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 • Title 45 Nevada Revised Statutes (NRS); Chapter 488 of NRS.
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 • NRSs 501.100, 501.110, 501.375 – 501.395; Chapter 502 Nevada Revised Statutes; NRSs 503.090, 503.270 – 503.430, 503.584 – 503.650; Nevada Administrative Code (NACs) 503.060 – 503.075, 503.090 – 503.094, 503.103 – 503.104.
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 • NRSs 488.530, 488.533, 488.536; NRSs 503.590 and 503.597; Chapter 506 Nevada Revised Statutes NACs 488.520 – 488.527, 488.540, 503.108, and 503.110.

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). In accordance with State and Federal regulations, the analysis also assumes the respective State agencies would manage aquatic species within their states and the USFWS would have regulatory oversight regarding 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 refined transmission corridor of approximately 500 to 3,600 feet wide. A 250-foot-wide transmission line ROW is within the refined transmission corridor. In addition, a potential disturbance area is included beyond the refined transmission corridor to account for access roads and staging areas. This additional potential disturbance area is approximately 2 miles in width. The exact locations of roads and staging areas are

not defined at this time. A reach of approximately 1 mile downstream of where the refined transmission corridor crosses a stream also was considered part of the analysis area for aquatic species. 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 also are discussed in terms of a larger Project analysis area comprised of the fifth-level Watersheds (HUC10) that would be 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/ponds 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) streams 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 refined transmission 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 regulatory oversight 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 habitat for game and special status fish species.

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]; Utah Comprehensive Wildlife Conservation Strategy [UDWR 2005]; Nevada Wildlife Action Plan [NDOW 2006]; and Wyoming State Wildlife Action Plan [WGFD 2010a]).

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**). Eleven 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 of Aquatic Biological Resources.

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 clarki*	Streams
Grayling	*Thymallus thymallus*	Lakes and streams
Mountain whitefish	*Prosopium williamsoni*	Streams
Rainbow trout	*Oncorhynchus mykiss*	Streams, lakes/reservoirs
Yellowstone cutthroat trout	*Oncorhynchus clarki bouvieri*	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
White crappie	*Pomoxis annularis*	Streams, lakes/reservoirs
Temperate Bass	Percichthyidae	
Striped bass	*Morone saxatilis*	Lakes/reservoir
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.

Sources: CPW 2012-2011; NDOW 2011; UDWR 2013-2010; USFS 2013; WGFD 2011-2010.

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.
Yellow perch				■	■								Egg masses usually deposited on vegetation.
Walleye				■	■								Spawn in lakes and streams in shallow water over rock substrates.
Northern pike		■	■	■	■	■							River spawners that typically use marshy or vegetated areas connected to the rivers.
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; 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 2010b) 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

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) also are categorized as Forest Sensitive (FS) species and are presented in Section 3.10, Special Status Aquatic Species. Specific MIS occurrence in waterbodies that would be crossed by the 250-foot-wide transmission line ROW is discussed in the Region II and III impact sections. Detailed information regarding FS species and MIS is provided for the USFS in a separate aquatic biological resources technical report.

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-La Sal National Forest Region II	Uinta[2] National Forest Planning Area Region II
Fish					
Bonneville cutthroat trout				FS[1] and MIS	FS[1] and MIS
Brook trout		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	

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

[2] In March 2008, the Uinta National Forest and the Wasatch-Cache National Forest were combined into one administrative unit (Uinta-Wasatch-Cache National Forest). Each of these forests continues to operate under individual forest plans approved in 2003. When the term Uinta National Forest is used, it refers to the Uinta Planning Area of the Uinta-Wasatch-Cache National Forest.

3.9.4.3 Aquatic Macroinvertebrates

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

Macroinvertebrate communities that occur in waterbodies located within the refined transmission corridors include a mixture of worms, immature and adult insect groups, crustaceans, snails, and numerous other groups. The composition and abundance of the macroinvertebrate 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. Macroinvertebrate communities are present throughout the year in all perennial waterbodies within the

analysis area. In contrast, macroinvertebrate occurrence in intermittent or ephemeral waterbodies would be limited to the period when water is present.

Macroinvertebrates 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-La Sal 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. Aquatic macroinvertebrate 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	X	
Brown trout	X	X		
Colorado River cutthroat trout	X	X		
Cutthroat trout		X		
Grayling		X		
Mountain whitefish		X		
Rainbow trout	X	X	X	
Yellowstone cutthroat trout	X			
Sockeye (kokanee) salmon	X	X		
Tiger trout (brown x brook hybrid)		X		
Catfishes				
Black bullhead	X	X		
Channel catfish	X	X		X

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

Fish Species	Region			
	I	II	III	IV
Sunfishes				
Black crappie	X	X		X
Bluegill	X	X		X
Green sunfish	X	X	X	
Largemouth bass		X		X
Rock bass	X	X		
Smallmouth bass	X	X	X	X
White crappie		X		X
Temperate Basses				
Striped bass				X
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 CPW (2012-2011); NDOW (2011); UDWR (2013-2011); WGFD (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 fish species. A reach of approximately 1 mile downstream of where the refined transmission corridor crosses a stream 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 would be crossed by each alternative's refined transmission 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 potential disturbance areas (i.e., 250-foot-wide transmission line ROWs and refined transmission corridors, and an area beyond the refined transmission corridor related to potential road and staging disturbance).

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 included 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 considered 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 during the life of the Project on streams from construction work crews and the public use of access roads	The analysis evaluated the potential for increased fishing pressure on game fisheries, based on the presence of workers near streams and the public use of access roads.
Potential direct and indirect effects of construction water use on aquatic habitat and species	The analysis used the results of the water resources impact analysis, which determined if water sources were 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 evaluated 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 named perennial streams with game fish species crossed by the 250-foot-wide transmission line ROW associated with each of the alternatives.
- Number of perennial streams with game fish species crossed by the refined transmission corridor and potential disturbance beyond the refined transmission corridor for each of the alternatives.
- Potential loss of aquatic habitat (square feet) 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 foundations. 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 completed. The evaluation would determine if water use could affect surface water quantity or habitat used by aquatic species in the North Platte Basin. As discussed in Section 3.10.6.3 and **Appendix C**, Section C.5 (Introduction), compliance with the PRRIP would require that water use in the Platte River Basin be evaluated to determine the potential effects of water depletions on Platte River federally listed species and their critical habitat. This protection measure for the Platte River system would benefit other aquatic species, if a new depletion is determined for the TWE Project.

