Lower Duchesne River Wetlands Mitigation Project

UTAH RECLAMATION MITIGATION AND CONSERVATION COMMISSION

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UTE INDIAN TRIBE

DRAFT ENVIRONMENTAL IMPACT STATEMENT

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UTAH RECLAMATION MITIGATION AND CONSERVATION COMMISSION

Draft Environmental Impact Statement for the Lower Duchesne River Wetlands Mitigation Project

Prepared by
Ute Indian Tribe
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Cover Sheet
Lower Duchesne River Wetlands Mitigation Project

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U.S. Department of the Interior

Cooperating Agencies
Ute Indian Tribe
U.S. Bureau of Indian Affairs
U.S. Fish and Wildlife Service
U.S. Bureau of Reclamation

Counties that Could be Affected
Duchesne and Uintah, Utah

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Abstract
This Draft Environmental Impact Statement (DEIS) covers the Lower Duchesne River Wetlands Mitigation Project (LDWP). The LDWP responds to the need to mitigate for past impacts of the Strawberry Aqueduct and Collection System (SACS) on portions of Strawberry Reservoir and the Duchesne River downstream of Starvation Reservoir. Flows diverted from the Duchesne River resulted in a loss of wetlands, riparian habitat and wetland-associated wildlife along the Duchesne River from Duchesne to Ouray. Most of the impacts occurred to land within the Uintah and Ouray Indian Reservation. As a result, the Ute Indian Tribe (Tribe) lost certain benefits associated with such wetlands. Three action alternatives were considered to restore wetlands and riparian habitat and associated Tribal benefits along the Duchesne River. All three alternatives are composed of a combination of fee lands to be acquired by the federal government and Tribal Trust lands to be placed under a conservation easement. All lands included within the project would be managed by the Tribe in accordance with plans specified in the Project Operating Agreement and Management Plans to be negotiated. All three alternatives would use a variety of restoration measures including rewatering oxbows, connecting oxbows to form contiguous systems, enlarging oxbows, enhancing water quality in oxbows, filling drainage ditches to create large marsh complexes, replanting riparian areas with native woody trees and shrubs, removing non-native invasive species and changing management of areas adjacent to wetlands to benefit wildlife. The Proposed Action would combine the mitigation obligations for the SACS with the Duchesne River Area Canal Rehabilitation Project (DRACR) resulting in a project area of 7,727 acres. The Pahcease and Topanotes Alternatives would provide mitigation only for the SACS impacts resulting in a project area of 6,640 acres with the DRACR mitigation implemented separately. The No Action Alternative would not restore any wetland or wildlife habitat or compensate the Tribe for loss of associated wildlife on Tribal Trust lands. Major environmental issues identified during public scoping are addressed in this DEIS, and include the following resource topics: potential economic impacts, acquisition of private land by the federal government, mosquito and weed control, wildlife benefits and recognition of the SACS impacts on wetlands with strong support for immediate completion of the mitigation obligation.

Other Requirements Served
This DEIS is intended to serve other environmental review and consultation requirements pursuant to 40 CFR 1502.25 (a).

Date DEIS Made Available to EPA and the Public: November 17, 2003

Date by Which Comments on the DEIS Must be Received to be Considered in the Preparation of the Final EIS: January 16, 2004

READER'S GUIDE TO THE DEIS

This Draft Environmental Impact Statement (DEIS) has been prepared to analyze and disclose the effects of three action alternatives for implementing restoration measures in the Lower Duchesne River area. This project is known as the Lower Duchesne River Wetlands Mitigation Project (LDWP). The DEIS is divided into the following sections:

- Table of Contents. This section provides detailed information on all the sections and subsections of the documents. Additionally, all the tables, maps and figures in the document are listed.
- Summary. A summary of the DEIS is located at the beginning of the document.
- Chapter 1 provides the project background, defines the purpose of and need for the LDWP and provides an overview of the alternatives.
- Chapter 2 presents construction details, land ownership and acquisition and features, and project management for the alternatives.
- Chapter 3 provides a comparative summary of the differences between alternatives.
- Chapter 4 includes a description of the baseline conditions in the project area and provides a summary of expected impacts from LDWP construction and operation.
- Chapter 5 summarizes consultation and coordination activities conducted during the LDWP planning process.
- The List of Preparers section describes the qualifications of the individuals who contributed to the preparation of the DEIS.
- Acronyms and Abbreviations and the Glossary provide a reference for terms used in the DEIS, while the References section provides information on sources quoted throughout the document.
- Appendices provide more detailed information on specific topics germane to the project. Included is information on Standard Operating Procedures that would be followed in project implementation (Appendix A) and measures to prevent the spread of noxious weeds (Appendix B), background information on the process used to assess wetland functions and results of that analysis (Appendix C), documentation of the processes used to determine impact analyses (Appendix D), lists of threatened and endangered species that may be located in the project area as provided by the U.S. Fish and Wildlife Service (Appendix E), and a draft Memorandum of Agreement that would ensure certain stipulations are implemented to protect historic properties (Appendix F).
- Map pockets. In addition to maps and figures included throughout the document, eight large maps are included at the end of the document. These maps are located in sleeves to prevent them from becoming separated from the document.

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Lower Duchesne River Wetlands Mitigation Project

Draft Environmental Impact Statement

SUMMARY

SUMMARY

S.1 INTRODUCTION

The Lower Duchesne River Wetlands Mitigation Project (LDWP) is an environmental restoration project designed to restore thousands of acres of wetland and other habitat along the Duchesne River in the Uinta Basin, Utah. The project responds to a need to fulfill mitigation commitments made to the Ute Tribe that resulted from the development of the Bonneville Unit of the Central Utah Project (CUP). The CUP is a major water development project designed to divert and transport Colorado River water from the Uinta Basin to populous areas on the Wasatch Front. This trans-basin diversion has harmed the Tribe by reducing flows in the Duchesne River, causing a loss of wetlands and wildlife that were important to the Tribe. The purpose of the LDWP is to mitigate for these losses.

