springs Located within the 2-mile Transmission Line Corridors	0	0	0

[1] Additional unnamed perennial streams are crossed by the 250-foot-wide transmission line ROWs.

[2] Habitat loss represents area that could be permanently or temporarily removed due to the use of a culvert or low water crossing or temporarily disturbed from the instream use of equipment.

The road density analysis for Region IV alternatives is discussed in Water Resources, Section 3.4, with results provided in **Table 3.4-19**. These results would apply to perennial streams as aquatic habitat for game fish and other aquatic species.

Table 3.9-19 Ground Disturbance (Acres) for Buffer Distances from Riparian Habitat, Region IV

	Alternatives					
	IV-A		IV-B		IV-C	
	100 feet	300 feet	100 feet	300 feet	100 feet	300 feet
Streams						
Construction	<1	<1	2	5	1	3
Operation	<1	<1	<1	1	<1	1
Reservoirs/Lakes/Springs						
Construction	3	5	2	3	2	3
Operation	1	1	2	2	2	2

Potential ground disturbance effects associated with the construction and operation of Region IV alternative ROWs on riparian habitat at 100 and 300-foot buffer distances from streams and lakes, reservoirs, and springs are listed in **Table 3.9-19**. The potential riparian disturbance associated with perennial streams would be slightly higher for Alternatives IV-B and IV-C compared to IV-A. Potential disturbance to riparian areas associated with reservoirs was slightly higher for Alternative IV-A. There are no stipulations for BLM FOs involving buffer protection for riparian areas.

<u>Alternative IV-A (Applicant Proposed and Agency Preferred)</u>

Key Parameters Summary

Alternative IV-A would cross one named perennial stream (Las Vegas Wash), which contains one warmwater game fish species, largemouth bass. Potential habitat loss due to possible use of culverts, low water crossing, or temporary disturbance from instream use of equipment would be 400 feet^2 or 0.01 acre One reservoir/lake is located within the Alternative IV-A 2-mile transmission line corridor. Mitigation measure WR-1 would avoid crossing Las Vegas Wash to eliminate additional impacts to an impaired

stream. As a result of this measure, there would be no impacts on aquatic habitat and species on game fish streams for Alternative IV-A. BMPs, design features, and mitigation measures involving herbicide use would be implemented to minimize water quality effects on aquatic habitat at the perennial stream crossings. There could be temporary reductions in macroinvertebrates at stream crossings. Water use for concrete foundations and construction dust control would be 28 acre-feet. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed for Region IV, Alternative IV-A. After implementing the BMPs, design features, and additional mitigation measures, there would be no long-term effects on aquatic habitat and species other than the small area associated with a culvert.

Alternative IV-B

Key Parameters Summary

Alternative IV-B would cross four named perennial streams. Hemenway Wash is crossed at three locations by the 250-foot-wide transmission line ROW and 2-mile transmission line corridor. Las Vegas Wash is crossed only by the 2-mile wide corridor. Las Vegas Wash is a game fish stream. Potential habitat loss due to possible use of culverts, low water crossing, or temporary disturbance from instream use of equipment would be 1,600 ft^2 or 0.04 acre. One reservoir/lake is located within the Alternative IV-B 2-mile transmission line corridor. There would be no impacts on aquatic habitat and species in Las Vegas Wash for Alternative IV-B due to the implementation of mitigation measure WR-1 (avoid crossing impaired streams). BMPs, design features, and mitigation measures involving herbicide use would be implemented to minimize water quality effects on aquatic habitat in the stream crossings. There could be temporary reductions in macroinvertebrates at the other stream crossings. Water use for concrete foundations and construction dust control would be 29 acre-feet. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed for Region IV, Alternative IV-B. After implementing the BMPs, design features, and additional mitigation measures, there would be no long-term effects on aquatic habitat and species other than the small area associated with a culvert.

Alternative IV-C

Key Parameters Summary

Alternative IV-C would cross three named perennial streams (Hemenway Wash at two locations and Las Vegas Wash). Las Vegas Wash is a game fish stream. Potential habitat loss due to possible use of culverts, low water crossing, or temporary disturbance from instream use of equipment would be 1,200 $feet^2$ or 0.03 acre. Four reservoirs/lakes are located within the Alternative IV-C 2-mile transmission line corridor. There would be no impacts on aquatic habitat and species in Las Vegas Wash for Alternative IV-C due to the implementation of mitigation measure WR-1 (avoid crossing impaired streams). BMPs, design features, and mitigation measures involving herbicide use would be implemented to minimize water quality effects on aquatic habitat in the stream crossings. There could be temporary reductions in macroinvertebrates at the other stream crossings. Water use for concrete foundations and construction dust control would be 33 acre-feet. The effect determination of new and existing water depletions would be made after the water sources are identified and an evaluation of their potential connection to surface flows is completed for Region IV, Alternative IV-C. After implementing the BMPs, design features, and additional mitigation measures, there would be no long-term effects on aquatic habitat and species other than the small area associated with a culvert.

