Utah Lake Drainage Basin
Water Delivery System
Bonneville Unit, Central Utah Project

Draft Environmental Impact Statement

Draft Wildlife Resources and Habitat Technical Report

March 2004

UTAH RECLAMATION
MITIGATION
AND CONSERVATION
COMMISSION

Utah Lake Drainage Basin Water Delivery System
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Prepared by
Central Utah Water Conservancy District

Wildlife Resources and Habitat Technical Report
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Chapter 1
Introduction

1.1 Purpose and Organization

This *Wildlife and Habitat Resources Technical Report* (TR) analyzes potential impacts on wildlife species and their habitats from the construction, operation and maintenance of the Utah Lake Water Delivery System (ULS).

This TR addresses issues raised during the public and agency scoping process for the ULS and provides baseline information to support the ULS Draft Environmental Impact Statement (DEIS) being prepared in compliance with the National Environmental Policy Act (NEPA). Related information on threatened and endangered and sensitive wildlife resources is presented in EIS, Chapter 3, Section 3.9 Threatened and Endangered Species, and Section 3.10 Sensitive Species.

This TR is organized by the following chapters:

Chapter 1 – An outline of the TR and a summary description of the Preferred Alternative and other alternatives

Chapter 2 – Methodology used in the analysis of wildlife and habitat resources

Chapter 3 – Existing Environment (Baseline Conditions)

Chapter 4 – Analysis of environmental consequences (impacts)

Chapter 5 – Mitigation and monitoring for significant impacts identified in the analysis

Chapter 6 – Unavoidable adverse impacts

Chapter 7 – Cumulative impacts of the ULS and related actions

1.2 Description of Preferred Alternative and Other Alternatives

This section serves as an overview of the ULS alternatives for this technical report.

1.2.1 Spanish Fork Canyon–Provo Reservoir Canal Alternative (Preferred Alternative)

Table 1-1 presents the Preferred Alternative features. This alternative has a total transbasin diversion of 101,900 acre-feet, which consists of the following amounts of water: 30,000 acre-feet of municipal and industrial (M&I) secondary water to southern Utah County, 30,000 acre-feet of M&I water to Salt Lake County, 1,590 acre-feet of M&I water already contracted to the southern Utah County cities, and 40,310 acre-feet of M&I water to Utah Lake for exchange to Jordanelle Reservoir. It would involve constructing five new pipelines: 1) from the mouth of Diamond Fork Canyon to the mouth of Spanish Fork Canyon; 2) from the mouth of Spanish Fork Canyon to Santaquin in southern Utah County; 3) from Santaquin to Mona Reservoir; 4) from the mouth of Spanish Fork Canyon to Hobble Creek along the Mapleton-Springville Lateral alignment; and 5) from the mouth of Spanish Fork Canyon to the Provo Reservoir Canal and Jordan Valley Aqueduct. Under this alternative, the Department of the Interior (DOI) would acquire approximately 57,000 acre-feet of the Central Utah Water Conservancy District's (District) secondary water rights in Utah Lake as part of the project water supply. Two power generating facilities would be constructed in the Diamond Fork System under this alternative.

Table 1-1
Construction Features of Utah Lake Drainage Basin Water Delivery System Alternatives

Feature	Spanish Fork Canyon – Provo Reservoir Canal Alternative (Preferred Alternative)	Bonneville Unit Water Alternative	No Action Alternative
Sixth Water Power Facility and Transmission Line	45 MW generator and 12.9 miles of overhead transmission line upgraded to 138 kV from Sixth Water Power Facility to Highway 6	45 MW generator and 12.9 miles of overhead transmission line upgraded to 138 kV from Sixth Water Power Facility to Highway 6	Not constructed
Upper Diamond Fork Power Facility and Underground Cable	5 MW generator and 1.6 miles of 25 kV underground cable (existing) through Tanner Ridge Tunnel to Sixth Water Transmission Line	5 MW generator and 1.6 miles of 25 kV underground cable (existing) through Tanner Ridge Tunnel to Sixth Water Transmission Line	Not constructed
Spanish Fork Canyon Pipeline	7.0 mile steel pipeline, 84-inches diameter from Spanish Fork Flow Control Structure at mouth of Diamond Fork Creek to Moark Junction	7.0 mile steel pipeline, 72-inches diameter from Spanish Fork Flow Control Structure at mouth of Diamond Fork Creek to Moark Junction	Not constructed
Spanish Fork-Santaquin Pipeline	17.5 mile steel pipeline, ranging from 60- to 36-inches diameter, from terminus of Spanish Fork Canyon Pipeline to Santaquin	17.5 mile steel pipeline, ranging from 48- to 30-inches diameter, from terminus of Spanish Fork Canyon Pipeline to Santaquin (CUPCA Section 207 feature)	Not constructed
Santaquin-Mona Reservoir Pipeline	7.7 mile steel pipeline, 24-inches diameter, from terminus of Spanish Fork-Santaquin Pipeline to Mona Reservoir	Not constructed	Not constructed
Mapleton-Springville Lateral Pipeline (CUPCA Section 207)	5.7 mile steel pipeline, ranging from 48- to 30-inches diameter from terminus of Spanish Fork Canyon Pipeline to Hobble Creek	5.7 mile steel pipeline, ranging from 48- to 30-inches diameter, from terminus of Spanish Fork Canyon Pipeline to Hobble Creek	Not constructed
Spanish Fork – Provo Reservoir Canal Pipeline	19.7 mile steel pipeline, ranging from 60- to 48 inches diameter, from terminus of Spanish Fork Canyon Pipeline to Provo Reservoir Canal and Jordan Valley Aqueduct	Not constructed	Not constructed

The following summarizes the Preferred Alternative operation.

- 30,000 acre-feet of M&I water would be conveyed to Salt Lake County through the new pipelines and a combination of existing facilities (Jordan Aqueduct and Provo Reservoir Canal conveyance facilities) to water treatment plants for treatment and culinary supply.

- 30,000 acre-feet of M&I water would be conveyed through the new pipelines to the South Utah Valley Municipal Water Association (SUVMWA) member cities in southern Utah County.

- 1,590 acre-feet of Bonneville Unit water already contracted would continue to be used by SUVMWA member cities as M&I water.

- 40,310 acre-feet of project M&I water would be delivered to Utah Lake for exchange to Jordanelle Reservoir. This water would consist of the following: an average of 16,273 acre-feet would be released for in-stream flows in Sixth Water Creek (8,773 acre-feet through the Strawberry Tunnel) and Diamond Fork Creek (7,500 acre-feet released from the Diamond Fork Flow Control Structure) and flow down the Spanish Fork River to Utah Lake mainly during the winter months; an average of 16,000 acre-feet would be conveyed through the Spanish Fork–Provo Reservoir Canal Pipeline and discharged to the Provo River to assist in meeting in-stream flows when water is being delivered from Strawberry Reservoir to Utah Lake for exchange up to Jordanelle Reservoir; and about 8,037 acre-feet would be conveyed through the Mapleton-Springville Lateral Pipeline and released to Utah Lake via Hobble Creek. All of this water would be subsequently exchanged from Utah Lake to Jordanelle Reservoir.

- Up to 10,200 acre-feet of Strawberry Valley Project (SVP) water shares held by SUVMWA would be conveyed to member cities through the new ULS pipelines in southern Utah County on a space-available basis.

- Hydroelectric project power would be generated and contracted to the Western Area Power Administration (see Table 1-1 for generating capacities).

- By implementing Section 207 Water Conservation Program projects, at least 12,000 acre-feet of project water would be provided for in-stream flow purposes to assist in meeting the flows necessary for recovery of the June sucker. Of this amount, at least 4,000 acre-feet would be obtained from projects in southern Utah County to be released down Hobble Creek, and at least 8,000 acre-feet would be obtained from projects in north Utah County to be released and conveyed through the lower Provo River.

- As allowed under the Jordanelle-Deer Creek Operating Agreement, an average annual 12,165 acre-feet of project water would be provided as flows for June sucker spawning and rearing in the lower Provo River to assist in meeting the June Sucker Recovery Implementation Program (JSRIP) goals. Of this amount 4,165 acre-feet has already been obtained, and as indicated above, at least an additional 8,000 acre-feet would be obtained from new section 207 projects in north Utah County and released through the lower Provo River.

- Approximately 3,300 acre-feet of lower Provo River water rights already purchased by the Mitigation Commission would flow undiverted to Utah Lake, thereby increasing the summertime flow in the lower Provo River.

- An average of 12,037 acre-feet of water would be available through the Mapleton-Springville Lateral pipeline to Hobble Creek for June sucker spawning and rearing flows to meet JSRIP goals and to provide

other fish and wildlife benefits throughout the year. This water would be subsequently exchanged from Utah Lake to Jordanelle Reservoir. Of the 12,037 acre-feet, 4,000 acre-feet would be provided in every year that it is needed. The remaining 8,037 acre-feet only would be provided when water is being delivered from Strawberry Reservoir to Utah Lake for exchange up to Jordanelle Reservoir. Hobble Creek supplemental water would not be delivered during high runoff years when Utah Lake is above compromise level. The high runoff years correspond with years when natural runoff would be sufficient to attract June sucker spawning. The term compromise is used throughout this report. It needs to be defined here or in the definition section.

1.2.2 Bonneville Unit Water Alternative

Table 1-1 presents the features of this alternative. This alternative has a total transbasin diversion of 101,900 acre-feet which consists of which consists of the following amounts of water: 15,800 acre-feet of M&I secondary water to southern Utah County, 1,590 acre-feet of M&I water already contracted to the southern Utah County cities, and 84,510 acre-feet of M&I water to Utah Lake for exchange to Jordanelle Reservoir. It would involve constructing three new pipelines, the same as described for the Preferred Alternative: 1) from the mouth of Diamond Fork Canyon to the mouth of Spanish Fork Canyon; 2) from the mouth of Spanish Fork Canyon to Santaquin in southern Utah County; and 3) from the mouth of Spanish Fork Canyon to Hobble Creek along the Mapleton – Springville Lateral alignment. The Spanish Fork Canyon Pipeline would be a federally funded ULS feature; the other two pipelines would be constructed as combined ULS and Section 207 Water Conservation Program features. Under this alternative, two power generating facilities would be constructed in the Diamond Fork System; the DOI would acquire approximately 15,000 acre-feet of District secondary water rights in Utah Lake as part of the project water supply; and no M&I water would be conveyed to Salt Lake County.

The following summarizes the Bonneville Unit Water Alternative operation:

- 15,800 acre-feet of additional Bonneville Unit M&I water would be delivered to SUVMWA member cities through the Spanish Fork-Santaquin Pipeline in southern Utah County under a contract with SUVMWA.

- 1,590 acre-feet of Bonneville Unit water already contracted would continue to be used by SUVMWA member cities as M&I water.