S.1.1 Purpose of this Summary

A summary is an essential component of an EIS as required by the National Environmental Policy Act (see 40 CFR 1502.1). At a minimum, the summary should provide an accurate and thorough overview of the EIS. Additionally, it should stress the major conclusions of the EIS, areas of controversy (especially those raised by the public and governmental agencies) and the issues to be resolved. This summary will fulfill this requirement and address those issues in the following organizational format:

1. Background information and development of the Proposed Action and alternatives,
2. Summary description of the Proposed Action and alternatives,
3. Public concerns and areas of controversy,
4. Major impact conclusions - affected environment and environmental consequences,
5. Issues to be resolved, and
6. Coordination and consultation.

S.2 SUMMARY OF CHAPTER 1

S.2.1 Background, Purpose and Need

The CUP, originally authorized in 1956 as part of the Colorado River Storage Project Act, is a massive water development project intended to assist Utah in utilizing its apportionment of waters from the Colorado River. The Bonneville Unit, the most expensive and complex subunit of the CUP, is being constructed to deliver water from the Uinta Basin to the populous Wasatch Front. One completed feature of the Bonneville Unit is the Strawberry Aqueduct and Collection System (SACS), a sophisticated aqueduct system that gathers water from the upper Duchesne River and various tributaries. This water is transported to Strawberry Reservoir for storage and eventual use on the Wasatch Front.

As a result of construction and operation of SACS, wetland-wildlife habitat was lost along the Duchesne River and adjacent to Strawberry Reservoir. Most of these wetland losses occurred on the Uintah and Ouray Reservation lands. As a result, the Ute Indian Tribe (Tribe) lost certain benefits associated with such wetlands, including hunting opportunities and plants and wildlife important to the Tribe.

It was recognized as early as 1964, in the CUP Bonneville Unit Definite Plan Report, that construction of the CUP would harm the interests of the Tribe. In response, the U.S. Fish and Wildlife Service (FWS) recommended in 1965 that wildlife management areas totaling 6,640 acres be developed to replace wetland and waterfowl habitat for the benefit of the Tribe. The U.S. Bureau of Reclamation (Reclamation) adopted this recommendation as a project feature in its September 1965 Supplement to the 1964 Definite Plan Report. The project commitment was affirmed again with the issuance of the 1988 Definite Plan Report for the Bonneville Unit.

The Central Utah Project Completion Act of 1992 (CUPCA) again reaffirmed the commitment of the federal government to complete the unfulfilled mitigation obligations of the CUP and at the same time recognized that these obligations had not kept pace with construction of project features. With the passage of CUPCA, Congress created the Utah Reclamation Mitigation and Conservation Commission (the Mitigation Commission) and gave that new agency the authority and responsibility to complete the unfulfilled CUP environmental mitigation obligations.

S.2.2 The Development of the Proposed Action and Alternatives

In 1995, the Mitigation Commission provided the Tribe the necessary funding to initiate planning for the LDWP. By that time it had been 31 years since the original SACS mitigation obligation had been recognized by Reclamation. Accordingly, a feasibility study was completed in 1998 that reevaluated and revised the original mitigation commitment to embrace the more current concepts such as habitat restoration, wetland diversity and ecosystem management required in CUPCA. Greater consideration was given to a much broader range of wetland-dependent species, including deer, raptors, wading birds and songbirds. Acreage goals for the project included a project area consisting of 6,640 total acres with 3,000 acres of wetland and riparian-dependent wildlife habitat. The U.S. Department of the Interior (DOI), FWS, U.S. Bureau of Indian Affairs (BIA) and Reclamation assisted the Tribe in this planning effort.

The LDWP Draft Environmental Impact Statement (DEIS) presents three action alternatives. Each alternative addresses the obligation to provide mitigation for the impacts of SACS on wetlands adjacent to the Duchesne River and to provide additional wetland-wildlife benefits to the Tribe. In addition, the Proposed Action fulfills the mitigation obligation of the Duchesne River Area Canal Rehabilitation Program (DRACR) that was recognized by Reclamation in 1982. Decision making authority for designating a proposed action rests with the joint lead agencies for this DEIS (the Mitigation Commission and the DOI-Central Utah Project Completion Act Office) and the Tribe.

S.2.3 Summary Description of the Proposed Action and Alternatives

S.2.3.1 Features Common to All Action Alternatives

The Proposed Action, Pahcease Alternative and Topanotes Alternative would use a variety of measures to rehabilitate wetland and riparian habitat in the Duchesne River corridor. These measures include rewatering oxbows, connecting oxbows to form contiguous systems, enlarging oxbows to at least their 1936 widths (as determined from aerial photographs), enhancing water quality in oxbows receiving agricultural return flows, filling drainage ditches to create large marsh complexes, replanting riparian areas with native woody trees and shrubs, seeding of new wetland edges, removing non-native invasive species and changing management of areas adjacent to wetlands to benefit wildlife.

There are four oxbow systems within the entire project area that historically formed annually flooded, continuous side channels of the Duchesne River. Each alternative would connect the oxbow systems on the sites included within the alternative into a continuous backwater channel and expand the oxbow width where ditched. Where feasible, the oxbow systems would be reconnected to the Duchesne River. Oxbow reconnection was identified as feasible if the oxbow would be flooded by the mean annual flood, the flow that occurs on average every 2.3 years. Because the river has narrowed by up to 40 percent, been downcut by 2 to 4 feet and had its flow reduced by diversions, reconnection of all oxbows to the river is no longer feasible without either increased flows or river reconstruction.

Large marshes would be created on the Uresk Drain site in each alternative by filling drainage ditches and constructing a series of berms to retain and pond water on the site.