Southern Terminal

Construction of the Southern Terminal would disturb previously developed upland areas in the Eldorado Valley watershed near Boulder City, Nevada. Waterbodies located adjacent to the area include playa lakes. No perennial waterbodies are located in this area. No game or native fish 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 foundations during construction of the Southern Terminal is estimated to be 1.2 acre-feet. The source of the water would be from 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 completed by the Nevada State Engineer. The evaluation would determine if water use could affect surface water quantity or habitat used by aquatic species. Compliance with the *Recovery Implementation Program for Endangered Fish Species in the Upper Colorado Basin* (Recovery Program) would require that water use in the Upper Colorado River Basin be evaluated to determine the potential effects of water depletions on Colorado River endangered fish species and their critical habitat. This protection measure for the Upper Colorado River system would benefit other aquatic species, if a new depletion is determined for the TWE Project.

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 above for the Northern and Southern terminals, and in 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 above for the Northern and Southern terminals, and in 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 that would be crossed by the 250-foot-wide transmission line ROWs and refined transmission corridors are provided in the region sections. Large rivers such as the Little Snake and Yampa rivers in Region I and the Duchesne, Green, Price, Sevier, and White rivers in Region II would be crossed by existing roads, if a crossing would be required.

Two types of crossings would be used for flowing streams: fords and culverts. The estimated disturbance per crossing for these two methods would include 1,250 square feet (25-foot width X 50-foot length) for the ford technique, and 7,500 square feet (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, USACE, 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 for fish species. Vehicle crossings would result in mortalities to macroinvertebrates and possibly early life stages of fish. Juvenile and adult fish likely would 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 is 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 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 portion of stream habitat. Construction could alter flow conditions and game fish spawning habitat depending on the timing of construction. The following 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, UDWR, or USFS. 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 macroinvertebrates. 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 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 deposited 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 1 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 1 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. In addition, mitigation measure **SSS-1**, discussed in Section 3.10.6.2, would provide minimization of sedimentation effects for federally listed and special management fish species (i.e., Forest MIS). Potential effects to Forest MIS are discussed in Sections 3.9.6.4 and 3.9.6.5.

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, which restricts refueling within 100 feet of wetlands and intermittent streams and 500 feet from perennial 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 2010b) 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 pounds per square inch) 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 concrete foundations 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 completed. Compliance with the Recovery Program would require that water use in the Upper Colorado River Basin be evaluated to determine the potential effects of water depletions on Colorado River endangered fish species and their critical habitat. This protection measure for the Upper Colorado River system would benefit other aquatic species, if a new depletion is determined for the TWE Project. Additional mitigation measures discussed in Section 3.10.6.2 would be implemented to protect federally listed and conservation agreement fish species. These measures include **SSS-2**(*Avoidance of Water Withdrawal and Entrainment/Impingement Effects for Federally Listed Fish Species*) and **SSS-3** (*Avoidance of Water Withdrawal and Entrainment/Impingement Effects for Conservation Agreement Fish Species)*. These mitigation measures also would assist in protecting other aquatic species, if a new depletion is determined for the Project.

Additional Fishing Pressure on Game Fish Streams/Fish Regulations

Fishing pressure on streams with game fish species could increase on a short-term basis from construction crews and on a long-term basis due to public use of access roads. 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.

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 and operation traffic within the ROW and on access roads could result in amphibian mortalities during spring and summer breeding migrations to and from flooded areas, wetlands, streams, ponds, or lakes. Operation traffic would occur through the life of the Project. 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. The mortality risk would depend on the timing of amphibian movements, amphibian abundance, and the traffic density. Estimates of maximum traffic levels in construction areas would be 200 to 250 trips per day during a 2-month period. Refer to Section 3.16.6 in Transportation for more details on vehicle traffic. Based on previous studies of toad mortalities from vehicles, the probability that a road crossing event would result in death ranged from 0.3 to 0.6 at volumes of approximately 3,200 vehicles per day (Jochimsen et al. 2014). Since Project traffic volumes would be 10 times less than those in the toad studies, the probability of mortalities would be much lower than 0.3.

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 FO. Some FOs 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-1** and **WET-3** would require avoidance of wetlands, intermittent and perennial drainages, and ephemeral channels if practical. If it is not practical to avoid wetlands and perennial streams, agency-approved construction methods would be required to minimize impacts to these habitats.

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 analysis 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. Herbicide use would follow procedures described in the Noxious Weed Management Plan (POD Appendix N). **NX-2** requires that herbicide use would be conducted following all applicable state and federal laws regarding chemical use, chemical storage, weather conditions, and chemical drift. 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 minimize 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 minimizing toxic effects of herbicide use on 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 refined transmission corridors are provided in **Appendix G**, **Table G-4** for streams and **Table G-5** for waterbodies (i.e., reservoirs, lakes, and springs).

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

Parameter	Alternative			
	I-A	I-B	I-C	I-D
Number of Named Perennial Stream[1] Crossings by 250-foot-wide transmission line ROW	2	2	11	2
Number of Game Fish Streams Crossed by 250-foot-wide transmission line ROW	2	2	8	2
Number of Game Fish Stream 250-foot-wide transmission line ROW Crossings	2	2	9	2
Potential Aquatic Habitat Alteration or Loss[2] (square feet)	0	0	2,000	0
Potential Aquatic Habitat Alteration or Loss (acres)	0	0	0.05	0
Percent of Potentially Affected Habitat Compared to Perennial Habitat in Watersheds	0	0	<0.1	0
Number of Reservoirs/Lakes Located within the Refined Transmission Corridor and Potential Disturbance Area Beyond the Refined Transmission Corridor	8	5	4	6
Number of Springs Located within the Refined Transmission Corridor and Potential Disturbance Area Beyond the Refined Transmission Corridor	2	2	1	3

[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.

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**.

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	4	7	22	60	4	7
Operation	1	2	1	2	6	16	1	2
Reservoirs/Lakes/Springs								
Construction	5	9	5	9	5	16	3	6
Operation	1	2	1	2	1	4	<1	1

Alternative I-A (Applicant Proposed)

Key Parameters Summary

The Alternative I-A ROW would cross two named perennial streams (Little Snake and Yampa rivers), which contain game fish species. There would be no habitat loss or alteration, since vehicle crossings or culverts would not be required for larger rivers. Existing roads would be used for large river crossings, if they are needed. One lake would be within Alternative I-A's refined transmission corridor. No additional

perennial streams would be in the potential disturbance area beyond the refined transmission corridor. However, eight reservoirs/lakes and two springs would be in this area (**Appendix G, Table G-5**). Four of the reservoirs/lakes contain game fish species (Coal Bank Lake, Spring Draw Reservoir, Flat Draw Reservoir, and Cherokee Reservoir). Access roads and staging areas potentially could adversely affect water quality near these waterbodies from surface disturbance and sedimentation and fuel spill.