- 84,510 acre-feet of project M&I water minus conveyance losses would be delivered to Utah Lake for exchange to Jordanelle Reservoir. This water would consist of the following: an average of 16,273 acre-feet would be released for in-stream flows in Sixth Water Creek (8,773 acre-feet through the Strawberry Tunnel) and Diamond Fork Creek (7,500 acre-feet released from the Diamond Fork Flow Control Structure) and flow down the Spanish Fork River to Utah Lake mainly during the winter months; 48,727 acre-feet would be released from the Spanish Fork Flow Control Structure to be conveyed down the Spanish Fork River to Utah Lake; and 19,510 acre-feet would be conveyed through the Mapleton-Springville Lateral Pipeline and released to Utah Lake via Hobble Creek. All of this water would be subsequently exchanged from Utah Lake to Jordanelle Reservoir.

- Up to 10,200 acre-feet of Strawberry Valley Project (SVP) water shares held by SUVMWA would be conveyed to member cities through the new ULS pipelines in southern Utah County.

- Hydroelectric project power would be generated from the M&I water conveyance and contracted to the Western Area Power Administration (see Table 1-1 for generating capacities).

- By implementing Section 207 Water Conservation Program projects, at least 12,000 acre-feet of project water would be provided for in-stream flow purposes to assist in meeting the flows necessary for recovery of the June sucker. Of this amount, at least 4,000 acre-feet would be obtained from projects in southern Utah County to be released down Hobble Creek, and at least 8,000 acre-feet would be obtained from projects in north Utah County to be released and conveyed through the lower Provo River.

- As allowed under the Jordanelle-Deer Creek Operating Agreement, an average annual 12,165 acre-feet of project water would be provided as flows for June sucker spawning and rearing in the lower Provo River to assist in meeting the June Sucker Recovery Implementation Program (JSRIP) goals. Of this amount 4,165 acre-feet has already been obtained, and as indicated above, at least an additional 8,000 acre-feet would be obtained from new section 207 projects in north Utah County and released through the lower Provo River.

- Approximately 3,300 acre-feet of lower Provo River water rights already purchased by the Mitigation Commission would flow undiverted to Utah Lake, thereby increasing the summertime flow in the lower Provo River.

- An average of 23,510 acre-feet of water would be conveyed through the Mapleton-Springville Lateral pipeline to Hobble Creek for June sucker spawning and rearing flows to meet JSRIP goals and to provide other fish and wildlife benefits throughout the year. This water would be subsequently exchanged from Utah Lake to Jordanelle Reservoir. Of the 23,510 acre-feet, 4,000 acre-feet would be provided in every year that it is needed. The remaining 19,510 acre-feet only would be provided when water is being delivered from Strawberry Reservoir to Utah Lake for exchange up to Jordanelle Reservoir. Hobble Creek supplemental water would not be delivered during high runoff years when Utah Lake is above compromise level The high runoff years correspond with years when natural runoff would be sufficient to attract June sucker spawning.

1.2.3 No Action Alternative

No new water conveyance features would be constructed under the No Action Alternative. The 86,100 acre-feet of Bonneville Unit M&I water, minus the 1,590 acre-feet of Bonneville Unit water already contracted for by SUVMWA member cities, would be conveyed from Strawberry Reservoir through the existing Diamond Fork System and discharged into the Spanish Fork River at the mouth of Diamond Fork Canyon, as described in the 1999 Diamond Fork FS_FEIS. All of this water would be exchanged from Utah Lake to Jordanelle Reservoir.

The following summarizes the No Action Alternative operation.

- 86,100 acre-feet of project M&I water minus conveyance losses would be delivered to Utah Lake for exchange to Jordanelle Reservoir. This water would consist of the following: an average of 16,273 acre-feet would be released for in-stream flows in Sixth Water Creek (8,773 acre-feet through the Strawberry Tunnel) and Diamond Fork Creek (7,500 acre-feet released from the Diamond Fork Flow Control Structure) and flow down the Spanish Fork River to Utah Lake mainly during the winter months; and 69,827 acre-feet would be released from the Spanish Fork Flow Control Structure. Of the 69,827 acre-feet, 1,590 acre-feet would be delivered to SUVMWA member cities under existing contracts, and the remaining 68,237 acre-feet would be conveyed through the Spanish Fork River to Utah Lake throughout the year. All of this water would be subsequently exchanged from Utah Lake to Jordanelle Reservoir.

- 1,590 acre-feet of Bonneville Unit water already contracted would continue to be used by SUVMWA member cities as M&I water.

- As allowed under the Jordanelle-Deer Creek Operating Agreement, an average annual 12,165 acre-feet of project water would be provided as flows for June sucker spawning and rearing in the lower Provo River to assist in meeting the June Sucker Recovery Implementation Program (JSRIP) goals. Of this amount 4,165 acre-feet has already been obtained, and as indicated above, at least an additional 8,000 acre-feet would be obtained from new section 207 projects in north Utah County and released through the lower Provo River.

- Approximately 3,300 acre-feet of lower Provo River water rights already purchased by the Mitigation Commission would flow undiverted to Utah Lake, thereby increasing the summertime flow in the lower Provo River.

1.3 Scoping Issues

1.3.1 Issues Raised in Scoping Meetings

The following wildlife and habitat issues were raised during the public and agency scoping process:

- What impacts would occur on wildlife under Concept 1? (Note: Concept 1 was later named the Strawberry Reservoir - Deer Creek Reservoir Alternative)

- What impacts would occur on Wasatch Mountain State Park from a power line?

- What would be the short-term impacts of pipeline construction on riparian areas, wildlife habitats and critical spawning periods for aquatic species?

- What would be the impacts on deer, elk and bighorn sheep under Concept 2 (Note: Concept 2 was later named the Spanish Fork Provo Reservoir Canal/Pipeline Alternative) if the pipeline followed the Bonneville Shoreline Trail?

- What would be the impacts on channel stability, wildlife habitats, and sediment transport?

- What would be the impacts on open space and wildlife habitat from providing irrigation rather than M&I water through the ULS?

- What would be the impacts of the ULS Project on wetlands and shoreline habitats around Utah Lake?

- What would be the impacts of each of the ULS concepts on any species covered by conservation agreements or strategies?

- What would be the impacts of the ULS water delivery concepts on:
  - Habitat destruction, fragmentation and alteration (aquatic and terrestrial)
  - Loss of species diversity (aquatic and terrestrial)

- What would be the impacts of the ULS water delivery alternatives on vegetation?

- What would be the short-term impacts of construction of a pipeline from Strawberry Reservoir to Daniels Pass, with particular concern for water quality, sediment yield, noxious weed invasion, and ORV use of disturbed sites?

- What would be the impacts of each ULS water delivery concept on Utah Lake emergent vegetation, water quality, and evaporation?

1.3.2 Scoping Issues Eliminated From Further Consideration

The following issues have been eliminated from further consideration.

What impacts would occur on Wasatch Mountain State Park from a power line?

None of the proposed alternatives would involve constructing a power line across the Wasatch Mountain State Park.

What would be the impacts on deer, elk and bighorn sheep under Concept 2 if the pipeline followed the Bonneville Shoreline Trail?

At the time of the public scoping process Concept 2 was a pipeline through Springville and Provo, which now corresponds to the Spanish Fork-Provo Reservoir Canal Alternative. No features in this alternative are proposed for construction along the Bonneville Shoreline Trail (Chapter 1, Section 1.4.2).

What would be the impacts of each of the ULS concepts on any species covered by conservation agreements or strategies?

Species covered by conservation agreements or strategies are included in Chapter 3, Section 3.10, Sensitive Species.

What would be the impacts on open space and wildlife habitat from providing irrigation rather than M&I water through the ULS?

Irrigation water is supplemental water to be applied to land that is already under irrigation. No new land would be irrigated and no changes in irrigation practices would result from supplying this supplemental irrigation water.

What would be the impacts of the ULS Project on wetlands and shoreline habitats around Utah Lake?

There would be no impacts on wetlands or shoreline habitats since operation of Utah Lake would not vary from normal operations and historic levels under any ULS alternatives.

What would be the impacts of each ULS water delivery concept on Utah Lake emergent vegetation, water quality and evaporation?

There would be no impacts on emergent vegetation since operation of Utah Lake would not vary from normal operations and historic levels under any ULS alternatives. Water quality and evaporation are discussed in Sections 3.2, Surface Water Hydrology and 3.3, Surface Water Quality.

What impacts would occur on wildlife under Concept 1? (Concept 1 was later named the Strawberry Reservoir-Deer Creek Reservoir Alternative.)

What would be the short-term impacts of construction of a pipeline from Strawberry Reservoir to Daniels Pass, with particular concern for water quality, sediment yield, noxious weed invasion, and ORV use of disturbed sites?

The Strawberry Reservoir – Deer Creek Reservoir was eliminated from detailed analysis. Please see Chapter 1, Section 1.

1.3.3 Scoping Issues Addressed in the Technical Report

All of the issues identified in section 1.3.1, with the exception of those listed in section 1.3.2 are addressed in Chapter 4, Impact Analysis.

1.4 Impact Topics

The following impact topics were used in the analysis:

Habitats
Wildlife Populations

Chapter 2
Methodology

2.1 Assumptions

The following assumptions were used in analysis of noise impacts on wildlife habitat:

- Highway and high traffic urban roadways are linear sound sources
- Construction sites are equivalent to point sound sources
- The noise threshold for possible effects on wildlife is 60 dB
- Construction noise would not affect areas that are predominantly urban in character and these areas can be eliminated from potential noise impacts on habitat

2.2 Impact Analysis Methodology

2.2.1 Habitat

The amount of general upland habitat disturbance and removal that would occur as a result of construction and operation of the ULS Project was obtained from the project land disturbance tables (EIS Chapter 1, Section 1.9.6, Tables 1-38, 1-39 and 1-40). The amount of wetland habitat disturbance and removal was obtained from EIS Chapter 3, Section 3.7, *Wetlands*.

Maps showing critical winter range habitat were developed for each alternative by species in geographic information systems (GIS) format for the impact area of influence.

The amount and location of the general habitat types that would be affected by an increase in noise levels was also determined and mapped. Details of the methodology are shown in Appendix A, including a map of areas subject to noise impacts. Habitats adjacent to high traffic corridors (Interstate 15, Highways 40, 6, 189 and 89) were excluded from habitat noise impacts because of the high ambient noise levels in these areas. Areas designated as urban in vegetation habitat maps were not included in noise impact areas. Where noise impact areas from two or more features overlapped, they were clipped to prevent "double counting."

2.2.2 Wildlife Populations

The numbers and type of wildlife species occurring within each habitat type was developed from species habitat preferences and from range maps and occurrence data. The impact on these species from habitat loss or disruption was analyzed by habitats utilized and the changes in those habitats that would be caused by construction or operation of ULS features. The impacts on populations from loss or fragmentation of habitat were evaluated in terms of minimum home range requirements of species, where known. Some species, such as long-eared owl (*Asio otus*), may require a critical amount of contiguous forest amid a larger area of hunting meadow and open land. Where such species have been found in the study area in recent surveys, the available habitat and potential changes were evaluated in terms of their critical habitat needs.