Woody riparian vegetation would be planted on former Duchesne River floodplains and non-native and invasive riparian woody species such as tamarisk and Russian olive would be removed through use of a combination of chemical and mechanical means.

A number of upland habitats would not be converted to wetlands, but their value to wetland and riparian species would be enhanced by changes in management. These include portions of currently irrigated wet meadow-grassland complexes, desert shrub and all existing cropland. Irrigated grasslands would continue to be irrigated under the Proposed Action, but grazing would be eliminated unless necessary to achieve specific wildlife management objectives. Grasslands would continue to be managed to provide nesting and foraging sites for wildlife. Desert shrub habitats would be maintained as buffers between human activity areas and wetlands. Grazing would be eliminated from all wildlife buffer areas unless necessary to achieve specific wildlife management objectives.

Land would be acquired for the project in a variety of ways. Fee land would be purchased by the federal government, and Tribal Trust land (both Reservation and allotted lands) would be placed under easements. Existing rotation cropland within the immediate vicinity of the proposed wetlands would be retained as cropland. Conservation easements instead of fee purchase may be used on existing croplands. The conservation easements would require that at least 20

percent of the crop be reserved for wildlife, that cropping schedules be adjusted if necessary to be compatible with nesting bird requirements and that native trees and shrubs along hedgerows and ditches be maintained and not cut down.

Differences among the action alternatives occur mostly in the acres and types of habitat enhanced, restored or created, the treatment of the DRACR mitigation obligation and land acquisition. These differences are described below.

S.2.3.2 The Proposed Action

- Combines both SACS and DRACR mitigation obligations in a single project encompassing 7,790 acres, of which 7,727 acres are required for SACS and DRACR mitigation (6,640 acres for SACS and 1,087 acres for DRACR).
- Requires the acquisition of up to 2,154 acres of private land and compensation to the Tribe for loss of income on 4,549 acres of Tribal Trust land that would be incorporated into the project. One thousand eighty-seven acres of existing federal land would be used in the project.
- Includes 3,962 acres of wetland and riparian habitat, which is 512 acres more than the joint (SACS and DRACR) mitigation planning goal of 3,450 acres.
- Restores riparian habitat in large blocks on the Riverdell North and Ted's Flat sites. Restores four oxbow systems (15 miles) in three sites around Myton plus one disjunct site. Two of the oxbows would be connected to the Duchesne River.
- Restores habitats bordering wetland areas that would include desert shrub, native shrub and managed grassland.

S.2.3.3 Description of the Pahcease Alternative

- Encompasses 6,765 acres, of which 6,640 acres are required for SACS mitigation. Does not satisfy DRACR mitigation.
- Requires the acquisition of up to 1,787 acres of private lands and compensation to the Tribe for loss of income on 3,891 acres of Tribal Trust land that would be incorporated into the project.
- Utilizes the federally-owned Riverdell North property of 1,087 acres for the LDWP, creating a need to purchase an alternative site suitable for DRACR mitigation.
- Includes 3,055 acres of wetland and riparian habitat, 55 acres more than the SACS planning goal of 3,000 acres.
- Restores two oxbow systems comprising nine miles, with the Flume oxbow system connected to the river.
- Restores riparian habitat in large blocks on the Riverdell North property. Restores habitats bordering oxbows and wetlands comprised of desert shrub and managed grassland.

S.2.3.4 Description of the Topanotes Alternative

- Encompasses 6,648 acres, of which 6,640 would satisfy SACS mitigation. Does not fulfill DRACR mitigation requirements.

- Requires acquisition of up to 2,171 acres of private land and compensation to the Tribe for loss of income on up to 4,477 acres of Tribal Trust land that would be incorporated into the project.
- Includes 3,175 acres of wetland and riparian habitat, 175 more than the SACS planning goal of 3,000 acres.
- Does not include the federally-owned Riverdell North property, but includes the Ted's Flat parcel further east.
- Restores riparian habitat in large blocks only on the Ted's Flat parcel. Restored habitats bordering oxbows and wetlands would be desert shrub and managed grassland.

S.2.3.5 No Action Alternative

- Restores no wetlands or riparian habitats impacted by SACS.
- Results in a continued decline of existing cottonwood forest and continued expansion of riparian and wetland weeds.
- Results in mitigation obligations identified in the 1988 Definite Plan Report remaining unfulfilled.

S.3 ISSUES AND PUBLIC CONCERNS

S.3.1 Acquisition of Private Property, Conflicts with County Land Use Plans

S.3.1.1 Issues and Concerns

Both Uintah and Duchesne Counties have adopted county land use plans that call for "no net loss of private land" in the county. The LDWP conflicts with those county policies because all of the alternatives require the acquisition of private property in order to be implemented.

S.3.1.2 Response

The LDWP is being formulated to complete unfulfilled environmental mitigation obligations, mainly to the Tribe, that have arisen from the development of the CUP. This mitigation obligation was first recognized by Reclamation in 1965 as part of its Supplement to the 1964 Definite Plan Report for the CUP (BOR 1965), and was again defined in the 1988 Definite Plan Report. In contrast, county land use plans were adopted in the late 1990s, several decades after the CUP mitigation commitments were first recognized.

With the passage of CUPCA in 1992, Congress reaffirmed the importance of fulfilling the mitigation objectives and recognized that the mitigation obligations for the CUP were lagging behind project development. The joint lead agencies currently planning the LDWP must comply with these federal requirements to complete the CUP.

In the process of acquiring private land, the LDWP will adopt strategies to minimize conflicts and controversy in the acquisition of private lands. Real estate appraisals will be made according to the highest and best use of the parcel in question. On that basis, every effort will be made to acquire property on a willing seller basis. Eminent domain will be employed only when all other reasonable efforts have failed.