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. Protection measures for potential water depletions would be the same as discussed in Section 3.9.6.2. 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 (Agency Preferred)

Key Parameters Summary

The Alternative I-B ROW 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. No additional perennial streams would be in the potential disturbance area beyond the refined transmission corridor. One lake (Coal Bank) would be in the refined transmission corridor and four additional lakes/reservoirs and two springs would be in the potential disturbance area beyond the refined transmission corridor (**Appendix G**, **Table G-5**). Coal Bank Lake contains game fish species. Potential effects of access roads and staging areas on these additional waterbodies would be the same as discussed for Alternative I-A.

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 117 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. Protection measures for potential water depletions would be the same as discussed in Section 3.9.6.2. 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

The Alternative I-C ROW would cross named perennial streams a total of 11 times. Seven of the perennial streams contain game fisheries: Elkhead Creek, Fortification Creek, Fourmile Creek, Little Bear Creek, Little Cottonwood Creek, Little Snake River, and Yampa River (2 crossings). No reservoirs/lakes or springs would be within the Alternative I-C refined transmission corridor. Four additional perennial streams, four reservoirs/lakes, and one spring would be in the potential disturbance area beyond the refined transmission corridor, which potentially could be affected by access roads and staging areas (**Appendix G, Tables G-4** and **G-5**). One of the streams, Willow Creek, contains game fish species. Potential habitat loss due to possible use of culverts, low water crossing, or temporary disturbance from instream use of equipment could be 2,000 square feet (0.05 acre). Large river crossings such as the Little Snake and Yampa were excluded from the habitat loss estimate because culverts would not occur as part of construction and existing roads would be used if crossings are required.

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. Protection measures for potential water depletions would be the same as discussed in Section 3.9.6.2. 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

Key Parameters Summary

Alternative I-D would cross two named perennial streams (Little Snake and Yampa rivers), both of which contain game fish species. No reservoirs/lakes or springs would be within the Alternative I-D refined transmission corridor. No additional perennial streams would be in the potential disturbance area beyond the refined transmission corridor. However, six reservoirs/lakes and three springs would be in this area (**Appendix G, Table G-5**). One of the waterbodies (Coal Bank Lake) contains game fish species. Potential effects of access roads and staging areas on these additional waterbodies would be the same as discussed for Alternative I-A. There would be no habitat loss because culverts or direct disturbance would not be required 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 126 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 Ranch Micro-siting Options 1, 3, or 4 were implemented, no additional perennial waterbodies would be crossed or impacted by these sites for any of the Region I alternatives.

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 applicant. The impacts associated with constructing and operating these alternative systems would be 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 0 to 23 intermittent streams depending on the selected electrode system (**Table 3.9-9**). 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 3.9-9 Summary of Region I Alternative Ground Electrode System Impact Indicators

Electrode System	Perennial Crossings	Intermittent Crossings	Total Stream Crossings	Water Use (acre-feet)
Bolten Ranch (All Alternative Routes)	1	22	23	11
Separation Flat (All Alterative Routes)	0	23	23	9
Eight Mile Basin (All Alternatives)	0	7	7	4
Separation Creek (All Alternatives)	0	0	0	1

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 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 (2,000 square feet or 0.05 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 60 acres at a 300-foot buffer distance) compared to the other three alternatives (4 acres at the 100-foot buffer distance and 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 3.9-10 and **3.9-11** provide a summary of impact parameters used to describe impacts for alternative routes in Region II. Game fish occurrences for Region II's refined transmission 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 3.4-10**. 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 II alternative ROWs on riparian habitat at 100- and 300-foot buffer distances from streams and lakes, reservoirs, and springs are listed in **Table 3.9-11**. 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.

Table 3.9-10 Summary of Region II Alternative Route Impact Parameters for Aquatic Biological Resources

Parameter	Alternative						
	II-A	II-B	II-C	II-D	II-E	II-F	II-G
Number of Named Perennial Stream[1] Crossings by 250-foot-wide transmission line ROW	18	22	27	18	46	25	16
Number of Game Fish Streams Crossed by 250-foot-wide transmission line ROW	11	7	12	13	13	14	11

Table 3.9-10 Summary of Region II Alternative Route Impact Parameters for Aquatic Biological Resources

Parameter	Alternative						
	II-A	II-B	II-C	II-D	II-E	II-F	II-G
Number of Game Fish Stream 250-foot-wide transmission line ROW Crossings	11	10	14	14	16	21	11
Potential Aquatic Habitat Alteration or Loss[2] (square feet)	6,400	6,000	8,800	5,600	16,800	9,600	6,400
Potential Aquatic Habitat Alteration or Loss (acres)	0.15	0.14	0.20	0.13	0.39	0.21	0.15
Percent of Potentially Affected Habitat Compared to Perennial Habitat in Watersheds	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Number of Reservoirs/Lakes Located within the Refined transmission corridor and Potential Disturbance Area Beyond the Refined transmission corridor	4	4	5	5	4	4	4
Number of Springs Located within the Refined transmission corridor and Potential Disturbance Area Beyond the Refined transmission corridor	3	7	6	2	3	4	3

[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 3.9-11 Ground Disturbance (acres) for Buffer Distances from Riparian Habitat, Region II

	Alternatives													
	II-A		II-B		II-C		II-D		II-E		II-F		II-G	
	100 feet	300 feet	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	31	86	39	95	38	99	31	102	100	253	67	186	37	103
Operation	11	32	11	28	9	24	10	30	19	52	20	57	11	32
Reservoirs/Lakes/Springs														
Construction	9	21	3	10	8	18	1	5	11	26	2	7	7	15
Operation	2	4	1	3	3	5	<1	2	2	6	<1	2	1	3

Alternative II-A (Applicant Proposed)

Key Parameters Summary

The Alternative II-A ROW would cross 18 named perennial streams and a total of 18 crossings. Eleven of these streams contain game fish species: Currant Creek, Duchesne River, Green River, Hop Creek, Lake Fork Creek, Lake Fork River, Thistle Creek, Red Creek, Soldier Creek, Strawberry River, and Tie Fork Creek. The Strawberry River has been designated a Blue Ribbon Fishery. Eight perennial streams would be in the potential disturbance area beyond the refined transmission corridor, which potentially could be affected by access roads and staging areas (**Appendix G, Table G-6**). Four of these streams (Hop and Currant creeks, and Lake Fork and Strawberry rivers) contain game fish species. Three reservoirs and three springs also would be in the potential disturbance area beyond the refined transmission corridor (**Appendix G, Table G-7**). Two of the reservoirs contain game fish species (Box Elder Reservoir Number 2 and Starvation Reservoir). Access roads and staging areas potentially could adversely affect water quality near these waterbodies from surface disturbance and sedimentation and fuel spill risk. Potential perennial stream habitat loss due to possible use of culverts, low water crossings, or temporary disturbance from instream use of equipment would be 6,400 square feet (0.15 acre). Large

rivers such as the Green and Duchesne were excluded from the habitat loss estimate because they would be crossed by existing roads if crossings are required. One reservoir (Box Elder 3 in Moffat County, Colorado) and one spring would be within the Alternative II-A refined transmission corridor. The reservoir contains game fish species.