Indirect impacts on wildlife populations due to activities associated with the ULS, including changes in noise levels in the impact area of influence, were determined based on best professional judgment. Direct and indirect impacts were quantified and compared to the significance criteria to determine significant impacts.

Chapter 3
Affected Environment (Baseline Conditions)

3.1 Impact Area of Influence

The impact area of influence includes the following:

- Corridors (approximately 100 feet wide) along the areas directly affected by construction of pipelines, access roads, pump stations, power lines, power generation facilities and diversion structures
- Streams and rivers and associated riparian vegetation that could have alterations in flow from baseline conditions under operation of the ULS
- Wetlands potentially affected by ULS alternatives

Map 3-1 shows the overall impact area of influence for the ULS alternatives.

3.2 Overview

Plant communities, local topography, elevation, proximity to water, and disturbance resulting from human activities generally characterize wildlife habitats in the impact area of influence. Vegetation types within the impact area of influence vary according to elevation and specific location. Native habitat types in montane areas include aspen and aspen/conifer. Vegetation communities in high valleys and foothill areas include oak woodland, sagebrush/grass, pinyon/juniper, mountain brush and wetlands. Lower valley vegetation has largely been converted to dryland and irrigated agriculture including cultivated crops, small grains, orchards, alfalfa, and pasture. Other valley lands include annual weeds on fallow fields, greasewood, sagebrush, shadescale and saline meadow. Lower elevation valleys contain wetland communities including cattail-bulrush marshes, sedge, spikerush and saltgrass meadows, and saline playas of pickelweed. Also present in the area are scattered deciduous wetland forests of willows, cottonwood, tamarisk and Russian olive.

A broad range of wildlife inhabits the habitats provided by the vegetative communities within the impact area of influence. Big game, mammalian predators and upland game birds generally occupy the higher elevations; small mammals, raptors, neotropical birds, reptiles and amphibians are found throughout the project area. Waterfowl, shorebirds and other aquatic bird species are found in appropriate habitats throughout the region. Major wildlife species groups and representative species are discussed, along with their habitat associations, in subsequent sections of this chapter.

3.2.1 Wildlife Habitats

For the purpose of this analysis, eight major plant communities providing wildlife habitat were delineated within the impact area of influence. These communities are aspen/conifer, oak woodland, pinyon juniper, mountain brush, sagebrush/grass, wetlands, agricultural lands, and previously disturbed lands. Each community, including representative species is described in the following sections. The specific habitats associated with alternatives and related features are discussed under the impact analysis of each alternative and feature. A ninth category of habitat was considered - big game winter range. The Utah Division of Wildlife Resources designates these areas based on habitat values rather than vegetative community type (UDNR 2003).

3.2.1.1 Aspen /Conifer

This habitat is generally found at elevations over 7500 feet above mean seal level (MSL). Species include aspen (*Populus tremuloides*) in monotypic stands and aspen-conifer associations with most conifers being species of fir (*Abies spp.*). It occurs at the head of the Diamond Fork drainage, in elevations above the Rays Valley, and in higher elevations along the Wasatch Front.

3.2.1.2 Oak Woodland

The oak woodland/scrub oak community is found widely throughout the upper foothills of the impact area of influence, occurring between 5,500 and 6,500 feet MSL in elevation. The dominant species is scrub oak (*Quercus gambellii*) that has a shrub or small deciduous tree growth form and a clonal growth pattern. Because of its clumped growth pattern, there are open spaces between the trees that often contain big sagebrush (*Artemesia tridentata*) and native grasses. Where there has been heavy grazing, cheatgrass (*Bromus tectorum*) is a dominant invasive species. This community is found in lower Spanish Fork Canyon, the Sixth Water/Diamond Fork Creek drainages, Rays Valley, Provo Canyon below Deer Creek Reservoir, and the middle and lower elevations of the Wasatch Front.

3.2.1.3 Pinyon/Juniper

This community is composed of pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperous osteosperma*). Areas of this habitat are located in the Diamond Fork drainage and across the lower portion of the Rays Valley Transmission Line corridor.

3.2.1.4 Mountain Brush

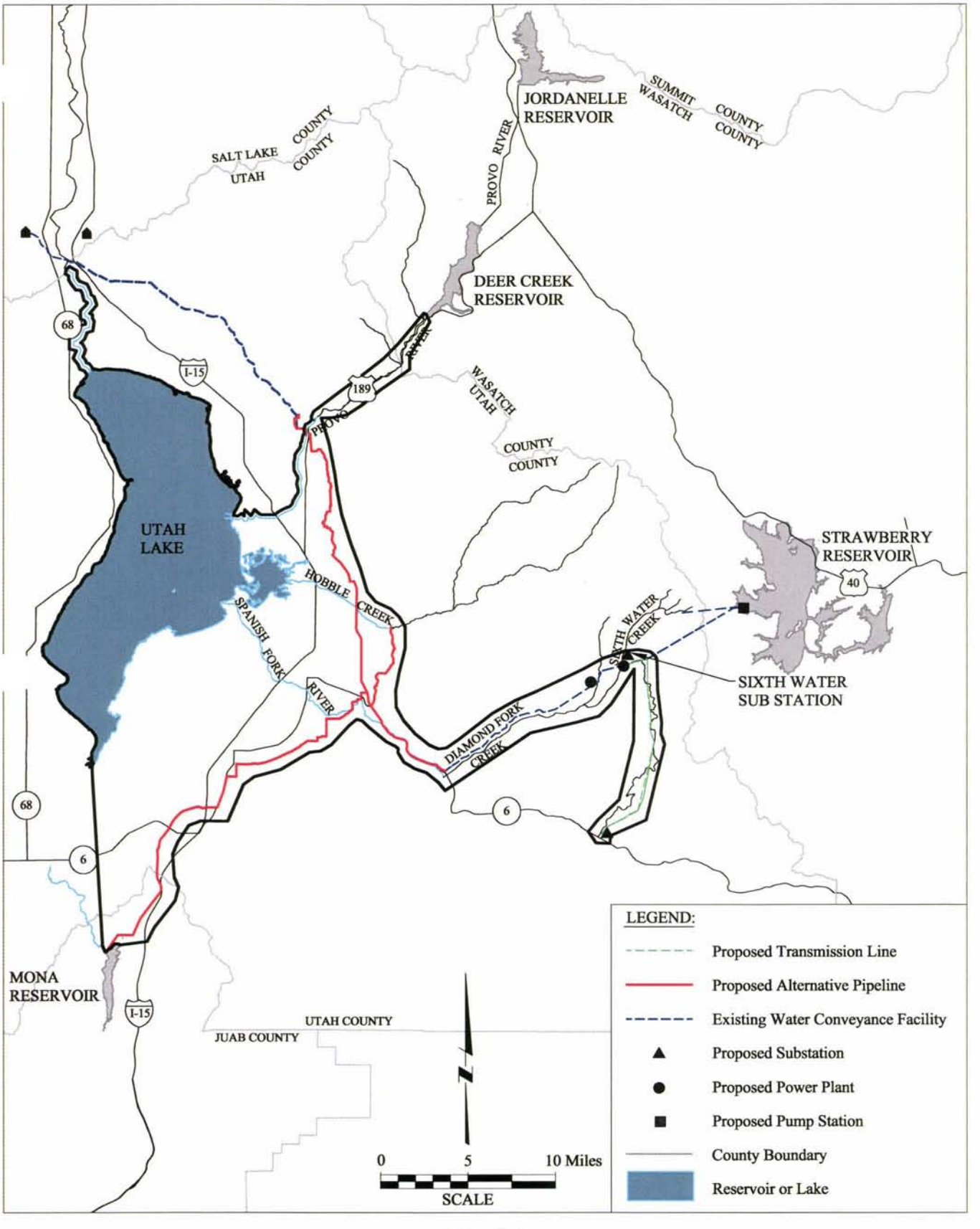
Oak brush and snowberry (*Symphoricarpos longiflorus*) dominate this shrub community, with big sagebrush, true mountain mahogany (*Cerocarpus montanus*) and rabbitbrush (*Ericameria spp.*) species as other important components. In the impact area of influence it occurs widely in Spanish Fork Canyon, Diamond Fork drainage, Provo River Canyon, Rays Valley and along the Wasatch Front, generally between 8,000 feet and 5,000 feet elevation MSL.

3.2.1.5 Sagebrush/Grass

The sagebrush/grass community covers much of the mountains, foothills and valleys of the Wasatch Mountains and Wasatch Front. It is common in the Diamond Fork drainage. The dominant woody species is big sagebrush; silver sagebrush (*Artemisia cana*) becomes dominant in wetter areas. Other shrub species in this community include rubber rabbitbrush (*Chrysothamnus nauseous*), low rabbitbrush (*Chrysothamnus viscidiflorus*) and broom snakeweed (*Gutierrezia sarothrae*). Dominance of grasses varies between sites, but the most common species include bluebunch wheatgrass (*Elymus spicatus*), western wheatgrass (*Elymus smithii*), cheatgrass, and muttongrass (*Poa fendleriana*). Dominant forbs are yarrow (*Achillea millefolium*), lupines (*Lupinus* spp.), and asters (*Aster* spp.).

3.2.1.6 Wetlands

EIS Chapter 3, Section 3.7, *Wetland Resources* describes the wetland communities present throughout the impact area of influence. The areas of wetlands in the impact area of influence are 5.7 acres along construction corridors and a unknown number of acres in the operations impact area of influence in southern Utah County.



Map 3-1

Overall Impact Area of Influence

Five major wetland community types have been identified within the impact area of influence: palustrine wet meadow, palustrine emergent marsh, palustrine riparian forest, riparian scrub-shrub and aquatic bed/open water. The following sections briefly describe the wetland habitats in the impact area of influence.

3.2.1.6.1 Palustrine Wet Meadow. Wet meadow is the most abundant wetland community type within the impact area of influence. Most of the wet meadow communities occupy low lands along the shoreline around Utah Lake. This community type is highly variable in the impact area of influence and is dominated by rush and wiregrass (*Juncus bufonius and J. articus*), blackcreeper sedge (*Carex praegracilis*), water sedge (*C. aquatilis*), redtop (*Agrostis stolonifera*), tall fescue (*Festuca arundinacea*), and common spikerush (*Elocharis palustris*).

3.2.1.6.2 Palustrine Emergent Marsh. Palustrine emergent marsh includes several plant communities, all of which occur in areas that are seasonally inundated or submerged. Small areas of emergent marsh are common along the shoreline around Utah Lake. Dominate plant species hardstem bulrush (*Scirpus acutus*), Olyney's threesquare (*S. americanus*), pale bulrush (*S. paludosus*), common threesquare (*S. pungens*), cattail (*Typha latifolia*) and horsetail (*Equisetum arvense*). Associates plant species in this community type typically include sedges, rushes, and grasses.