S.3.2 Mosquito Control

S.3.2.1 Issues and Concerns

One of the most controversial aspects of the LDWP is that the project will increase wetlands and marshy habitats that are known breeding sites for mosquitoes. There are two important questions related to this issue: 1) will there be a significant increase in nuisance mosquitoes from wetlands and marshes within two miles of the town of Myton?, and 2) will there be a significant increase in disease-bearing mosquitoes in the Uinta Basin that cannot be reasonably controlled?

S.3.2.2 Response

The Proposed Action and alternatives will increase mosquito habitat in the project area, much of it within two miles of Myton residential areas. Using the Proposed Action as an example, implementation would create 1,027 acres of wet meadow and emergent marsh wetlands and enhance 857 acres of existing wetlands. This would be offset by a reduction in irregularly flooded pastures, which currently represent the most extensive mosquito-producing habitat in the project area. The net result would be an increase of 746 acres of mosquito producing habitat. Under the Pahcease Alternative, the net increase would be 912 acres, 698 of which would be in the area near Myton. In each alternative, the increase in mosquito habitat acreage represents 1 percent or less of the acreage currently treated for mosquitoes in Duchesne and Uintah Counties.

The LDWP will undertake two different strategies to reduce the number of mosquitoes generated by the project and to reduce the risk of disease when disease vectors are present. The first strategy involves managing the water supply to the wetlands to reduce mosquito production. For instance, the flow-through hydrologic regime employed for the LDWP wetlands would reduce stagnant water areas where mosquitoes thrive. Additionally, increasing water depths to 18 inches in the emergent marshes would reduce habitat for certain types of mosquitoes.

The second strategy involves developing special use permits with the Mosquito Abatement Districts (MADs) in both Duchesne and Uintah Counties to provide mosquito control. Ongoing access to the project areas will be allowed for mosquito monitoring, and low impact chemicals such as *Bacillus thuringiensis* (BTI) and goldenbear oil will be employed. Stronger chemicals, such as Malathion, may be permitted as a last resort when disease vectors are detected in the area.

S.3.3 Changes to County Tax Revenues

S.3.3.1 Issues and Concerns

Each of the alternatives in the LDWP will require converting approximately 2,000 acres of private land to public ownership. What

effect will this action have on county property tax revenues?

S.3.3.2 Response

The conversion of private land to public ownership will cause a relatively small decrease in county property tax collections. The amount of these tax losses has been estimated for each alternative and presented in section 4.9. For the Proposed Action, the annual projected tax loss is $699 for Duchesne County and $909 for Uintah County. The losses are relatively minor due to the fact that the lands to be converted are valued through the "greenbelt" tax classification for agricultural lands and are therefore taxed at a rate far below their normal market value.

Under certain circumstances, these tax losses might be offset by federal reimbursements through the Payment in Lieu of Taxes (PILT) Program, a program that provides payments to counties to offset the practical costs of having lands in their jurisdiction that generate no tax revenues. However, in the case of both Duchesne and Uintah Counties, a ceiling in PILT payments precludes them from receiving additional funds even if federally-owned acreage were to increase.

S.4 MAJOR IMPACT CONCLUSIONS - AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

S.4.1 Introduction

This section summarizes important issues and concerns that are evaluated in chapter 4 of this DEIS, Affected Environment and Environmental Consequences. Chapter 4 is organized according to different resource topics, such as water rights or agriculture, and addresses issues raised during the scoping process, through agency consultation or by the EIS team during analysis. This summary will focus on the most important and controversial of the resource topics. Major issues that were addressed in these topic areas will be identified and the impact analysis for those issues will be summarized. Resource topics that contained little or no controversial information are briefly summarized or dropped from this summary discussion entirely (e.g., soils and air quality). The discussion generally follows the order of the resource topics as they are presented in chapter 4.

S.4.2 Wetland and Riparian Habitats

S.4.2.1 Issues and Concerns

Will the construction and operation of the LDWP change or reduce the existing acreage of wetland and riparian habitat types in the project area?

S.4.2.2 Impact Analysis

Under the Proposed Action, 22.4 acres of wetland and riparian habitats would be temporarily impacted and 12.2 acres permanently impacted. The permanent impacts generally occur where wetland berms are constructed across existing wetlands, notably in the Uresk Drain site. There would also be some conversion of existing wet meadow and emergent marsh habitats to other habitat types, but similar habitats would be

developed elsewhere in the project area to compensate for such losses. Impacts under the Topanotes and Pahcease Alternatives would be similar to those of the Proposed Action.

The few acres of wetlands lost or altered by the LDWP would be more than offset by the restoration or creation of wetlands envisioned by the project. The Proposed Action would restore or create 2,073 acres of new wetlands as well as enhance the value of 1,925 acres of wetland and riparian habitats. The Pahcease Alternative would restore or create 2,125 acres and enhance 930 acres. The numbers for the Topanotes Alternative are 1,461 and 1,714, respectively. Additionally, all the alternatives would improve the value and function of other existing habitats in the project area, such as cottonwood forests.

S.4.2.3 Issues and Concerns

What will be the impact of the project on wetland and riparian weeds in the project area?

S.4.2.4 Impact Analysis

Two of Utah's listed noxious weeds, pepperweed and Russian olive, are prevalent in the project area. Tamarisk, a non-native invasive species, is also abundant in the active floodplain of the Duchesne River.

The LDWP would decrease the abundance of noxious weeds in the project area, representing a beneficial impact of the project. The Proposed Action itself would remove 668 acres of Russian olive and tamarisk as well as treat for pepperweed. Moreover, an ongoing weed control program would be an integral part of the LDWP Comprehensive Conservation and Management Plan.

S.4.3 Wildlife Resources

S.4.3.1 Issues and Concerns

The construction of the LDWP would dramatically alter wetland and riparian habitats in the project area, as well as impact the adjacent uplands and the Duchesne River itself. What effects will this alteration have on the health and populations of the different species of waterfowl, fish, songbirds, raptors and mammals that are currently found in the project area?