Mitigation measures **AB-1** and **AB-2** would minimize 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 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 193 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. Protection measures for potential water depletions would be the same as discussed in Section 3.9.6.2. 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 Fruitland Micro-siting Options 1, 2, and 3 would cross two perennial streams Red Creek (one crossing) and Currant Creek (two crossings). These same streams would be crossed by the comparable portions of Alternative II-A. Potential impacts to these streams would be reduced by BMPs, design features, and mitigation measures discussed in Section 3.9.6.2. The Strawberry IRA Micro-siting Options would not substantially affect the impact analyses for aquatic species because there are no perennial streams crossed.

USFS MIS

In total, two perennial streams (Sheep and Tie Fork creeks) would be crossed by the Alternative II-A ROW in the Uinta National Forest Planning Area (**Appendix G**, **Table G-13**). There would be a direct loss of aquatic habitat of 400 square feet (0.01 acre) in the streams that contain MIS, if culverts or low water construction is required. One stream (Birch Creek) would be in the potential disturbance area beyond the refined transmission corridor, which potentially could be affected by access roads or staging areas. This stream does not contain MIS. Mitigation measure **SSS-1**, discussed in Section 3.10.6.2, would minimize sedimentation impacts to forest streams with MIS fish.

Alternative II-B

Key Parameters Summary

The Alternative II-B ROW would cross 14 named perennial streams and a total of 22 crossings. Seven of these streams contain game fish species: Green River (2 crossings), Huntington Creek, Pleasant Creek, Price River (2 crossings), San Pitch River, Sevier River (2 crossings), and the White River. Eleven perennial streams would be in the potential disturbance area beyond the refined transmission corridor, which potentially could be affected by access roads and staging areas (**Appendix G, Table G-6**). Five of these streams (Bitter, Dry Pole Fork, Huntington, and North Fork Pleasant creeks and the Lowry River) contain game fish species. Two reservoirs and five springs also would be in the disturbance area beyond the refined transmission corridor (**Appendix G, Table G-7**). Both reservoirs (Huntington Reservoir and Potters Pond) contain game fish species. Potential effects of access roads and staging areas on these additional waterbodies would be the same as discussed for Alternative II-A. Potential aquatic habitat loss would be 6,000 square feet (0.14 acre). Large rivers such as the Green Price, Sevier, and White were excluded from the habitat loss estimate because they would be crossed by existing roads if crossings are required. Two reservoirs/lakes (Box Elder Reservoir in Moffatt County, Colorado; and Cactus Reservoir in Rio Blanco County, Colorado) and two springs would be within the Alternative II-B refined transmission corridor. Both reservoirs contain game fish species.

Mitigation measures **AB-1** and **AB-2** would minimize 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 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 259 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. Protection measures for potential water depletions would be the same as discussed in Section 3.9.6.2. 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 (Indian and Straight Fork creeks) would be within the Alternative II-B refined transmission corridor in the Manti-La Sal National Forest (**Appendix G**, **Table G-13**). The MIS group, macroinvertebrates, occurs in all of these waterbodies. Based on one 250-foot-wide transmission line ROW crossing of Indian Creek, there could be a direct loss of aquatic habitat of 400 square feet (0.01 acre), if culverts or low water construction is required. Three perennial streams (Dry Pole and North Fork Coal creeks and the Lowry River), one spring, and one pond would be in the potential disturbance area beyond the refined transmission corridor, which potentially could be affected by access roads or staging areas. The MIS group, macroinvertebrates, is present in all of these waterbodies. Dry Pole Creek and the Lowry River also contain the MIS, Colorado River cutthroat trout. Mitigation measure **SSS-1**, discussed in Section 3.10.6.2, would minimize sedimentation impacts to forest streams with MIS fish.

Alternative II-C

Key Parameters Summary

The Alternative II-C ROW would cross 21 named perennial streams and a total of 27 crossings. Twelve of these streams contain game fish species: Blackham Creek, Gooseberry Creek, Green River (2 crossings),Huntington Creek, Ivie Creek, Meadow Creek, Lost Creek, Niotche Creek, Sevier River (2 crossings), White River, Willow Creek, and Yogo Creek. Six perennial streams would be in the potential disturbance area beyond the refined transmission corridor (**Appendix G, Table G-6**). Two of these streams (Bitter and Little creeks) contain game fish species. Two reservoirs and five springs also would be in the potential disturbance area beyond the refined transmission corridor (**Appendix G, Table G-7**). Both reservoirs (Saleratus Reservoir and Scirpio Lake) contain game fish species. Potential effects of access roads and staging areas on these additional waterbodies would be the same as discussed for Alternative II-A. Potential aquatic habitat loss would be 8,800 square feet (0.20 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; Box Elder in Moffat County, Colorado; and DMAD Reservoir in Millard County, Utah) and one spring would be within the Alternative II-C refined transmission corridor. Game fish are present in these three reservoirs/lakes.

Mitigation measures **AB-1** and **AB-2** would minimize 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 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 273 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.

USFS MIS

In total, three perennial streams (Meadow, Niotche, and Saleratus creeks) would be within the Alternative II-C refined transmission corridor in the Fishlake National Forest (**Appendix G**, **Table G-13**). MIS in these streams include brown, cutthroat, and rainbow trout in Meadow Creek and cutthroat trout in Niotche Creek. Two of the streams with MIS would be crossed by the 250-foot-wide transmission line ROW, which could result in a direct loss of aquatic habitat of 400 square feet (0.01 acre) per stream, if culverts or low water construction is required. One stream (Little Creek), three springs, and Saleratus Reservoir would be within the potential disturbance beyond the refined transmission corridor, which could be affected by access roads or staging areas. Little Creek is the only waterbody that contains the MIS brown trout and rainbow trout. Mitigation measure **SSS-1**, discussed in Section 3.10.6.2, would minimize sedimentation impacts to forest streams with MIS fish.

Alternative II-D

Key Parameters Summary

The Alternative II-D ROW would cross 17 named perennial streams and a total of 18 crossings. Thirteen of these streams contain game fish species: Argyle Creek, Gooseberry Creek, Cottonwood Creek (Emery County, Utah), Green River, Hop Creek, North Fork Gordon Creek, Minnie Maud Creek, Mud Creek, Price River, San Pitch River, Upper Huntington Creek, White River, and Willow Creek (2 crossings). Five perennial streams would be in the potential disturbance area beyond the refined transmission corridor (**Appendix G, Table G-6**). One stream (Minnie Maud Creek) contains game fish species. Potential effects of access roads and staging areas on these waterbodies would be the same as discussed for Alternative II-A. Potential aquatic habitat loss would be 5,200 square feet (0.13 acre). Large rivers such as the Green and White were excluded from the habitat loss estimate because they would be crossed by existing roads if crossings are required. Box Elder Reservoir Number 3 in Moffat County, Colorado and one spring would be within the refined transmission corridor. Game fish are present in the reservoir. Four reservoirs and one spring also would be in the potential disturbance area beyond the refined transmission corridor (**Appendix G, Table G-7**). Three of the reservoirs/lakes (Box Elder Reservoir Number 2, Boulger Reservoir, and Electric Lake) contain game fish species.