3.2.1.6.3 Riparian Forest (Palustrine, Forested, Broad-leaved, Deciduous). The riparian forest community type occurs primarily along the Provo River, portions of the lower Spanish Fork River, near Interstate 15 (I-15) in southern Utah County, and along Diamond Fork Creek. The riparian forest community classification is divided into two sub-classes: low tree-dominated communities and cottonwood-dominated communities. One of the two low tree-dominated communities is composed of boxelder (*Acer negundo*) in the overstory with thinleaf alder (*Alnus incana*), red-osier dogwood (*Cornus sericea*) and mixed willow (*Salix sp.*) species making up the shrub stratum. A separate community is dominated by thinleaf alder in the low tree overstory with a dense shrub layer of mixed willows and red-twig dogwood primarily found along Diamond Fork Creek.

Riparian forest also occurs on the south shores of Utah Lake between Benjamin Slough and the mouth of the Spanish Fork River where tamarisk tree/shrubs dominated. These areas, which were subject to prolonged flooding in 1983, are dominated by extensive stands of tamarisk. Tamarisk is an exotic shrub species that can out-complete native tree and shrub species under suitable conditions. Tamarisk is an exotic of particular concern since it tends to form dense stands, uses extensive water and is of limited value to native wildlife. Although some native willow and cottonwood remain in these areas, tamarisk has invaded and dominates large tracts of former mixed deciduous woodland habitat along the moister, immediate shoreline of Utah Lake. Tamarisk can occupy dry to moist sites, typically with slightly higher salinity levels than other natural plant communities.

3.2.1.6.4 Riparian Shrub (Palustrine Scrub-shrub). The riparian shrub community is found along various reaches of streams and rivers within the impact area of influence and is often associated with natural springs, rivers, canals, ditches, and areas receiving irrigation return flows. These riparian shrub edges are found near the confluence with Utah Lake, Beer Creek (Benjamin Slough), the lower Spanish Fork River (below the Strawberry diversion and above Utah Lake), shoreline areas of Utah Lake, the Jordan River, and the Provo River. Numerous plant species dominate these areas, depending on area observed, but often they are woody species such as willows (*Salix* spp.), red-osier dogwood (*Cornus stolonifera*), chokecherry (*Prunus virginiana*), Wood's rose (*Rosa woodsii*), Russian Olive, and tamarisk.

3.2.1.6.5 Aquatic Bed/Open Water. The aquatic bed/open water community type is the second type of open water aquatic habitat and is comprised of open water habitat. This community type applies to lakes, small ponds, and reservoirs. The community is dominated by one plant species, broad-leaf pondweed (*Potamogeton latifolius*). Other common pondweeds include sago pondweed (*P. pectinatus*) and widgeon grass (*Ruppia maritima*). This wetland community is present in southern Utah County.

3.2.1.7 Agricultural Lands

Large areas within the impact area of influence in southern Utah County have been converted from native vegetation to dryland and irrigated agriculture consisting of cultivated crops, orchards, alfalfa and pasture. This agricultural land provides varying habitat value for wildlife. Agricultural lands under active management have low wildlife value, species and structural diversity. Native wildlife has often been replaced by species that are tolerant of human activity and are adaptable to dynamic land-use practices such as regular disking, mowing, burning, harvesting, flooding and application of fertilizers and pesticides.

3.2.1.8 Previously Disturbed Lands

This category includes all areas disturbed by activities other than cultivation, including areas adjacent to highways, railroads and other rights-of-way. Most of these areas have been reseeded to a grass/forb community for erosion control, to enhance wildlife food and cover, or for aesthetics. Dominant species within these reseeded areas include yellow sweet clover (*Melitotus officinalis*), pepperweed (*Lepidium montanum*), gumweed (*Grindelia squarrosa*), sunflower (*Helianthus annuus*) and bluegrass (*Poa pretensis*). Wildlife values are limited in these areas due to high levels of human presence, activity and noise.

3.2.1.9 Big Game Winter Range

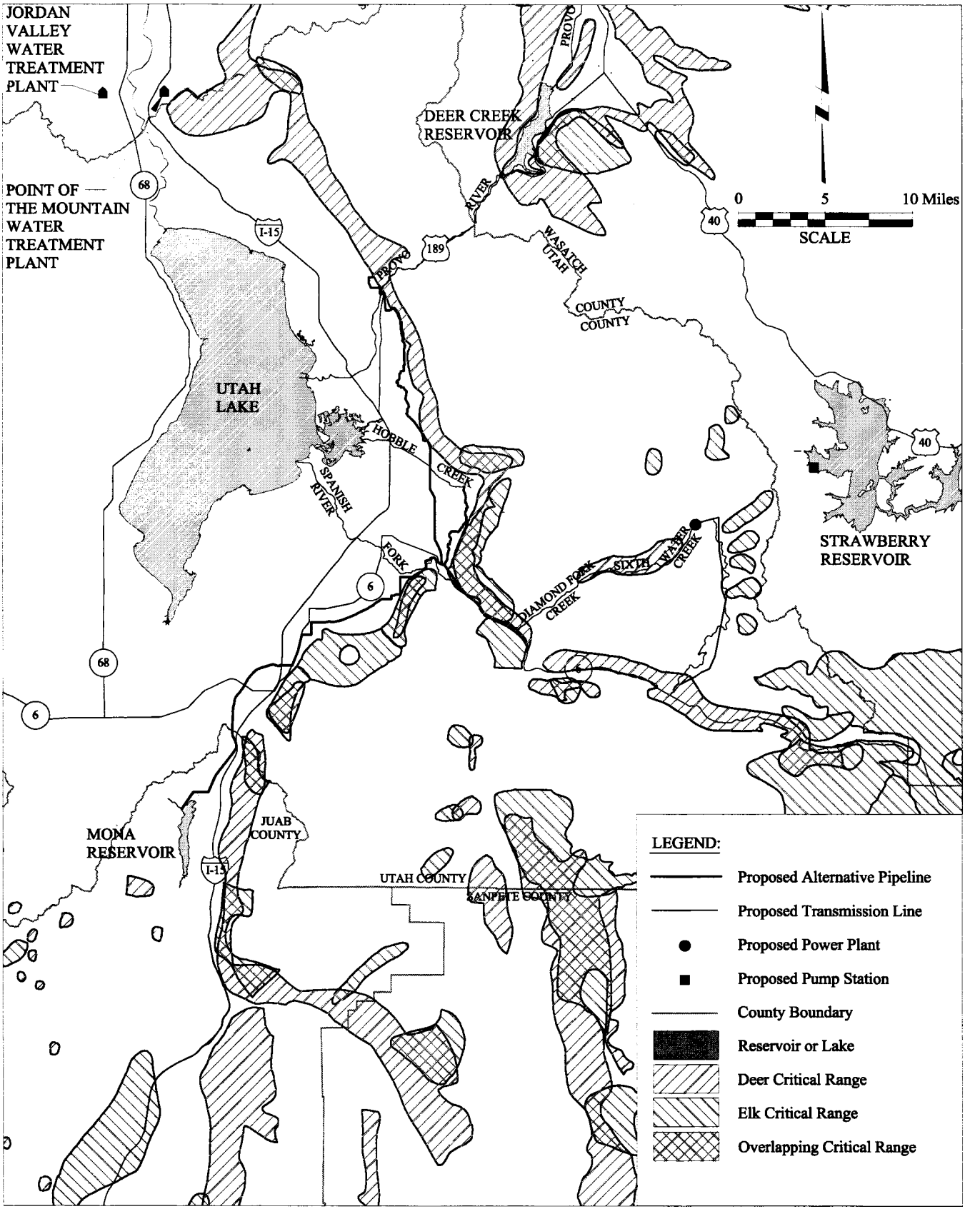
The Utah Division of Wildlife Resources has established areas that are critical winter ranges for mule deer, elk and moose. The foothills of the Wasatch Front, Spanish Fork Canyon and the Salem and Santaquin benches serve as these important winter foraging areas for both mule deer and elk that summer in the Wasatch Mountains. The Utah Division of Wildlife Resources has classified wintering habitat on the basis of distribution, abundance, forage value and availability to wintering animals. The Utah Division of Wildlife Resources definition of "critical" habitat is: "*sensitive use areas that, because of limited abundance and/or unique qualities, constitute irreplaceable, critical requirements for "high interest wildlife." For big game, these areas include the most critical summer and/or winter ranges (concentration areas) and critical movement corridors* (CUWCD 1998).

Map 3-2 shows the big game "critical" winter ranges in the impact area of influence.

3.2.2 Wildlife Populations

A broad range of wildlife inhabits the habitats provided by the vegetative communities within the impact area of influence. The following wildlife and habitat resources topics are addressed in the analysis:

- Game species (deer, elk, large mammalian predators, furbearers, upland gamebirds and waterfowl)
- Non-game species (non-domestic small mammals, birds and reptiles)



Map 3-2

Big Game Critical Winter Range

3.2.2.1 Game Species

Mule deer (*Odocoileus virginiana*) and elk (*Cervus elaphus*) are the most numerous big game species within the impact area of influence. Mule deer are found widely throughout many habitats from montane areas to grasslands and cultivated lands around Utah Lake. Elk utilize mountain forests and open meadows from spring to fall, but descend to lower valleys during the winter, depending on the presence of snow cover. Calving occurs from late May to early June. They are common in the Uinta Range and Strawberry Ridge and small numbers are present in the West Mountain area adjacent to Utah Lake. Moose (*Alces alces*) are potential in the Uinta Range in Wasatch County, but are more common farther to the north in Summit County, well away from the impact area. Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*) were reintroduced to the Mount Nebo area, but a viable population has not survived. Trapped species

Large mammalian predators occupy areas of the impact area of influence where adequate prey populations exist. Black bears (*Ursus americanus*), although omnivorous and largely vegetarian, are included in the predator category. Black bears utilize a wide range of habitats at higher elevations, but generally prefer areas remote from human presence. Cougar (*Felis concolor*) may be found in mountain forests in Wasatch and Utah Counties. Coyotes (*Canis latrans*) are widely distributed in most habitats available in the impact area, including suburban areas.

Furbearers in the general project area include spotted skunk (*Spilogale putorius*) in wooded areas, long-tailed weasel (*Mustela frenata*) and mink (*Mustela vision*) in riverine and riparian areas, badger (*Taxidea taxus*) in open grasslands, beaver (*Castor canadensis*) in rivers and streams, and bobcat (*Lynx rufus*) in mixed woodlands with rocky outcrops.

Upland gamebirds can be found throughout the impact area of influence. Ring-necked pheasants (*Phasianus colchicus*) utilize farmlands and bordering brushy areas and woodland edges. Mourning doves (*Zenadia macroura*) and California quail (*Callipepla californica*) are found from mountains to valleys in open or brushy areas near water. Chukars (*Alectoris chukar*) is found in sagebrush areas on at middle to high elevations as are sage grouse (*Centrocercus urophasiensis*) and blue grouse (*Dendragapus obscurus*). Wild turkeys (Rio Grande subspecies, *Meleagris gallopava*) have been introduced in the Hobble Creek (Wasatch County) and Diamond Fork drainages.