S.4.3.2 Impact Analysis

Taken as a whole, the construction of the LDWP would improve the habitat for all of the nine major wildlife species groups that were evaluated. For instance, the elimination of cattle grazing and better management of upland grasslands would benefit songbirds, provide grazing for mule deer, elk, and antelope and improve habitat for small mammals (in turn providing an additional food source for raptors). The restoration of cottonwood forests along the river corridor would provide habitat for a variety of birds, as well as nesting habitat for raptors, golden and bald eagles and great blue herons. These forests would also provide winter habitat for mule deer as well as a wood source for beaver. The creation of open water areas and marsh habitat would benefit a variety of ducks and other waterfowl, while the reduction in cropping on agricultural lands would increase the food base for a number of species. There would be some minor negative impacts to wildlife as one type of habitat is converted to another, but these impacts are almost all temporary and would eventually be offset by improved habitat of similar types in other areas of the project. Generally, habitat improvements that benefit wildlife are

considered to be significant beneficial impacts of the Proposed Action.

S.4.4 Threatened, Endangered and Candidate Species (Listed Species)

S.4.4.1 Issues and Concerns

Would the LDWP affect any listed species through mortality, disturbance through key life stages or habitat degradation?

S.4.4.2 Impact Analysis

Only seven listed species are known to occur or to have potential habitat within the LDWP project area of influence. Of the seven, two are plant species (Uinta Basin hookless cactus and Ute ladies'-tresses orchid), two are fish known to occur in the Duchesne River in this area (Colorado pikeminnow and razorback sucker) and three are animal species (bald eagle, mountain plover and western yellow-billed cuckoo).

The construction and operation of the LDWP would not negatively impact any of these listed species, but would in fact benefit several of them. The Uinta Basin hookless cactus is found in desert shrub north of the Riverdell Canal, where its habitat would be improved through the elimination of grazing. Ute ladies'-tresses have been observed upstream on the Duchesne River, but not in the project area. Habitat improvements anticipated by the project are not expected to inhibit its possible emergence in the area. No impacts to either the Colorado pikeminnow or the razorback sucker are expected from the LDWP, which would result in no measurable change in water quantity or quality in the Duchesne River. The bald eagle and western yellow-billed cuckoo are expected to benefit from the project as the restoration of the cottonwood forest provides improved roosting and feeding habitat.

S.4.5 Water Resources

S.4.5.1 Issues and Concerns

Would the construction and operation of the LDWP interfere with the water rights of existing users, reduce water availability or alter existing water supply patterns to these users?

S.4.5.2 Impact Analysis

All of the irrigable lands within the project area, except the Riverdell North property which has a junior water right, are supplied by certified 1861 Indian water rights and are authorized for direct diversion from the Duchesne River. These water rights, which will be available for the LDWP, total 17,802 to 20,653 acre-feet, depending on the alternative. Water budgets prepared for the Proposed Action and alternatives predict a water requirement that ranges from 11,325 to 14,785 acre-feet. These numbers include water for water quality control, which ranges from 27 to 50 percent of the total water requirement depending on site characteristics. As these numbers indicate, there are secure water rights available on project lands to fulfill LDWP needs without obtaining water from other sources outside the project area.

Given that the project lands have sufficient water rights for project needs, the LDWP would not change average canal diversions in the project area over the long-term. There would be no change in water deliveries from Starvation Reservoir to these canals under the

LDWP in average or wet years. In dry years, there may be less natural flow water delivered to junior water rights holders in the Duchesne River system than there is under baseline conditions which may require additional calls on CUP water by junior water rights holders.

There would be no measurable change in streamflow under any alternative.

S.4.6 Water Quality

S.4.6.1 Issues and Concerns

Would the LDWP increase contaminants or salts in the mitigation wetlands to a point where wildlife would be adversely affected? Would the project affect salinity inputs to the Duchesne River in terms of the total amount of salts?

S.4.6.2 Impact Analysis

Boron and total dissolved solids (TDS) have been identified as the most problematic contaminants in the project area; return flows from agriculture increase the level of these contaminants. Under the Proposed Action and alternatives, return flows would continue to enter the mitigation sites as they do under current irrigation practices. To combat this problem, wetlands at all sites in the LDWP would be operated as flow-through systems, with extra water delivered to each site to prevent the accumulation of salts and maintain acceptable water quality levels. This supplemental water would be provided from canals with low levels of boron and TDS, such as the Myton Townsite Canal, or the Duchesne River. This supplemental water would keep the water quality in the project wetlands within established wildlife guidelines.

The estimated long-term average annual salt load contributed to the Colorado River by the Duchesne River is 330,000 tons (BOR 1986, as cited in Swanson 2003), which represents 4 percent of the total annual Colorado River salt load of 8.2 million tons at Imperial Dam. Under all alternatives, total annual salt loading from wetlands and irrigated pastures in the project area would increase by 1,125 tons. This equates to an increase of 0.3 percent of the salt load of the Duchesne River, an amount too small to be measured at Imperial Dam or to be considered a significant change.

S.4.7 Agriculture and Land Use

S.4.7.1 Issues and Concerns

Will the LDWP negatively impact the agriculture industry in the two counties through the elimination of grazing in the project area and the use of conservation easements to reduce total crop harvest? (Note: conflicts between the LDWP and county land use objectives are summarized in section S.3.)

S.4.7.2 Impact Analysis

The LDWP would reduce agricultural output in two different ways. Grazing would be eliminated on 6,212 acres of pasture land to allow the creation and restoration of different wetland and upland habitats. This would reduce cow/calf production in the two counties by approximately 2.5 percent, varying slightly by alternative. Additionally, 491 acres of land in the Proposed Action project area are presently cultivated for rotation crops. This crop production would continue, but conservation easements would

reduce crop harvest by 20 percent to provide additional food for wildlife. These constraints would reduce marketable crop output in the two-county area by approximately 0.1 percent. Neither of these actions is expected to have a significant impact on the agriculture industry as a whole in the two counties.