Mitigation measures **AB-1** and **AB-2** would minimize 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 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 193 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. Protection measures for potential water depletions would be the same as discussed in Section 3.9.6.2. 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.

USFS MIS

Three streams (Gooseberry, Upper Huntington, and White Pine Fork creeks) in the Manti-La Sal National Forest would be within the Alternative II-D refined transmission corridor (**Appendix G**, **Table G-13**). These streams would be crossed by the 250-foot-wide transmission line ROW, which could result in direct loss of aquatic habitat of 400 square feet (0.01 acre) per stream, if culverts or low water construction is required. Two streams (Dry and Huntington creeks) and two lakes/reservoirs (Boulger Reservoir and Electric Lake) would be within the potential disturbance beyond the refined transmission corridor, which could be affected by access roads or staging areas. All of these waterbodies contain the MIS group, macroinvertebrates. Huntington Creek also contains the MIS, Colorado River cutthroat trout. Mitigation measure **SSS-1**, discussed in Section 3.10.6.2, would minimize sedimentation impacts to forest streams with MIS fish.

Alternative II-E

Key Parameters Summary

The Alternative II-E ROW would cross 20 named perennial streams and a total of 46 crossings. The increased number of crossings is due to multiple crossings for Argyle Creek (2), Soldier Creek (2), Price River (2), and Sowers Creek (24). Thirteen of the named streams contain game fish species: Argyle Creek (2 crossings), Beaver Creek, Duchesne River, Green River, Hop Creek, Lake Fork Creek, Lake Fork River, Price River (2 crossings), Soldier Creek (2 crossings), Thistle Creek, Tie Fork Creek, Uinta River, and Willow Creek. Eleven perennial streams would be in the potential disturbance area beyond the refined transmission corridor (**Appendix G, Table G-6**). Five of these streams (Clear, Hop, and Willow creeks and the Duchesne and White [tributary to the Price] rivers) contain game fish species. Potential aquatic habitat loss would be 16,800 square feet (0.39 acre). Large rivers such as the Duchesne, Green, Price, and White were excluded from the habitat loss estimate, as discussed for previous alternatives. One reservoir (Box Elder Reservoir 3 in Moffat County, Colorado) and one spring also would be within the Alternative II-E refined transmission corridor. Game fish occur in the reservoir. Three reservoirs and two springs also would be in the potential disturbance area beyond the refined transmission corridor (**Appendix G, Table G-7**). One reservoir (Box Elder Number 2) contains game fish species. Potential effects of access roads and staging areas on these additional waterbodies would be the same as discussed for Alternative II-A.

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 201 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. Protection measures for potential water depletions would be the same as discussed in Section 3.9.6.2. 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 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 refined transmission corridor would overlap with waterbodies in the Uinta National Forest Planning Area (Indian and Sheep creeks) and Ashley (Sowers Creek). MIS occurrence includes macroinvertebrates in Sowers Creek. Potential direct loss of aquatic habitat would include 800 square feet (0.02 acre) in the Uinta National Forest Planning Area and 9,600 square feet (0.22 acre) in the Ashley National Forest, if culverts or low water construction is required. One stream, Birch Creek, would be within the potential disturbance beyond the refined transmission corridor, which could be affected by access roads or staging areas. No MIS occur in the Birch Creek drainage.

Alternative II-F

Key Parameters Summary

A total of 18 named perennial streams would be crossed by the Alternative II-F ROW, with a total of 25 crossings. Game fish species occur in 14 of the streams crossed by the refined transmission corridor ROW. Fourteen of the named streams contain game fish species: Argyle Creek, Green River, Hop Creek, Kyune Creek, Right Fork Kyune Creek, Lake Fork Creek, Soldier Creek (2 crossings), Tabbyune Creek, Thistle Creek, Tie Fork Creek, West Fork Willow Creek (3 crossings), White River (tributary to the Green River), White River (tributary to the Price River), and Willow Creek (5 crossings). Nine perennial streams would be in the potential disturbance area beyond the refined transmission corridor (**Appendix G, Table G-6**). Four of these streams (Clear, Hop, and Minnie Maud creeks and the White River [tributary to the Price]) contain game fish species. Potential habitat loss due to the addition of a culvert or equipment disturbance during low water construction would be approximately 9,600 square

feet (0.21 acre). Large rivers such the Green and White were excluded from this estimate, as discussed for previous alternatives. Box Elder Reservoir Number 3 (in Moffat County, Colorado) and two springs also would be within the refined transmission corridor. The reservoir contains game fish species. Three reservoirs and two springs also would be in the potential disturbance area beyond the refined transmission corridor (**Appendix G, Table G-7**). One reservoir (Box Elder Number 2) contains game fish species. Potential effects of access roads and staging areas on these additional waterbodies would be the same as discussed for Alternative II-A.

Mitigation measures **AB-1** and **AB-2** would minimize 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 202 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-F. Protection measures for potential water depletions would be the same as discussed in Section 3.9.6.2. 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.

USFS MIS

The Alternative II-F transmission line refined transmission corridor and 250-foot-wide transmission line ROW would cross two streams in the Uinta National Forest Planning Area (Indian and Sheep creeks) (**Appendix G**, **Table G-13**). No MIS occur in these two streams. No streams would be within the potential disturbance beyond the refined transmission corridor.

Alternative II-G (Agency Preferred)

The Alternative II-G ROW would cross 16 named perennial streams with a total of 16 crossings. Two fewer streams (Gardner and West creeks) would be crossed by Alternative II-G compared to Alternative II-A. The same game fish streams (11) would be crossed by the Alternative II-G and II-A ROWs. Other parameter information involving the number of lakes and reservoirs within the refined corridor and potential disturbance from low water crossings or culverts would be the same as discussed for Alternative II-A.

The Fruitland Micro-siting Options 1, 2, and 3 would cross two perennial streams, Red and Currant creeks. These same streams would be crossed by the comparable portions of Alternative II-A. Potential impacts to these streams would be reduced by BMPs, design features, and mitigation measures discussed in Section 3.9.6.2. The Strawberry IRA Micro-siting Options would not substantially affect the impact analyses for aquatic species because there are no perennial streams crossed.