Characteristic waterfowl game species include Canada goose (*Branta canadensis*), mallard (*Anas platyrhnchos*), northern pintail (*Anas acuta*), gadwall (*Anas strepera*), American widgeon (*Anas americana*), and blue-winged (*Anas discors*), cinnamon (*Anas cyanoptera*) and green-winged (*Anas crecca*) teal.

3.2.2.2 Non-Game Species

Small mammals potentially present in the impact area include a variety of species. Striped skunk *(Mephites mephites*) can be found throughout the region, often in association with suburban areas. Red fox (*Vulpes vulpes*) is almost as cosmopolitan in habitat preference as coyote, although there is some evidence that, in a given area, their home ranges do not overlap (Major and Sherburne 1987). Mammalian prey species include shrews (Merriam's shrew [*Sorex merriami*], masked shrew *[Sorex cinereus*]), voles (long-tailed vole [*Microtus longicaudus*], meadow vole [*Microtus pennsylvanicus*], montane vole [*Microtus montanus*]), mice (deer mouse [Peromyscus maniculatus]), ground squirrels (golden-mantled ground squirrel [Spermophilus *lateralis*], Piute ground squirrel [*Spermophilus mollis*], rock squirrel [S. variegatus]), pocket gopher (Botta's pocket gopher [*Thomomys bottae*]), lagomorphs (mountain cottontail [*Sylvilagus nuttallii*], snowshoe hare [*Lepus americanus*]), and bats (little brown myotis [*Myotis lucifugus*], long-legged myotis, [*Myotis volans*], big brown bat [*Eptesicus fuscus*]. These prey species occupy a wide range of habitats, although agricultural practices and irrigation have affected distribution and abundance.

Non-game birds include raptors, passerine birds and water-related species. Raptors (eagles, hawks and falcons, owls, vultures) occupy habitats throughout the impact area of influence. Golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), Merlin (*Falco columbarius*), American Kestrel (*Falco sparverius*) and turkey vulture (*Cathartes aura*) can be found from mountains to the Utah Lake valley. Northern harrier (*Circus cyaneus*) hunts over wetlands and open fields. Potential owl species include great horned (*Bubo virginianus*), long-eared (*Asio otus*), barn (*Tyto alba*), western screech-owl (*Otus kennicottii*) and northern pygmy-owl (*Glaucidium gnoma*).

Many species of passerine (perching) birds and neotropical migrants are found throughout the impact area of influence. Wooded riparian areas support species such as Bewick's wren (*Thyromanes bewickii*), hermit thrush (*Cathartus guttata*), warbling vireo (*Vireo glivus*), yellow warbler (*Dendroica petechia*), black-headed grosbeak (*Pheucticus melanocarpus*), spotted towhee (*Pipilo maculatus*), fox sparrow (*Passerella iliaca*), song sparrow (*Melospisa melodia*) and Bullock's oriole (*Icterus bullockii*). Species utilizing wetlands and sloughs include bank swallow (*Riparia riporia*), red-winged blackbird (*Agelaius phoeniceus*) and yellow-headed blackbird (*Xanthocephalus xanthocephalus*). Foothill shrublands and woodlands are habitat for broad-tailed hummingbird (*Selasphorus platycercus*), northern flicker *(Colaptes auratus*), tree swallow (*Iridoprocne bicolor*), violet-green swallow (*Tachycineta thalassina*), scrub jay (*Aphelocoma coerulescens*), rock wren (*Salpinctes obsoletus*), mountain bluebird (*Sialia currucoides*), American robin (*Turdus migratorius*) and white-crowned sparrow (*Zonotrichia leucophrys*). Say's phoebe (*Sayornis saya*), western kingbird (*Tyrannus verticalis*), horned lark (*Eremophila alepstris*), black-billed magpie (*Pica pica*), common raven (*Corvus corax*), American crow (*Corvus brachyrhynchos*), European starling (*Sturnus vulgaris*), vesper sparrow (*Pooecetes gramineus*), lark sparrow (*Chondestes grammacus*), savannah sparrow (*Passerculus sandwichensis*), western meadowlark (*Sturnella neglecta*), Brewer's blackbird (*Euphagus cyanocephalus*), house finch (*Carpodacus mexicanus*) and American Goldfinch (*Carduelis tristis*) are found in open grassland and agricultural lands.

Water-related birds include shorebirds, wading birds and other aquatic species that are seasonally common in wetland habitats and water bodies throughout the impact area of influence. Irrigation canals also provide some marginal habitat for water birds. Characteristic species include double-crested cormorant (*Phalacrocorax auritus*), black-crowned night-heron (*Nycticorax nycticorax*), sandhill crane (*Grus canadensis*), common snipe (*Capella gallinago*), killdeer (*Charadrius vociferous*), black-necked stilt (*Himantopus mexicanus*), Wilson's phalarope (*Steganopus tricolor*) pied-billed grebe (*Podilymbus podiceps*), western grebe (*Aechmophorus occidentalis*) and California (*Larus californicus*) and ring-billed (*Larus delawarensis*) gulls.

Foothill shrub and grassland in the impact area of influence provide habitat for a number of reptiles including common sagebrush lizard (*Sceloporus graciosus*), common side-blotched lizard (*Uta stansburiana*), tiger whiptail (*Cnemidophorus tigris*) and greater short-horned lizard, *Phrynosoma hernandesi*). Potential snake species include garter snakes (*Thamnophis spp.*), common gopher snake (*Pituophis catenifer*) and eastern racer (*Coluber constrictor*).

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Chapter 4
Environmental Consequences (Impacts)

4.1 Significance Criteria

As there are no regulatory guidelines for wildlife population or habitat loss or impacts, the significance criteria are based on past experience with similar projects and best professional judgment.

The following criteria were used to determine significant impacts on wildlife and habitats.

- Activities resulting in substantial disturbance to wildlife habitat or populations. A substantial disturbance is one that destroys a large area of utilized habitat, disturbs or displaces a resident population or sub-population, or results in losses of a large number of individuals of the species within the impact area of influence. Disturbance may arise from direct construction effects on habitat or indirectly by noise or human activity that would reduce wildlife habitat values. Substantial disturbance is based on the status, population dynamics, behavior, habitat availability and quality for each species group (e.g., game or non-game species) relative to the type, intensity and duration of a specific impact. For example, species that are locally common (e.g., Brewer's blackbird [*Euphagus cyanocephalus*]) or have a high reproductive potential and the ability to recolonize disturbed sites rapidly (e.g., deer mouse [*Peromyscus maniculatus*]) would not be significantly affected by ULS development.

- Project activities that would cause the loss (temporary or permanent) or unavailability of "critical" big game range (as officially designated by the Utah Division of Wildlife Resources) from December 1 to April 15.

4.2 Potential Impacts Eliminated From Further Analysis

4.2.1 Construction Phase

- Construction of the Spanish Fork Canyon Pipeline would be entirely within the shoulder of Highway 6 and there is no wildlife habitat within the area of construction disturbance.

- Impacts on big game critical range would not occur. None of the features proposed for construction under any of the alternatives would be placed in or cross any designated big game critical habitat.

4.2.2 Operations Phase

- Impacts on wildlife habitat and populations from changes in reservoir levels have been eliminated from further analysis. The changes in reservoir storage volume and stage are shown in the EIS, Chapter 3, *Surface Water Hydrology*, Section 3.2.8.2.6. The incremental changes would be small relative to baseline reservoir operations and would be within the normal fluctuations that these reservoirs experience on a yearly basis. The changes in reservoir volume and stage would not impact game and non-game wildlife populations or home ranges.

- Changes in Provo and Spanish Fork River and Hobble Creek flows would not impact wildlife habitat or populations because the incremental changes would be small relative to baseline (see EIS Chapter 3, Section 3.2 *Surface Water Hydrology*) and habitat impacts would be minimal and unmeasurable.

- Wildlife habitat and populations would not be impacted by noise from operation of the Sixth Water, and Upper Diamond Fork Power Facilities. These features would not cause measurable noise disturbance outside of the facility structures (see EIS Chapter 3, Section 3.17.8.3.2, *Noise*).

4.3 Spanish Fork–Provo Reservoir Canal/Pipeline Alternative (Preferred Alternative)

4.3.1 Construction Phase

Big game, mammalian predators, most small mammals, all adult birds and many reptiles would disperse from construction sites and direct mortality would not be expected. Construction could cause mortality of some species of small mammals and reptiles that would be unable to disperse from the site. Small animals could fall into open trenches and be buried by placement of fill or concrete. Clearing of vegetation and trees could cause mortality of bird eggs or nestlings if done during the nesting season. Procedures to avoid and minimize these effects are described in EIS Chapter 1, Section 1.9.8, *Standard Operating Procedures (SOPs) During Construction*. There would be conversion of some areas from forested habitats to revegetated grasses and shrubs. The *Noxious Weed Control Plan* (see EIS Appendix B) would be implemented to prevent noxious weed invasion of areas of construction disturbance.

In summation of construction disturbance areas, "Existing Disturbed Areas Returned to Previous Use" were not included because there would be no habitat change in these areas. These previously disturbed habitats generally have such low wildlife values that they do not support significant populations.

4.3.1.1 Sixth Water Power Facility and Transmission Line

4.3.1.1.1 Habitat. Table 4-1 shows the acreage that would be affected by these features. The Sixth Water Power Facility would be placed adjacent to the existing Sixth Water Flow Control Structure and would disturb 0.7 acre of previously disturbed lands that would be returned to previous use.

Power facility construction noise would temporarily disturb approximately 736 acres that are primarily mountain brush and pinyon/juniper habitats, along with small areas of oak woodland, sagebrush/grass and riparian corridor habitat. No critical or unique habitat or big game critical winter range would be affected.

The Sixth Water Transmission Line would follow and upgrade an existing powerline. Upgrade construction would permanently disturb 1.1 acres, including 0.3 acres for a substation at Sixth Water, 0.5 acres for a substation at Highway 6 and 0.3 acres for power poles and associated structures. Revegetated habitats would be grasses and shrubs. The vegetation changed includes 37.5 acres changed from trees, shrubs and grass to grass directly under the transmission lines, and 56.2 acres changed from trees, shrubs and grass to shrubs and grass within the 60-foot wide transmission line right-of-way. Revegetation would change the habitat plant community type, but would restore or, in some circumstances, enhance habitat values because of edge effects (a mixture of habitats with open spaces) for some species and could cause a loss of habitat value for other species. Construction SOPs (see EIS, Chapter 1, Section 1.8.8) would be followed to avoid impacts on small riparian wetland corridors along the Transmission Line.

Transmission line noise disturbance would temporarily disturb approximately 8,931 acres of the same habitats as transmission line construction.