S.4.8 Socioeconomics

S.4.8.1 Issues and Concerns

Will the LDWP have a positive or negative impact on socioeconomic conditions in the area, including impacts to the Tribe? Will there be impacts on county services or community infrastructure? How will the LDWP affect county taxes?

S.4.8.2 Impact Analysis

The LDWP would provide some seasonal local employment, mainly during the construction phase. There would be an emphasis on hiring Tribal members where possible. The project would not create enough jobs to have a significant impact on the local economy; however, given the high rate of unemployment within the Tribe, this additional employment would be significant for the Tribe itself. Since employees for the project are expected to come from within the two-county area, the LDWP should create no additional burden for the schools or other social services in the area.

The LDWP would generate a small increase in sales tax revenues due to increased personal spending from employment and purchases of materials. However, each of the alternatives in the LDWP would slightly decrease county property taxes as private land is purchased for the project and turned to public ownership. (This issue is discussed in more detail in section S.3)

S.4.9 Health and Safety

The primary concern identified in this resource topic is mosquito control, which is addressed in section S.3.

S.4.10 Recreation Resources

S.4.10.1 Issues and Concerns

Would the project change existing recreational use or access within the Duchesne River corridor?

S.4.10.2 Impact Analysis

Recreational use of the project area should increase slightly as the LDWP brings more wildlife to the area and opens up formerly closed fee lands. Non-consumptive recreation would be encouraged, although hunting would continue to be allowed. All types of recreational use would be somewhat limited by the requirement to obtain a Tribal permit and by the lack of parking facilities. Current public access to the Riverdell North property would not change. Hunting and fishing from this property would require either a State or a Tribal permit, but not both. There would be no fee or permit needed for non-consumptive recreation on the Riverdell North property.

S.4.11 Transportation

S.4.11.1 Issues and Concerns

Would the LDWP change the existing levels of service (LOS) on roads that would be used by workers traveling to and from the job, deliveries of various materials or visits by recreational users? (LOS is a highway rating system that evaluates traffic flow conditions on various road segments.)

S.4.11.2 Impact Analysis

During peak construction periods, it is expected that implementation of the LDWP would add up to 50 vehicle round trips to the road network in the surrounding area, particularly near Roosevelt. This volume of traffic is not expected to cause any deterioration in the road infrastructure nor any noticeable decline in the LOS on the roads, a measure of volume and flow rates of traffic. One exception to this might be during peak evening traffic periods in Roosevelt, where LDWP project traffic would add to the increasing congestion and might cause the LOS to decline slightly.

S.4.12 Cultural Resources

S.4.12.1 Issues and Concerns

Would the LDWP affect any prehistoric or historic sites eligible for the National Register of Historic Places (NRHP)? Would the LDWP affect any Tribe traditional or religious use areas?

S.4.12.2 Impact Analysis

Most of the known sites within the project area are historic structures or engineering features. Significant cultural resources in the LDWP project area are limited to four historic canals that have been officially determined to be eligible for the NRHP; the remaining five sites are either unevaluated or have been judged insignificant by field recorders. There would be no impacts to these known sites. The Uresk Drain, a drainage ditch constructed between 1936 to 1939, would be filled. The significance of this action has not yet been determined. There are no known sites of cultural importance or sacred sites to the Tribe within the project area.

Since cultural resources surveys of the impact area of influence have not been comprehensive, additional cultural and paleontological surveys and analyses would be conducted under a Memorandum of Agreement (MOA) among the Utah State Historic Preservation Office (SHPO), Mitigation Commission and the Tribe.

S.4.13 Native American Trust Resources/Environmental Justice

S.4.13.1 Issues and Concerns

Would the LDWP affect Tribal sovereignty? Would the LDWP insure that Trust resources are utilized for the benefit of the Tribal owners? Would the project have a disproportional effect on minority or low income populations such as Tribal members?

S.4.13.2 Impact Analysis

The Proposed Action would occur on portions of the Uintah and Ouray Indian Reservation and would utilize land and water rights of the Tribe. The Tribe would be compensated for placing a conservation easement on its land and leasing its water to the project. The Tribe would also receive the benefit of increased wetland-wildlife resources and associated hunting, cultural and educational opportunities. The Tribe is a lead agency on this project for planning purposes. The Tribe has developed the conceptual project plans (WWS 1998, WWS 2000) and would manage the entire wetland-wildlife area regardless of land ownership.

Under the Proposed Action, construction would occur over a 10-year period generating jobs for up to 30 local residents. Construction contractors would be required to give preference to qualified Ute Indians in hiring and income would be generated for some individual Ute Indians during project construction. The project would be operated by the Tribe under terms of the operating agreements to be negotiated. Employment would be provided for an estimated regular staff of three personnel with periodic needs for temporary workers to meet operation and maintenance needs. Both project employment opportunities and increased wetland-wildlife resources would provide a positive impact on the Tribe (a minority and low-income population) without adversely affecting the health or safety of local residents or adversely affecting the local economy. None of the alternatives would disproportionally affect low-income or minority communities.

S.4.14 Cumulative Impacts

S.4.14.1 Issues and Concerns

The Proposed Action differs from the other alternatives as it meets both the SACS and DRACR mitigation obligations instead of only one mitigation obligation, and as a result includes a larger project area, which generally provides both greater beneficial and adverse impacts. If the Topanotes or Pahcease Alternative is selected for implementation, the DRACR mitigation would be completed as a separate action by the Mitigation Commission. Cumulatively, all projects would result in a minimum total area of 7,727 acres.