USFS MIS

Two perennial streams, Sheep and Tie Fork creeks, would be crossed by the Alternative II-G ROW in the Uinta National Forest Planning Area, which is the same as discussed for Alternative II-A. The only notable difference when comparing Alternative II-G to Alternative II-A is that no additional streams (e.g., Birch Creek) would be in the potential disturbance area beyond the refined transmission corridor associated with Alternative II-G.

Alternative Variation in Region II

Reservation Ridge Alternative Variation

Potential impacts of constructing the Reservation Ridge Alternative Variation on aquatic biological resources would be less than the comparable portion of Alternative II-F, based on the number of perennial stream ROW crossings. In total, two perennial streams (Bear and Tabbyune creeks) would be crossed by the Reservation Ridge Alternative Variation refined transmission corridor ROW. Six additional perennial streams would be within the refined transmission corridor for this variation (Argyle, Kyune,

Right Fork Kyune, Right Fork White River, Tabbyune, and West Fork Willow creeks). In comparison, six perennial streams would be crossed by the comparable portion of Alternative II-F (Horse, Kyune, Right Fork Kyune, Tabbyune, West Fork Willow, and Willow creeks). Erosion control and spill control measures would be implemented to reduce water quality impacts to streams crossed by the ROW for the II-F segment and the Reservation Ridge Alternative Variation.

Two waterbodies (Horse Ridge Spring in the Ashley National Forest and Tabbyune Creek in the Uinta National Forest Planning Area) would be crossed by the Reservation Ridge Alternative Variation refined transmission corridor. MIS in these streams include macroinvertebrates in the spring and Colorado River cutthroat trout in Tabbyune Creek. If a culvert or low water construction is required for the ROW crossing for Tabbyune Creek, there would be a habitat loss of 400 square feet (0.01 acre).

Alternative Connectors in Region II

The Castle Dale and IPP East alternative connectors would not cross perennial streams. **Table 3.9-12** summarizes impacts and advantages associated with the Price and alternative connectors in Region II.

Table 3.9-12 Summary of Region II Alternative Connector Impacts for Aquatic Biological Resources

Alternative Connector	Analysis	Advantage
Price	There would be two perennial streams (Miller and South Gordon creeks) within the refined transmission corridor. These streams do not support game fish species.	There would be no apparent unique opportunities or constraints for aquatic biological resources by utilizing this connector.
Roan Cliffs	Two perennial streams (West Fork Willow and Willow creeks) would be crossed by the refined transmission corridor in this alternative connector. The comparable portion of Alternative II-F would cross six perennial streams (Horse, Kyune, Right Fork Kyune, Tabbyune, West Fork Willow, and Willow creeks). Except for Bear and Horse creeks, the streams contain game fish species.	There would be an advantage to aquatic biological resources by utilizing this connector due to the lower number of perennial stream crossings. However, BMPs, design features, and additional mitigation would reduce effects on aquatic biological resources in spite of the additional crossings by the comparable portion of Alternative II-F.

USFS MIS

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

Region II Series Compensation Stations (Design Option 3)

If Design Option 3 were implemented, a series compensation station would be necessary along the alternative routes of Region II during the first-phase (AC operation). Potential impacts associated with three stations are described below.

Series Compensation Station 1 – Design Option 3 corresponds to Alternatives II-A, II-E, and II-G. There would be two intermittent channels within the siting area that contain macroinvertebrates during periods when water is present. No game fish species are present in these streams. There are existing roads that could be used to access the site, negating the need for additional stream crossings.

Series Compensation Station 2 – Design Option 3 corresponds to Alternatives II-B and II-C. There would be one intermittent channel within the siting area that could support macroinvertebrates when water is present. No game fish species are present. There is a mapped existing road that could be used to access the site, negating the need for additional stream crossings.

Series Compensation Station 3 – Design Option 3 corresponds to Alternatives II-D and II-F. There would be several intermittent channels within the siting area, which could contain macroinvertebrates. No game

fish species occur in these streams. There are existing oil and gas roads that could be used to access the site, negating the need for additional stream crossings.

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 Alternative II-E. Potential effects for the other alternatives including II-G would be similar and lower compared to Alternative II-E (**Table 3.9-10**). Alternative II-E could result in the greatest potential alteration or loss of habitat (16,800 square feet or 0.39 acre) compared to 5,600 to 9,600 square feet or 0.13 to 0.21 acre for the other six Region II alternatives. 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 seven alternatives. Alternative II-E could result in the highest potential construction disturbance to riparian areas near perennial streams (100 acres at a 100-foot buffer distance and 253 acres at a 300-foot buffer distance) (**Table 3.9-11**). Potential disturbance to riparian habitat for the other six alternatives would be similar or less compared to Alternative II-E. Alternative II-G ranked in the low to mid-range of the riparian disturbance estimates. Even though the greatest level of impacts would be associated with Alternative 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 3.9-13 and **3.9-14** provide a summary of impact parameters used to describe impacts for alternative routes in Region III. Game fish occurrences for Region III's refined transmission corridors are provided in **Appendix G**, **Table G-8** for streams and **Table G-9** for waterbodies.

The road density analysis for Region III alternatives is discussed in Water Resources, Section 3.4, with results provided in **Table 3.4-13**. These results would apply to perennial streams as aquatic habitat for game fish and other aquatic species.

Table 3.9-13 Summary of Region III Alternative Route Impacts for Aquatic Biological Resources

Parameter	Alternative			
	III-A	III-B	III-C	III-D
Number of Named Perennial Stream[1] Crossings by 250-foot-wide transmission line ROW	3	4	0	4
Number of Game Fish Streams Crossed by 250-foot-wide transmission line ROW	0	1	0	1
Number of Game Fish Stream 250-foot-wide transmission line ROW Crossings	0	1	0	1
Potential Aquatic Habitat Alteration or Loss[2] (square feet)	1,200	1,600	0	1,600
Potential Aquatic Habitat Alteration or Loss (acres)	0.03	0.04	0	0.04
Percent of Potentially Affected Habitat Compared to Perennial Habitat in Watersheds	<0.1	<0.1	0	<0.1
Number of Reservoirs/Lakes Located within the Refined transmission corridor and Potential Disturbance Area Beyond the Refined transmission corridor	3	5	3	3
Number of Springs Located within the Refined transmission corridor and Potential Disturbance Area Beyond the Refined transmission corridor	12	8	9	9

[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.

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 3.9-14**. The highest level of potential riparian disturbance is indicated for Alternatives III-A, III-B, and III-D. However, compliance with WWEC stipulation ECO-3, which requires project design to avoid or minimize impacts to riparian resources, combined with relevant BLM FO stipulations and TransWest's applicant-committed measure to span, avoid, or mitigate impacts to riparian vegetation (TWE-12), would preclude long-term impacts on riparian habitat (see **Appendix C**, **Tables C.1-1, C.2-1, C.3-27**, and **C.3-28**).