Table 4-1
Area Disturbed by the Sixth Water Power Facility and Transmission Line (acres)

Permanent Disturbance	Habitat Revegetated	Vegetation Changed	Temporary Noise Disturbance
1.1	1.9	93.7	8,931

4.3.1.1.2 Populations. The Sixth Water Power Facility area of disturbance does not have high value habitat for game or non-game species and the small area removed would not support significant populations. Power facility and transmission line construction could cause impacts on small mammals and reptiles similar to those described in Section 4.3.1. Impacts on wildlife populations and species diversity would be insignificant.

Noise-sensitive game and non-game wildlife would disperse from temporary noise disturbances into abundant adjacent habitats. Revegetation of disturbed areas would restore their habitat value for game and non-game species and wildlife populations would not be affected.

4.3.1.2 Upper Diamond Fork Power Facility and Transmission Line

4.3.1.2.1 Habitat. Table 4-2 shows the acreages that would be affected by these features. The Upper Diamond Fork Power Facility would be located adjacent to the existing Upper Diamond Fork Vortex Structure. The power facility and access roads would permanently disturb approximately 0.3 acres of oak woodland/mountain brush. The power facility would not affect critical or unique habitat. The Upper Diamond Fork Transmission Line connecting to the Sixth Water Transmission Line would not affect wildlife habitat because it would be buried in the existing Upper Diamond Fork Pipeline right-of-way and installed through the existing Tanner Ridge Tunnel. Abundant equivalent or higher value habitat is available adjacent to the power facility and transmission line and wildlife home ranges would not be affected.

Construction noise would temporarily impact approximately 736 acres of habitat, predominantly oak woodland, pinyon/juniper and mountain brush.

Table 4-2
Area Disturbed by the Upper Diamond Fork Power Facility and Transmission Line (acres)

Permanent Disturbance	Habitat Revegetated	Vegetation Changed	Temporary Noise Disturbance
0.3	0	0	736

4.3.1.2.2 Populations. The Upper Diamond Fork Power Facility area of construction disturbance does not have high value habitat for game or non-game species. The small area removed would not support significant wildlife

populations. Power facility construction could cause impacts on small mammals and reptiles similar to those described in Section 4.3.1. Noise-sensitive game and non-game wildlife would disperse from temporary noise disturbances into abundant adjacent habitats. Impacts on wildlife populations and species diversity would be insignificant.

The Transmission line would not cause impacts on wildlife populations.

4.3.1.3 Spanish Fork-Santaquin Pipeline

4.3.1.3.1 Habitat. Table 4-3 shows the area disturbed by the Spanish Fork – Santaquin Pipeline. Permanent and temporary impacts are listed separately. Habitats disturbed have marginal wildlife value because they are within or adjacent to highways and urban streets. Revegetated habitats would be grasses and shrubs. Vegetation changed would be open areas of brush or orchards. The type of vegetation restored on these areas would be up to the landowner, but would not include trees. No critical or unique habitat would be disturbed. Approximately 0.62 acres (of the 35.4 acres changed) of riparian forest and scrub-shrub wetland habitat within the pipeline construction corridor adjacent to the Salem Canal would be converted to grasses and shrubs after pipeline construction. This riparian vegetation is subject to periodic clearing for Canal maintenance and change in the vegetative community of this habitat would not be significant. Abundant equivalent or higher value habitat is available adjacent to the pipeline corridor and wildlife home ranges would not be affected.

Major areas affected by temporary noise disturbance (mileposts 1.8 to 5.7, 8.4 to 9.0, 9.5 to 9.7, 12.1 to 17.5, Appendix A, Map A-1) would include agricultural lands (6,275 acres), mountain brush (528 acres) and sagebrush/grass (696 acres). The disturbed agricultural lands would have marginal wildlife habitat values.

Table 4-3
Area Disturbed by the Spanish Fork - Santaquin Pipeline (acres)

Permanent Disturbance	Habitat Revegetated	Vegetation Changed	Temporary Noise Disturbance
0.3	78.3	35.4	7,499

4.3.1.3.2 Populations. The Spanish Fork – Santaquin Pipeline corridor does not have high value habitat for game species. Some small non-game species could be supported within the corridor, but it is unlikely that they would be significant populations. Revegetation of disturbed areas would restore their habitat values for non-game species. Construction could cause minor mortality of small wildlife species. The pipeline would not cause permanent loss of wildlife habitat and pipeline construction would have insignificant impacts on wildlife populations and species diversity. Noise-sensitive game and non-game wildlife would disperse from temporary noise disturbance into adjacent abundant habitats. Impacts on wildlife populations and species diversity would be insignificant.

4.3.1.4 Santaquin-Mona Reservoir Pipeline

4.3.1.4.1 Habitat. Table 4-4 shows the area disturbed by the Santaquin – Mona Reservoir Pipeline. The disturbance area includes staging areas at Spanish Fork (10 acres) and Santaquin (7.9 acres). The pipeline would cause minimal permanent loss of habitat. Revegetated habitats would include open areas, grasses and shrubs. The disturbed habitats have marginal wildlife value because they would be within or adjacent to roadways, urban streets and railroad right-of-way. No critical or unique habitat would be disturbed. Abundant equivalent or higher value habitat is available adjacent to the pipeline corridor and wildlife home ranges would not be affected.

Habitats disturbed by temporary construction noise (mileposts 0 to 6.4, Appendix A, Map A-1) would be comprised of agricultural lands (1,349 acres) and sagebrush/grass (1,458 acres). The disturbed agricultural lands would have marginal wildlife habitat values.

Table 4-4
Area Disturbed by the Santaquin – Mona Reservoir Pipeline (acres)

Permanent Disturbance	Habitat Revegetated	Vegetation Changed	Temporary Noise Disturbance
0.2	70.9	0	2,807

4.3.1.4.2 Populations. The Santaquin – Mona Reservoir Pipeline corridor contains some habitat that could be utilized by game and non-game species, but there is abundant adjacent alternative habitat and revegetation of disturbed areas would restore their wildlife habitat values. Noise-sensitive wildlife would disperse from temporary noise impacts into abundant adjacent habitats; impacts on wildlife populations and species diversity would be insignificant.

4.3.1.5 Mapleton-Springville Lateral Pipeline

4.3.1.5.1 Habitat. Table 4-5 shows the area disturbed by the Mapleton – Springville Lateral Pipeline. The habitats disturbed have marginal wildlife value because they would be within or adjacent to suburban areas, streets and the irrigation canal channel. Revegetated habitats would include agricultural lands, grasses and shrubs. Approximately one acre of riparian forest and scrub-shrub wetland habitat adjacent to the Mapleton Lateral in the construction corridor would be revegetated to grasses and shrubs after construction. This riparian vegetation is subject to periodic clearing during Lateral maintenance and change in community of this habitat would not be significant. No critical or unique habitat would be disturbed. Abundant equivalent or higher value habitat is available adjacent to the pipeline corridor and wildlife home ranges would not be affected.

Construction noise (mileposts 0.7 to 1.5, Appendix A, Map A-1) would disturb agricultural lands (265 acres) and a small area of mountain brush (17 acres). Noise-sensitive wildlife along the pipeline corridor would disperse into abundant adjacent habitats and impacts on wildlife populations would be insignificant. The disturbed agricultural lands would have marginal wildlife habitat values.

Table 4-5
Area Disturbed by the Mapleton – Springville Lateral Pipeline (acres)

Permanent Disturbance	Habitat Revegetated	Vegetation Changed	Temporary Noise Disturbance
0.1	60.2	0	282

4.3.1.5.2 Populations. The Mapleton – Springville Lateral Pipeline corridor does not contain high value game species habitat. Some small non-game species could utilize the habitats within the corridor, but it is unlikely that hey would constitute significant populations. Revegetation of disturbed areas would restore their habitat values for non-game species. Construction could cause minor mortality of small wildlife species. The pipeline would

cause minimal permanent loss of wildlife habitat and would have insignificant impacts on wildlife populations and species diversity.

4.3.1.6 Spanish Fork-Provo Reservoir Canal Pipeline

4.3.1.6.1 Habitat. Table 4-6 shows the area disturbed by the Spanish Fork – Provo Reservoir Canal/Pipeline Pipeline. The pipeline would be constructed within existing highway shoulders and city streets with no or minimal wildlife habitat values. Revegetated habitat and changed vegetation would be grasses and shrubs. No critical or unique habitat would be disturbed. Wildlife home ranges would not be affected.

Only a small area of non-urban mountain brush habitat (268 acres) would be affected by pipeline construction noise (mileposts .4 to 1.5, 17.8 to 17.9, 18.0 to 18.3, Appendix A, Map A-1).

Table 4-6
Area Disturbed by the Spanish Fork – Provo Reservoir Canal Pipeline (acres)

Permanent Disturbance	Habitat Revegetated	Vegetation Changed	Temporary Noise Disturbance
0.4	20.0	17.7	268

4.3.1.6.2 Populations. Game and non-game wildlife habitat is minimal in the pipeline corridor and the presence of significant wildlife populations is unlikely. Revegetation of disturbed areas would restore those minimal habitat values present before construction. Pipeline construction could cause minor mortality of small wildlife species. Noise-sensitive wildlife would disperse into abundant adjacent habit during construction; wildlife populations and species diversity would not be affected.

4.3.1.7 Spanish Fork Canyon Pipeline

4.3.1.7.1 Habitat. This pipeline would have little or no impact on wildlife habitat values, and wildlife home ranges would not be affected because the pipeline would be constructed within existing highway shoulders.

Table 4-7 shows the acreage disturbed by the Spanish Fork Canyon Pipeline (permanent and temporary impacts). Only a small area of non-urban mountain brush habitat would be affected by pipeline construction noise.

Table 4-7
Area Disturbed by the Spanish Fork Canyon Pipeline (acres)

Permanent Disturbance	Habitat Revegetated	Vegetation Changed
0	38.4	0

4.3.1.7.2 Populations. Wildlife populations and species diversity would not be affected by this pipeline because game and non-game wildlife habitat is minimal in the pipeline corridor and the presence of significant wildlife

populations is unlikely. Revegetation of disturbed areas would restore those minimal habitat values. Pipeline construction could cause minor mortality of small wildlife species. Noise-sensitive wildlife would disperse into abundant adjacent habit during construction.

4.3.2 Operations Phase

Stream flows in the Provo River, Spanish Fork River, and Jordan River from the Utah Lake Outlet to the Narrows would be affected. Hobble Creek flows from the Mapleton-Springville Lateral to Utah Lake would be changed.

The delivery of project M&I water could have some small beneficial impacts on the wetlands within the impact area of influence. Some increased level of groundwater recharge resulting from the application of the secondary use M&I water would cause the potential beneficial impact. The quantity and location of the wetlands beneficially impacted is not measurable based on the information available for use in the EIS analysis (see EIS, Chapter 3, Section 3.4.8.3 Groundwater Hydrology).

The changes in stream flows are shown in EIS, Chapter 3, Section 3.2 Surface Water Hydrology. Augmentation of flows in the Provo River and Hobble Creek could enhance wildlife habitat in riparian corridors, although this effect would not be quantifiable. The change in "water surface area" of the Jordan River and Spanish Fork River from flow reductions could have minor impacts on instream wetlands, but would not cause a material change in overall riparian vegetation and wildlife habitat (see EIS Chapter 3, Section 3.7, *Wetland.* The changes in streamflows would not impact game and non-game wildlife populations or home ranges.