Alternative Variations in Region IV

No waterbodies are crossed by the Marketplace Alternative Variation.

Alternative Connectors in Region IV

Table 3.9-20 tabulates impacts for the alternative connectors in Region IV. There would be no impacts for the Sunrise Mountain, Lake Las Vegas, Three Kids Mine, and Railroad Pass alternative connectors.

Table 3.9-20 Summary of Region IV Alternative Connector Impacts for Aquatic Biological Resources

Alternative Connector	Analysis	Advantage
River Mountains Alternative Connector	Impacts would be limited to one stream (Hemenway Wash) crossed by this alternative.	There is a slight disadvantage in this alternative, since there would be one stream crossing with perennial reaches.

Region IV Conclusion

Based on a comparison of impact parameters for Region IV alternatives, potential impacts to aquatic biological resources would be slightly higher for Alternatives IV-B and IV-C. Potential effects for Alternatives IV-A (Applicant Proposed and Agency Preferred) would be similar and slightly lower compared to Alternatives IV-B and IV-C (**Table 3.9-18**). Alternatives IV-A and IV-B could result in the greatest potential alteration or loss of habitat (1,200 to 1,600 ft^2 or 0.03 to 0.04 acre) compared to 400 ft^2 or 0.01 acre for Alternative IV-A. Even though there are differences in potential habitat effects, less than 0.1 percent of the available aquatic habitat would be affected for each of the three alternatives. Alternatives IV-B and IV-C also could result in the slightly higher potential construction disturbance to riparian areas near perennial streams (1 to 2 acres at a 100-foot buffer distance and 3 to 5 acres at a 300-foot buffer distance) (**Table 3.9-19**). Potential disturbance to riparian habitat for Alternative IV-A would be <1 acre for both buffer distances. Even though the greatest level of impacts are associated with Alternatives IV-B and IV-C, project effects on aquatic species and their habitat would be avoided or considered to be low magnitude and short-term in duration after applying BMPs, design features, and additional mitigation (Sections 3.9.6.2 and 3.9.6.6 and **Appendix C**). The only potential long-term impacts would be in streams where a culvert would displace stream bottom habitat. In comparison with available stream habitat, the relatively small long-term impacts of all alternatives are unlikely to impact the population viability of aquatic species inhabiting these streams.

3.9.6.7 Impacts to Aquatic Biological Resources from the No Action Alternative

Under the No Action Alternative, the proposed Project would not be constructed or operated. No project-related disturbance would occur in waterbodies as a result of vehicle traffic or removal of riparian vegetation. No project-related sedimentation or risks to aquatic species from potential fuel spills or introduction of invasive species would occur from the Project. Impacts to aquatic habitat and species would continue at present levels as a result of natural conditions (e.g., annual fluctuations in stream flow due to varying precipitation, erosion, and wildfires) and existing development in drainages within the analysis area.

3.9.6.8 Residual Impacts

The following residual impacts would occur after implementation of BMPs, agency stipulations, design features, and additional mitigation:

- Potential loss or alteration of aquatic habitat in smaller streams that require culverts or vehicle crossings.
- Potential short-term sedimentation effects on aquatic habitat and species as a result of direct disturbance within or adjacent to streams from vehicle traffic.

- Potential loss or disturbance to riparian vegetation along streams on private lands or public lands where the ROW is parallel and adjacent to streams.
- Potential amphibian mortalities from vehicle traffic during amphibian movements to and from waterbodies located within the ROWs.

3.9.6.9 Irreversible and Irretrievable Commitment of Resources

- Potential loss of aquatic habitat in streams that require culverts for vehicle crossings would be irretrievable. However, the habitat loss would be reversible if the culvert was removed at a later time.
- Potential amphibian mortalities from vehicle traffic would be an irretrievable and irreversible loss of a portion of amphibian populations.

3.9.6.10 Relationship Between Local Short-term Uses and Long-term Productivity

The proposed action and alternatives would result in short-term disturbance to aquatic habit but these effects would not affect the long-term productivity of fish, invertebrate, or amphibian populations.

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