Table 3.9-14 Ground Disturbance (Acres) for Buffer Distances from Riparian Habitat, Region III

	Alternative							
	III-A		III-B		III-C		III-D	
	100 feet	300 feet	100 feet	300 feet	100 feet	300 feet	100 feet	300 feet
Streams								
Construction	3	10	2	7	<1	<1	2	7
Operation	1	3	<1	1	<1	<1	<1	1
Reservoirs/Lakes/Springs								
Construction	1	3	1	2	<1	2	1	2
Operation	1	1	<1	1	<1	<1	<1	1

Alternative III-A (Applicant Proposed)

Key Parameters Summary

The Alternative III-A ROW would cross three named perennial streams (Spring Creek, Magotsu Creek, and the Muddy River). None of the perennial streams that would be 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 1,200 square feet (0.03 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 12 springs would be within the Alternative III-A refined transmission corridor and potential disturbance area beyond the refined transmission 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. Protection measures for potential water depletions would be the same as discussed in Section 3.9.6.2. 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 four springs would be within the Alternative III-A refined transmission corridor in the Dixie National Forest (**Appendix G, Table G-13**). Both streams contain MIS, Virgin spinedace. No MIS occur in the springs. Both streams would be crossed by the 250-foot-wide transmission line ROW, which could result in a direct loss of aquatic habitat of 400 square feet (0.01 acre) per stream, if culverts or low water construction is required. No additional

waterbodies with MIS would be in the potential disturbance area beyond the refined transmission corridor. Mitigation measure **SSS-1**, discussed in Section 3.10.6.2, would minimize sedimentation impacts to forest streams with MIS fish.

Alternative III-B

Key Parameters Summary

The Alternative III-B ROW would cross four named perennial streams (Clover Creek, Mud Springs Wash, Meadow Valley Wash, and Muddy River). Clover Creek is the only stream that contains game fish species (rainbow trout). Potential habitat loss would be 1,600 square feet (0.04 acre), if culverts or low water construction is required. Five reservoirs/lakes and eight springs would be within the Alternative III-B refined transmission corridor and potential disturbance area beyond the refined transmission corridor. The reservoirs/lakes include Smelter Knolls 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 minimize 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. Protection measures for potential water depletions would be the same as discussed in Section 3.9.6.2. 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 NFS lands would be crossed by the Alternative III-B refined transmission corridor or 250-foot-wide transmission line ROW (**Appendix G**, **Table G-13**).

Alternative III-C

Key Parameters Summary

The Alternative III-C ROW would not cross any perennial streams. One stream, Meadow Valley Wash, would be in the refined transmission corridor and contains game fish species (rainbow trout). There would be no potential habitat loss, since there are no streams crossed by the ROW. Three reservoirs/lakes (West Clay Knoll and West Marshall Tract reservoirs in Millard County, Utah; and Lower Big Wash Reservoir in Beaver County, Utah) and nine springs would be within the Alternative III-C refined transmission corridor and potential disturbance area beyond the refined transmission corridor. None of these waterbodies contain game fish species.

Mitigation measures **AB-1** and **AB-2** would minimize 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. Protection measures for potential water depletions would be the same as discussed in Section 3.9.6.2. 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 NFS lands would be crossed by the Alternative III-C refined transmission corridor or 250-foot-wide transmission line ROW.

Alternative III-D (Agency Preferred)

The potential impacts of Alternative III-D on aquatic biological resources would be the same as discussed for Alternative III-B. The same BMPs, design features and mitigation measures would be implemented to reduce impacts to aquatic biological resources. 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 NFS lands would be crossed by the Alternative III-D refined transmission corridor or 250-foot-wide transmission line ROW.

Alternative Variations in Region III

Table 3.9-15 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 Variation ROWs would be 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. Three perennial streams (South Fork Pinto Creek, Pinto Creek, and the Santa Clara River) would be within the Pinto Alternative Variation refined transmission corridor, with 8 crossings of the 250-foot-wide transmission line ROW. All of these streams (South Pinto Creek, Pinto Creek, and the Santa Clara River) contain game fish. The comparable portion of Alternative III-A would cross 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 3.9-15 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 Stream[1] Crossings by 250-foot-wide transmission line ROW	1	1	1	1	10	1
Number of Game Fish Streams Crossed by 250-foot-wide transmission line ROW	0	0	0	0	3	0

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

USFS MIS

Waterbodies that would occur within Region III variations on Dixie National Forest lands are listed in **Appendix G**, **Table G-13**. The following alternative variations would overlap with waterbodies in the Dixie National Forest:

- Ox Valley East – One stream (Spring Creek) with MIS (Virgin spinedace);
- Ox Valley West – One stream (Spring Creek) with MIS (Virgin spinedace);

- Ox Valley East and West – No streams with MIS; and
- Pinto – MIS in four streams – 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 would not cross perennial streams.

The Arrowhead Alternative Connector would cross one named perennial stream, the Muddy River. No game fish species occur in the Muddy River.

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 were analyzed. Impacts associated with the construction and operation of this system would be the same as discussed for Alternative I-A. **Table 3.9-16** 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 3.9-16 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[1] (acre-feet)
Mormon Mesa - Carp Elgin Rd (Alternative III-A)	0	7	8	7	4
Halfway Wash - Virgin River (Alternative III-A)	0	5	1	6	3
Halfway Wash E (Alternative III-A)	0	12	0	12	6
Mormon Mesa - Carp Elgin Rd (Alternative III-B)	0	8	1	9	6
Halfway Wash - Virgin River (Alternative III-B)	0	3	0	3	4
Halfway Wash E (Alternative III-B)	0	15	1	16	7
Meadow Valley 2 (Alternative III-C)	0	27	0	27	16
Delta (Design Option 2)	0	11	0	11	10

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

Region III Series Compensation Stations (Design Option 2)

If Design Option 2 were implemented, a series compensation station would be necessary along the AC-configured alternative routes of Region III. Impacts associated for three potential sites are described below.

Series Compensation Station 1 – Design Option 2 corresponds to Alternative III-A. There would be one intermittent channel within the siting area that could support macroinvertebrates when water is present. No game fish species are present. There is an existing road that could be used to access the site, negating the need for additional stream crossings.

Series Compensation Station 2 – Design Option 2 corresponds to Alternative III-C. There would be multiple intermittent channels within the siting area, all flowing through an alluvial fan from the Delmar Mountains, which could support macroivertebrates when water is present. These streams do not contain

game fish species. There is an existing road that could be used to access the site, negating the need for additional stream crossings.