Operation of the Sixth Water, and Upper Diamond Fork Power Facilities would not cause measurable noise disturbance outside of the facility structures (see EIS, Chapter 3, Section 3.16.8.3.2, *Noise*).

Occasional inspection or maintenance activity along the pipeline corridors, at the pump station and at power facilities would not be anticipated to cause measurable disturbance to wildlife populations or critical big game winter range.

4.3.3 Summary of Alternative Impacts

4.3.3.1 Construction Phase

4.3.3.1.1 Habitat. Table 4-8 summarizes the area disturbed by construction of the Spanish Fork – Provo Reservoir Canal Alternative.

Table 4-8
Area Disturbed by Spanish Fork – Provo Reservoir Canal Alternative Construction (acres)

Permanent Disturbance	Habitat Revegetated	Vegetation Changed	Temporary Noise Disturbance
2.4	269.7	146.8	21,259

No critical or unique habitats of big game as defined by the Utah Division of Wildlife Resources would be disturbed. Permanently disturbed habitats have marginal wildlife values and abundant equivalent or higher value habitat is available adjacent to all features constructed for this alternative. Impacts on game and non-game

wildlife home ranges would be minimal. The alternative would not cause a substantial disturbance to wildlife habitats; habitat disturbance would not exceed the significance criteria.

4.3.3.1.2 Populations. Some small mammals and reptiles could be lost to construction mortality. This mortality would be minimized by the construction SOPs and would not affect a large number of any wildlife species population or sub-population. Construction and noise disturbance would not permanently displace any significant game or non-game wildlife populations or sub-populations. Impacts on wildlife resources would not exceed the significance criteria.

4.3.3.2 Operations Phase

There may be some improvements in the riparian habitat along Provo River and Hobble Creek. The amount of these improvements and associated wildlife effects is not quantifiable.

4.4 Bonneville Unit Water Alternative

4.4.1 Construction Phase

The impacts of the following features of this alternative would be the same as described for the Spanish Fork – Provo Reservoir Canal Alternative and are not repeated in this section:

Sixth Water Power Facility and Transmission Line - Section 4.3.1.1
Upper Diamond Fork Power Facility - Section 4.3.1.2
Spanish Fork-Santaquin Pipeline - Section 4.3.1.3
Mapleton-Springville Lateral Pipeline - Section 4.3.1.4
Spanish Fork Canyon Pipeline – Section 4.3.1.7

General construction impacts on wildlife are described in Section 4.3.1.

4.4.2 Operations Phase

Stream flows in the Provo River, Spanish Fork River, and Jordan River from the Utah Lake Outlet to the Narrows would be affected. Hobble Creek flows from the Mapleton-Springville Lateral to Utah Lake would be changed.

Impacts from delivery of M&I water under this alternative would be the same as the Preferred Alternative (Section 4.3.2).

The changes in stream flows are shown in EIS, Chapter 3, Section 3.2, Surface Water Hydrology. Impacts would be similar to those described in Section 4.3.2.

Operation of power facilities and effects of inspection and maintenance activity would be the same as those described in Section 4.3.2.

4.4.3 Summary of Alternative Impacts

4.4.3.1 Construction Phase

4.4.3.1.1 Habitat. Table 4-9 summarizes the area disturbed by Bonneville Unit Water Alternative construction.

Table 4-9 Area Disturbed by Bonneville Unit Water Alternative Construction (acres)			
Permanent Disturbance	**Habitat Revegetated**	**Vegetation Changed**	**Temporary Noise Disturbance**
1.8	178.8	129.1	18,980

No critical or unique habitats as defined by the Utah Division of Wildlife Resources would be disturbed. Permanently disturbed habitats have marginal wildlife values and abundant equivalent or higher value habitat is available adjacent to all features constructed for this alternative. Impacts on game and non-game wildlife habitat and home ranges would not be significant. The alternative would not cause a substantial disturbance to wildlife habitats; habitat disturbance would not exceed the significance criteria.

4.4.3.1.2 Populations. Some small mammals and reptiles could be lost to construction mortality. This mortality would be minimized by the construction SOPs and would not affect a large number of any wildlife species population or sub-population. Construction and noise disturbance would not permanently displace any significant game or non-game wildlife populations or sub-populations. Impacts on wildlife resources would not exceed the significance criteria.

4.4.3.2 Operations Phase

There may be some improvements in the riparian habitat along Provo River and Hobble Creek. The amount of these improvements and associated wildlife effects is not quantifiable.

4.5 No Action Alternative

4.5.1 Construction Phase

No features would be constructed in this alternative.

4.5.2 Operations Phase

No ULS water would be delivered to southern Utah County. Wetlands could be potentially impacted are those that occur in the area where the wetland water supply may decline due to the groundwater drawdown of one foot or more relative to baseline as determined under a worse case scenario. The wetland acreage and specific locations of potential wetland impacts relative to baseline is not measurable based on the information available for use in the analysis (see EIS, Chapter 3, Section 3.4.8.5 Groundwater Hydrology). However, it is expected that a considerable amount of wetland area could be potentially impacted under the No Action Alternative. Potential increased pumping resulting from continued population growth would cause the drawdown of groundwater levels relative to baseline and the potential effect on wetlands.

Sub-populations of wetland-associated wildlife could be placed at risk because of the area of wetland reduction, the distances required for dispersal into equivalent wetland habitat and the smaller area of alternative wetland habitat available. However, from a regional perspective, it would be unlikely that any species as a whole would be placed at risk by the loss of wetland habitat.

4.5.3 Summary of Alternative Impacts

The No Action Alternative could cause significant impacts on wetland wildlife habitats in southern Utah County. Local sub-populations of wetland-associated wildlife could be adversely impacted, although it is unlikely that any regional species population would have impacts that would exceed the significance criteria.

Chapter 5
Mitigation and Monitoring

None.

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Chapter 6
Unavoidable Adverse Impacts

None.

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Chapter 7
Cumulative Impacts

No specific wildlife species would be impacted by the ULS project. Construction of the ULS project would result in the removal of only a small acreage of wildlife habitat scattered over a wide area within the impact area of influence. Of the projects listed in the EIS Chapter 1, Section 1.10.3 (Future Projects Included in the Cumulative Impact Analysis) only three would have the potential to create cumulative impacts on wildlife habitat. These projects are the Provo River Parkway Trail (EIS, Chapter 1, Section 1.10.3.3), Hobble Creek Trail (EIS, Chapter 1, Section 1.10.3.4), and Utah Lake Wetland Preserve (EIS, Chapter 1, Section 1.10.3.7).

7.1 Spanish Fork Canyon-Provo Reservoir Canal Alternative (Preferred Alternative)

This alternative eliminates only 2.4 acres of wildlife habitat scattered over a wide area. The Provo River Parkway Trail and the Hobble Creek Trail would eliminate an unknown amount of wildlife habitat. The Mitigation Commission has been acquiring land for the Utah Lake Wetland Preserve. Land and water acquired for the preserve will be managed by the Utah Division of Wildlife Resources for protection of migratory birds, wildlife habitat and wetland values. The resulting cumulative impact would be a positive impact on wildlife habitat within the impact area of influence.

7.2 Bonneville Unit Water Alternative

This alternative eliminates only 1.8 acres of wildlife habitat scattered over a wide area. The cumulative impact under this alternative would be the same as described for the Preferred Alternative in Section 7.1.

7.3 No Action Alternative

The no action alternative has the potential to convert a large acreage of wetlands to upland habitat. The Utah Lake Wetland Preserve could offset this impact, resulting in a positive cumulative impact. The wetland preserve would have a positive cumulative impact by providing alternative habitat for wetland-associated wildlife, replacing that lost in southern Utah County under the No Action Alternative. Although no wildlife populations would be placed at risk on a regional basis, the acquisition of land and water for wetland preservation along the southeast portion of Utah Lake could benefit local wildlife populations that would be stressed as groundwater drawdown to support the estimated continued population growth caused a reduction and fragmentation of historic wetland habitats.

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References Cited

American National Standards Institute (ANSI). 1990. ANSI S12.40-1990 (R1996) American National Standard Sound Level Descriptors for Determination of Compatible Land Use.

Central Utah Water Conservancy District (CUWCD). 1998. *Draft Wildlife Resources Technical Report, Spanish Fork Canyon – Nephi Irrigation System Draft Environmental Impact Statement.* Orem, Utah.

Cooper, C. 2003. Personal Communication. Montgomery Watson Harza, Boise, Idaho.

Major, S.T. and J.A. Sherburne. 1987. Interspecific relationships of coyotes, bobcats and red foxes in western Maine. J. Wildlife Management 51:606-615.

Manci, K.M., D.N. Gladwin, R. Villella, and M.G. Cavendish. 1988. Effects of aircraft noise and sonic booms on domestic animals and wildlife: a literature synthesis. U.S. Fish and Wildlife Service, National Ecology Research Center, Ft. Collins, CO. NERC-88/29. 88 pp.

U.S. Army Corps of Engineers (USACE). 2002. Crandon Mine Project EIS Noise and Vibrations Technical Memorandum. St. Paul District, U.S. Army Corps of Engineers, St. Paul, MN.

Utah Department of Natural Resources, Division of Wildlife Resources (UDNR). 2003. [database online] Available on the World Wide Web: <http://dwrcdc.nr.utah.gov/ucdc/DownloadGIS/disclaim.htm.> [cited 24 Sep. 2003]

U.S. Department of Transportation, Federal Highway Administration (FHA). 1995. Highway Traffic Noise Analysis and Abatement Policy and Guidance [online]. Available on the World Wide Web: <http://www.fhwa.dot.gov//environment/polguid.pdf> [cited 24 Sep. 2003]

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Glossary

Affect. As a verb, to influence or change.

Affected environment. The part of the environment that changes from a proposed change in operation or management.

Alternative. A proposition or situation offering a choice between two or more proposals, only one of which may be chosen. An opportunity for deciding between two or more courses or propositions.

Ambient. Occurring in an area, the normal condition in an area.

Baseline. The set of starting conditions from which changes and impacts are quantified.

Carnivore. A mammal predator that consumes animal flesh as a major component of its diet.

Decibel, dB. A standard measure of loudness of sound.

Edge Effect. Increased value of habitat in areas where different types of vegetation occur along a boundary (open land – trees, grassland – shrubs, etc.).

Effect. As a verb, to bring about or execute; as a noun, the result of an action.

Habitat. The type of environment in which an animal or group of animals normally lives or occurs.

Marginal. Minimal or borderline, generally insignificant

Mitigate, mitigation. To cause to become less severe or harmful; reduce impacts; actions to avoid, minimize, reduce, eliminate or rectify impacts to resources.

Monitor. To systematically and repeatedly measure conditions in order to track changes.