S.4.14.2 Impact Analysis

Wetland and wildlife benefits would be similar cumulatively among all alternatives with implementation of both the SACS and DRACR, although there would still be a greater amount of wetland and riparian habitats restored under the Proposed Action (3,998 acres cumulatively for the Proposed Action, 3,505 cumulative acres for the Pahcease Alternative and 3,625 cumulative acres for the Topanotes Alternative). Areas in which large cumulative impact differences would be seen among the alternatives are public health and safety (mosquitoes), fee land acquisition and changes in tax revenues. Table S-1 provides a comparison of the cumulative effects of DRACR and SACS implementation on these resources under each alternative.

Table S-1. A Comparison of the Cumulative Effects of SACS and DRACR Mitigation on Key Resources.				
Alternative	**Resource**			
	Wetland/ Riparian (acres)	**Mosquito Habitat (acres)**	**Fee land Acquisition (acres)[1]**	**Tax Revenues ($)**
Proposed Action[2]	+ 3,998	+ 746	2,154 (2,494)	-1,608
Pahcease Alternative and DRACR	+3,505	+1,362	2,874 (3,214)	-3,145
Topanotes Alternative and DRACR	+3,625	+ 1,305	2,171 (2,511)	-1,371

Note: A "+" indicates an increase in acres of functional habitat from baseline conditions. A "-" for tax revenues indicates a decrease in revenues from baseline conditions.
[1] The number in parentheses indicates the full cumulative impact fee land acquisition including all other related projects.
[2] Includes DRACR.

S.5 ISSUES TO BE RESOLVED

S.5.1 Unfulfilled DRACR Mitigation

The DRACR Program generated a mitigation obligation that was identified by Reclamation in 1982. The Riverdell North property was purchased as the site where this mitigation was to occur. The Riverdell North property and the DRACR mitigation obligation were combined with SACS obligation in formulating the Proposed Action. However, if either the Pahcease or the Topanotes Alternative is selected, the DRACR mitigation obligation will remain unfulfilled.

S.5.2 Management of LDWP with Multiple Landowners

Following the acquisition of fee properties in the project area, land ownership in the LDWP would consist of federally-owned property and Tribal Trust lands. An operating agreement for the LDWP would be formulated that resolves this ownership situation for management purposes.

S.6 SUMMARY OF CONSULTATION AND COORDINATION

S.6.1 Project Planning

The Tribe, in conjunction with the Mitigation Commission and DOI, conducted extensive consultation and coordination while preparing this DEIS. Because the majority of the LDWP would occur on Tribal Trust lands and mitigation for Tribal resource losses is a key project need, the Tribe managed the consultation and coordination for the LDWP DEIS. Consultation and coordination was

initiated in 1997 during preparation of project feasibility reports. Public input was sought by the Tribe through individual landowner contacts, preparation and distribution of a survey to Tribal members, field tours of the project area and a series of presentations made by the Tribe to area high schools, at Tribal Council meetings and at public Mitigation Commission meetings. Less formal consultation with agencies, organizations and technical experts took place throughout the preparation of the DEIS.

Early in the planning process, the lead federal agencies appointed representatives to be involved in an LDWP Planning Team. Planning Team members included representatives from the Tribe, Mitigation Commission, DOI, FWS, Reclamation and the BIA. The first Planning Team meeting was held on April 15, 1997, in Salt Lake City. Between April 1997 and initiation of the DEIS with public scoping meetings, 18 additional Planning Team meetings were held.

S.6.2 Development of the DEIS

Public scoping meetings were held in Fort Duchesne and Roosevelt on May 15, 2001, and in Salt Lake City on May 16, 2001. Thirty oral and written comments from such agencies as Duchesne County Water Conservancy District, Duchesne County Commission, Great Salt Lake Audubon, Utah Waters and the Stonefly Society of Trout Unlimited were received. Results of the scoping meetings and comments received during the scoping process were used to establish the scope of the DEIS and focus the environmental analysis on important issues and concerns. Issues and concerns focuses on seven general categories: potential economic impacts, loss of private land, project costs and long-term financing, mosquito and weed control, wildlife benefits and recognition of SACS impacts on wetlands. There was strong support for immediate completion of the mitigation obligation.

The DEIS was developed through continued coordination between the Planning Team and a Technical Team of specialists who prepared individual sections and contributed to detailed analyses. There was weekly coordination with specialists during individual section preparation. Monthly meetings were held with the entire Planning Team and representatives of the Technical Team. Small group working sessions were scheduled as necessary with specialists and appropriate members of the Planning Team. These small group working sessions were focused on wildlife, water resources and land ownership analyses.

Prior to the DEIS preparation, draft project descriptions and an administrative DEIS were submitted to Planning Team members for review and comment. Preparation of a Preliminary DEIS (PDEIS) was initiated in January 2003; on April 30, 2003, this completed document was distributed to all cooperating and lead agencies, including Planning Team members, for review and comment. Comments on the PDEIS were used to prepare the DEIS. The following agencies participated in the PDEIS review:

- U.S. Department of the Interior
- U.S. Bureau of Indian Affairs
- U.S. Fish and Wildlife Service
- U.S. Bureau of Reclamation
- Ute Indian Tribe Business Committee
- Ute Indian Tribe Fish and Wildlife Advisory Board

- Utah Reclamation Mitigation and Conservation Commission

S.6.3 Review of the DEIS

The DEIS will be distributed to at least 30 agencies, organizations and other individuals that have requested, or may request, a copy. A complete mailing list of all agencies, organizations and individuals who will receive the DEIS is available upon request from:

Ron Groves
Ute Indian Tribe, Wetlands-Fish and Wildlife
PO Box 190
Fort Duchesne, UT 84026

Additional copies of the DEIS and technical reports referenced therein are available on request from the same office. Public hearings will be held on the DEIS in Fort Duchesne, Roosevelt and Salt Lake City. Following are the hearing dates, times and locations:

Fort Duchesne DEIS Public Hearing

Date: December 16, 2003
Time: 6:00 p.m.
Location: West Junior High
East Highway 40
Fort Duchesne, Utah