Series Compensation Station 3 – Design Option 2 corresponds to Alternative II-B. There would be several intermittent channels within the siting area that could contain macroinvertebrates. No game fish species are present. There are existing roads that could be used to access the site, negating the need for additional stream crossings.

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, III-B, and III-D compared to Alternative III-C (**Table 3.9-13**). Alternatives III-A, III-B, and III-D could result in the greatest potential alteration or loss of habitat (1,200 to 1,600 square feet or 0.03 to 0.04 acre) compared to no habitat loss 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, III-B, and III-D also could result in the highest potential construction disturbance to riparian areas near perennial streams (2 to 3 acres at a 100-foot buffer distance and 7 to 10 acres at a 300-foot buffer distance) compared to Alternative III-C (<1 acre for both buffer distances) (**Table 3.9-14**). Even though the greatest level of impacts would be associated with Alternatives III-A, III-B, and III-D, 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 3.9-17 provide a list of impact parameters associated with alternative routes in Region IV. Game fish occurrences for Region IV's refined transmission corridors are provided in **Appendix G**, **Table G-10** for streams and **Table G-11** for waterbodies.

Table 3.9-17 Summary of Region IV Alternative Route Impacts for Aquatic Biological Resources

Parameter	Alternative IV-A	Alternative IV-B	Alternative IV-C
Number of Named Perennial Stream[1] Crossings by 250-foot-wide transmission line ROW	1	2	1
Number of Game Fish Streams Crossed by 250-foot-wide transmission line ROW	1	0	0
Number of Game Fish Stream 250-foot-wide transmission line ROW Crossings	1	0	0
Potential aquatic habitat alteration or loss[2] (square feet)	400	800	400
Potential Aquatic Habitat Alteration or Loss (acres)	0.01	0.02	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 Refined transmission corridor and Potential Disturbance Area Beyond the Refined transmission corridor	0	1	3
Number of Springs Located within the refined transmission corridor and Potential Disturbance Area Beyond the Refined transmission corridor	1	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 3.4-18**. These results would apply to perennial streams as aquatic habitat for game fish and other aquatic species.

Table 3.9-18 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	2	2	5	1	3
Operation	<1	<1	<1	1	<1	1
Reservoirs/Lakes/Springs						
Construction	1	1	1	2	1	2
Operation	<1	1	1	1	1	1

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 3.9-18**. The potential riparian disturbance associated with perennial streams would be slightly higher for Alternative IV-B compared to Alternatives IV-A and IV-C. Potential disturbance to riparian areas associated with reservoirs would be similar for all three alternatives. Impacts to riparian areas would be minimized as a result of design features and stipulations for BLM lands such as a 0.25-mile buffer from natural waters in the Las Vegas FO.

Alternative IV-A (Applicant Proposed and Agency Preferred)

Key Parameters Summary

The Alternative IV-A ROW 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 square feet or 0.01 acre. No additional waterbodies that contain game fish species would be crossed by the refined transmission 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 for Alternative IV-A. BMPs, design features, and mitigation measures involving herbicide use and sediment control would be implemented to minimize water quality effects on aquatic habitat at the perennial stream crossing. 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. Protection measures for potential water depletions would be the same as discussed in Section 3.9.6.2. After implementing the BMPs, design features, and additional mitigation measures, there would be no long-term effects on aquatic habitat and species.

Alternative IV-B

Key Parameters Summary

The Alternative IV-B 250-foot-wide transmission line ROW would cross one named perennial stream (Hemenway Wash) at two locations. In addition, Las Vegas Wash and an arm of Lake Mead would be located in the potential disturbance area beyond the refined transmission corridor, which potentially could be affected by access roads or staging areas. Las Vegas Wash and Lake Mead 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 800 square feet or 0.02 acre in Hemenway Wash.

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 and sediment control would be implemented to minimize water quality effects on aquatic habitat in the other waterbody crossings. There could be temporary reductions in macroinvertebrates, if water is present at the time of construction. Water use for concrete foundations and construction dust control would be 30 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. Protection measures for potential water depletions would be the same as discussed in Section 3.9.6.2. 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 potential culvert.

Alternative IV-C

Key Parameters Summary

The Alternative IV-C ROW would cross one named perennial stream, Hemenway Wash, at one location. Las Vegas Wash and an arm of Lake Mead would be located within the potential disturbance area beyond the refined transmission corridor, which potentially could be affected by access roads or staging areas. Game fish occur in Las Vegas Wash and Lake Mead. Potential habitat loss due to possible use of culverts, low water crossing, or temporary disturbance from instream use of equipment would be 400 square feet or 0.01 acre. Three reservoirs/lakes (Lake Mead, Dry Lake, and C C C Reservoir) would be within the Alternative IV-C potential disturbance area beyond the refined transmission corridor. Water use for construction would be 33 acre-feet.

The effects of construction and maintenance activities on aquatic species and habitat associated with Hemenway Wash, Lake Mead, and Las Vegas Wash would be the same as discussed for Alternative IV-B. The same BMPs, design features, and additional mitigation measures discussed for Alternative IV-B would be applied to Alternative IV-C with the exception of water use for concrete foundations and construction dust control, which would be 33 acre-feet.

Alternative Variations in Region IV

No waterbodies would be crossed by the Marketplace Alternative Variation.

Alternative Connectors in Region IV

Table 3.9-19 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 3.9-19 Summary of Region IV Alternative Connector Impacts for Aquatic Biological Resources

Alternative Connector	Analysis	Advantage
River Mountain Alternative Connector	Impacts would be limited to one stream (Hemenway Wash) crossed by this alternative.	There would be 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 Alternative IV-B compared to Alternatives IV-A and IV-C.

Potential effects for Alternatives IV-A and IV-C would be similar (**Table 3.9-17**). Alternative IV-B could result in the greatest potential alteration or loss of habitat (800 square feet or 0.02 acre) compared to 400 square feet or 0.01 acre for Alternatives IV-A and IV-C. Even though there are slight 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 also could result in slightly higher potential construction disturbance to riparian areas near perennial streams (2 acres at a 100-foot buffer distance and 5 acres at a 300-foot buffer distance) (**Table 3.9-18**). Potential disturbance to riparian habitat for Alternatives IV-A would be 1 to 2 acres for the buffer distances, respectively. Even though the greatest level of impacts would be associated with Alternative IV-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 3.9.6.6 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 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 (**Tables 3.9-7, 3.9-10, 3.9-13**, and **3.9-17**).
- 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.

3.9.6.8 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 (**Tables 3.9-7, 3.9-10, 3.9-13**, and **3.9-17**).
- Potential amphibian mortalities from vehicle traffic would be an irretrievable and irreversible loss of a portion of amphibian populations.

3.9.6.9 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, macroinvertebrate, or amphibian populations.

3.9.6.10 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 wildland fires) and existing development in drainages within the analysis area.