Mortality. The whole sum or number of deaths in a given time or a given community.

Neotropical. Occurring south of the Tropic of Cancer, typically comprising Central and South America.

Noxious. Harmful or undesirable.

Palustrine. Defining a wetland area that is not continuously flooded.

Passerine. Perching and, typically, song birds.

Preferred Alternative. The proposal or proposed project by sponsoring agent or proponent.

Raptor. Birds that consume animal flesh as a major component of their diet.

Reclamation. Returning disturbed land to a form and productivity that will be ecologically balanced and in conformity with a predetermined goal and land-use objective.

Revegetation. Restoring plants in a disturbed area by planting or seeding.

Riparian. Land area adjacent to rivers and streams; river or stream banks.

Riverine. Defining a wetland area occurring within a river or stream bed.

Topography. The surface contour of a land area.

Scoping. Process established to incorporate public input on proposed activities, disclosed in a NEPA document.

Scrub-shrub. Defining a specific type of wetland dominated by woody vegetation less than 6 meters (20 feet) in height.

Spawning. Egg-laying by aquatic animals, including fish and amphibians.

Species Diversity. Having multiple different species; a variety of species.

Standard Operating Procedures (SOPs). Measures followed during construction, operation or maintenance of a project to avoid, minimize or rectify adverse impacts on natural resources and people.

Upland. As defined herein, any area that does not qualify as a wetland because the associated hydrologic regime is not sufficiently wet to elicit development of vegetation, soils, and/or hydrologic characteristics associated with wetlands. Such areas occurring within floodplains are more appropriately termed non-wetlands.

Wetland. A land area defined by vegetation, soils and hydrology; saturated soils during all or part of the year determine the plant species that can grow in the area.

Wildlife. Animals normally existing in the wild, not domesticated.

Abbreviations and Acronyms

CUPCA.	Central Utah Project Completion Act
dB.	Decibel
DEIS.	Draft Environmental Impact Statement
District.	Central Utah Water Conservancy District
DOI.	Department of the Interior
EIS.	Environmental Impact Statement
JSRIP.	June Sucker Recovery Implementation Program
M&I.	Municipal and Industrial
MSL.	Mean Sea Level
NEPA.	National Environmental Policy Act
SFN.	Spanish Fork Canyon – Nephi Irrigation Project
SOPs.	Standard Operating Procedures
SUVMWA.	South Utah Valley Municipal Water Association
SVP.	Strawberry Valley Project
TR.	Technical Report
UDNR.	Utah Department of Natural Resources
ULS.	Utah Lake Water Delivery System

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Utah Lake Drainage Basin Water Delivery System

Draft Wildlife Resources and Habitat Technical Report

Appendix A Noise Impact Methodology

Appendix A
Noise Impact Methodology

Noise Effects on Wildlife

Impacts of noise on wildlife are difficult to quantify and most studies have focused on very loud noises of greater than 100dB from aircraft and sonic booms (Manci, K.M. et. al. 1988). Noise level standards and regulations are defined by human criteria and auditory sensitivity and may not be directly applicable to animals. EPA standards specify the DNL. – averaged 24-hour sound level – as the criterion for impact on human health. Under ANSI S12.40-1990, an outdoor DNL level of 60 dB is considered compatible with land use for extensive natural wildlife and recreation areas (ANSI 1990). The level of 57 dB has been deemed appropriate for "... lands in which serenity and quiet are of extraordinary significance..." by the U.S. Department of Transportation, Federal Highway Administration (FHA 1995). Specific thresholds for noise disturbance are not known for most species and noise effects may be difficult to separate from visual effects of noise sources. Sound transmission attenuates over distance and is affected by multiple factors including atmospheric, topographical and vegetative conditions between the source and a receptor (USACE 2002). The rate of sound level attenuation decreases with distance from the source, but the rate of attenuation is different for stationary point sources and for linear or moving sources, such as traffic on roadways. Point source sound decreases by six dB for each doubling of distance from the source; linear source sound decreases by three dB for each doubling of distance. Areas of forested and undulating landscape surrounding project features would further attenuate noise. It appears that many species become tolerant to sound over time and will resume use of habitat initially abandoned. General population health and reproductive success of most species are not documented to be affected by moderately loud sound levels of approximately 60 - 70 dB (Manci, K.M., et. al. 1988). A sound intensity of 60 dB was chosen as the impact level for potential reduction of habitat value for wildlife.

Noise Disturbance Distance Determination

Roadway noise on Interstate 15, Highway 6 and high traffic urban areas (Highway 89 in Springville and Provo Cities) was estimated to be approximately 78 dB Leq (h) (C. Cooper 2003) and was treated as a linear sound source. Construction noise was treated as a point sound source because construction activity would move distances over hours to days, rather than seconds to minutes, like traffic. Maximum construction noise levels would be approximately 95 dB (EIS Noise Impact Analysis, Chapter 3, Section 3.16.8.3). Because of the more rapid attenuation of sound from point sources, the distance required to reach 60 dB from a 96 dB point noise source is approximately equal to the distance required to reach 60 dB from a 78 dB linear noise source, as shown in Table A-1.

Table A-1 Sound Decay by Distance From Sound Source				
	Point Sound Source		Linear Sound Source	
Distance	dB Decrease	Net dB	dB Decrease	Net dB
50	-	95	-	78
100	6	89	3	75
200	12	83	6	72
400	18	77	9	69
800	24	71	12	66
1,600	30	65	15	63
3,200	36	59	18	60

For that reason, construction disturbance distance along high traffic road corridors would be equivalent to traffic disturbance distance. Therefore, additional noise-disturbed habitat areas were not calculated for those construction segments.

Habitat Noise Impact Calculation

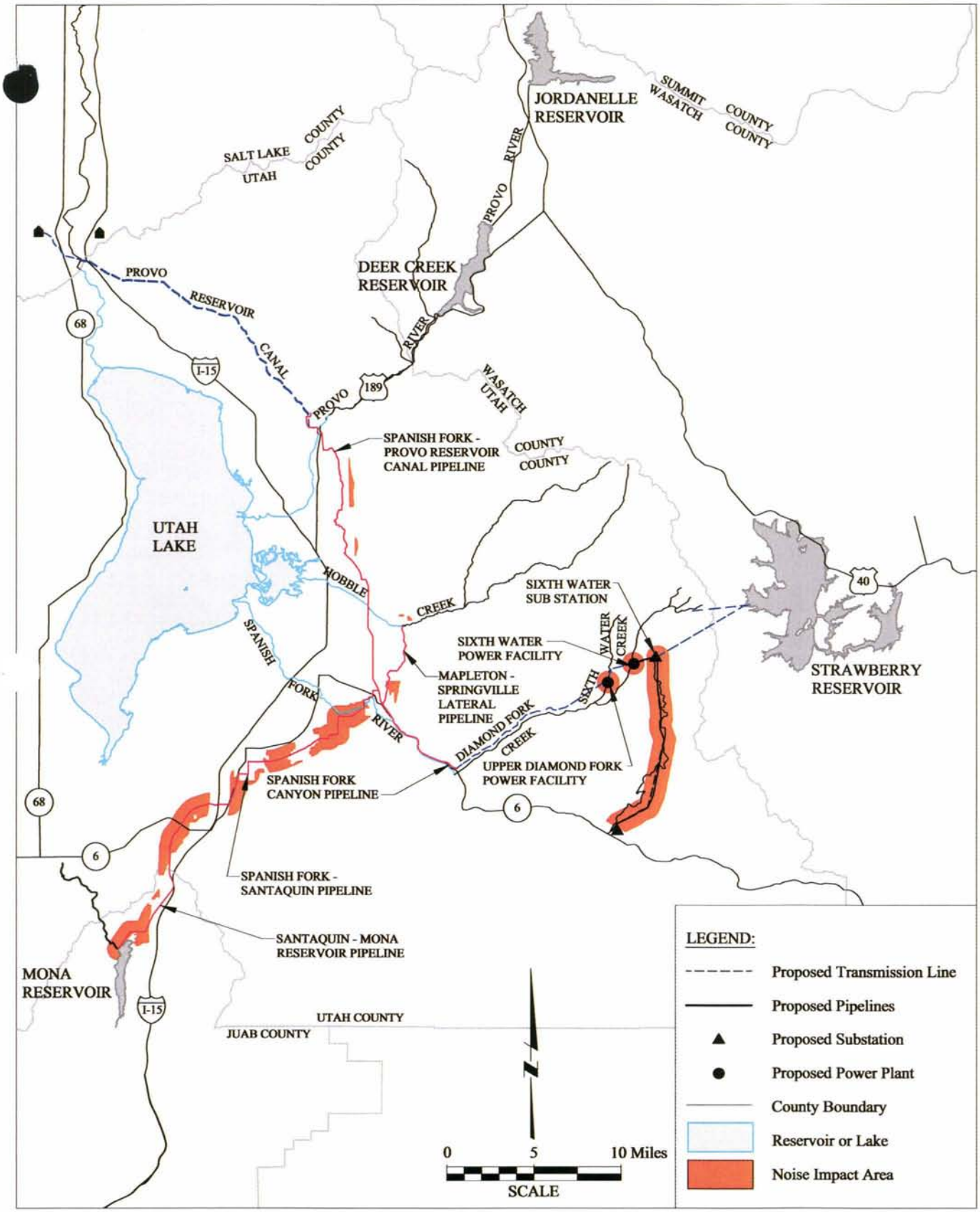
In construction areas without high ambient noise levels, ULS project features were buffered in a geographic information system (GIS) map to create noise impact polygons. The buffer distance from construction was set at a distance sufficient to reduce maximum construction noise levels to approximately 60dB, i.e., at 3,200 feet. The following were removed from the habitat noise impact area:

- Areas within 3,200 feet of major high traffic highways (Highways 6, 89, Interstate 15)
- Areas within established municipal boundaries
- Areas designated as open water on vegetation maps

Helicopters would be used in Sixth Water Transmission Line Upgrade construction. The "noise shadow" for helicopter operations was assumed to follow the transmission line corridor and would not exceed noise levels from surface equipment used in the same corridor (EIS Chapter 3, Section 16, *Noise* Table 16-10).

The calculated noise boundary polygons were used to clip vegetation community maps available online from the Uinta National Forest and the Utah State Automated Geographic Reference Center (AGRC). The areas of the remaining vegetation community polygons within the noise boundary polygons were summarized by the GIS (ArcView© 8.3) for each feature. Map A-1 shows the areas of noise impact resulting from this process.

In areas where noise disturbance overlies pipeline construction corridors, the calculated noise disturbance includes lands permanently disturbed or revegetated. The method used to calculate noise impact areas and affected vegetation community habitats could not consider the effects of topography or vegetation on noise attenuation. Additionally, there was no mechanism available to incorporate the duration of noise (work day versus 24-hour) in the spatial representation of noise disturbance. For these reasons, the calculated noise disturbance areas in the Technical Report may be considered "worst case" effects.



Map A-1

ULS Noise Impact Areas for All Alternatives