Roosevelt DEIS Public Hearing

Date: December 17, 2003
Time: 6:00 p.m.
Location: Crossroads Senior Center
192 South 100 East
Roosevelt, Utah

Salt Lake City DEIS Public Hearing

Date: December 18, 2003
Time: 6:00 p.m.
Location: Bureau of Land Management
Salt Lake Field Office
324 South State Street
Salt Lake City, Utah

Lower Duchesne River Wetlands Mitigation Project

Draft Environmental Impact Statement

CHAPTER 1

GENERAL OVERVIEW

CHAPTER 1: GENERAL OVERVIEW

1.1 INTRODUCTION

The Lower Duchesne River Wetlands Mitigation Project (LDWP) is proposed to fulfill certain mitigation commitments of the Bonneville Unit of the Central Utah Project (CUP). The Strawberry Aqueduct and Collection System (SACS) is a key component of the Bonneville Unit, collecting water from the upper Duchesne River and its tributaries and storing it in Strawberry Reservoir for subsequent delivery to the Wasatch Front. Under full operation, the Bonneville Unit is expected to deliver approximately 102,000 acre-feet of water to the Wasatch Front on an average annual basis.

As a result of construction and operation of the SACS, wetland-wildlife habitat along the Duchesne River and adjacent to Strawberry Reservoir was lost. Most wetland impacts occurred on the Uintah and Ouray Reservation lands and, as a result, the Ute Indian Tribe (Tribe) experienced a loss of certain wetland-wildlife benefits such as reduced hunting opportunities and the loss of plants and wildlife important to the Tribe. The LDWP would restore, create and enhance wetland and riparian habitat along the Duchesne River to compensate for the impacts of the SACS on wetlands, compensate the Tribe for lost fish and wildlife resources and provide associated Tribal wetland-wildlife resource benefits. Figure 1-1 depicts the location of the LDWP in relation to the Bonneville Unit and the SACS impact area.

In 1995, the Utah Reclamation Mitigation and Conservation Commission (Mitigation Commission) provided funding to the Tribe to plan the LDWP. The U.S. Department of the Interior (DOI), U.S. Fish and Wildlife Service (FWS), U.S. Bureau of Indian Affairs (BIA) and U.S. Bureau of Reclamation (Reclamation) assisted the Tribe in this planning. The goal was to develop a plan to meet SACS mitigation requirements that would be acceptable to the Tribe and the other partners and provide wetland-wildlife benefits to the Tribe. The project goals are to create and improve a mix of wetland and riparian habitat types to benefit a broad range of wetland-dependent wildlife, including waterfowl, and to provide compensation to the Tribe for loss of wetlands on the Uintah and Ouray Indian Reservation.

The LDWP Draft Environmental Impact Statement (DEIS) analyzes three action alternatives that address the obligations to provide mitigation for the impacts of the SACS on wetlands adjacent to the Duchesne River downstream of Starvation Reservoir and to provide additional wetland-wildlife benefits to the Tribe. Decision-making authority regarding a proposed action rests with the joint lead agencies for this DEIS (the Mitigation Commission and the DOI-Central Utah Project Completion Act Office) and the Tribe.

This LDWP DEIS has been prepared based on a feasibility level of analysis. The material presented in this chapter describing the Proposed Action and alternatives has been summarized from a series of feasibility study reports prepared for the Tribe that describe conceptual plans for the project (Basin Hydrology 1997, FWS 2000, WWS 1998,

WWS 2000). Final design for the selected alternative would be prepared after the FEIS is finalized and the Record of Decision issued, but prior to construction.

Chapter 1 provides the project background, defines the purpose of and need for the LDWP and provides an overview of the alternatives. Chapter 2 presents construction details, land ownership and acquisition and features, and project management for the alternatives. Chapter 3 provides a comparative summary of the differences between alternatives. Chapter 4 includes a description of the baseline conditions in the project area and provides a summary of expected impacts from LDWP construction and operation. Consultation and coordination activities conducted during the LDWP planning process are summarized in Chapter 5.

1.2 PURPOSE AND NEED

1.2.1 Need for the Proposed Action

Measures to improve wetlands along the Duchesne River are required as mitigation of the impacts of the SACS on Tribal and non-Tribal wetland-wildlife habitat in the Duchesne River corridor and to provide additional wetland-wildlife benefits to the Tribe. The project need was first recognized in 1965 (FWS 1965) and subsequently accepted in the 1973 Final Environmental Impact Statement (FEIS) for the Bonneville Unit and the 1988 Definite Plan Report for the Bonneville Unit. The project need remains unfulfilled more than 15 years after SACS facilities became operational and more than 35 years after project planning began.

With the diversion of flows from the Duchesne River, the river floodplain changed from a wide floodplain traversed by annually flooded backwater channels dominated by willow thickets, marshes and extensive areas of cottonwood forest to a single channel bordered by a much narrower floodplain (see also section 1.3.3). Diversions of water from the Duchesne River due to SACS and other water projects now approach 80 percent of the total annual flow (WWS 1998), with substantial loss of adjacent river-connected wetlands and riparian habitats. The habitat types affected most by SACS have been identified as river-connected and annually flooded backwaters, native shrub thickets, extensive marsh complexes and cottonwood forest.

The following needs would be met by the Proposed Action and alternatives:

- Acquire, develop and manage 6,640 acres of wildlife areas incorporating sufficient quality and quantity of wetlands to compensate for Tribal and non-Tribal wetland-wildlife losses resulting from construction and operation of SACS, of which 1,787 to 2,171 acres would be acquired from private landowners and developed and managed in perpetuity as wetland-wildlife habitat, and
- Provide additional wetland-wildlife benefits to the Tribe through wetland restoration, creation and enhancement on 3,891 to 4,549 acres of Tribal Trust lands.

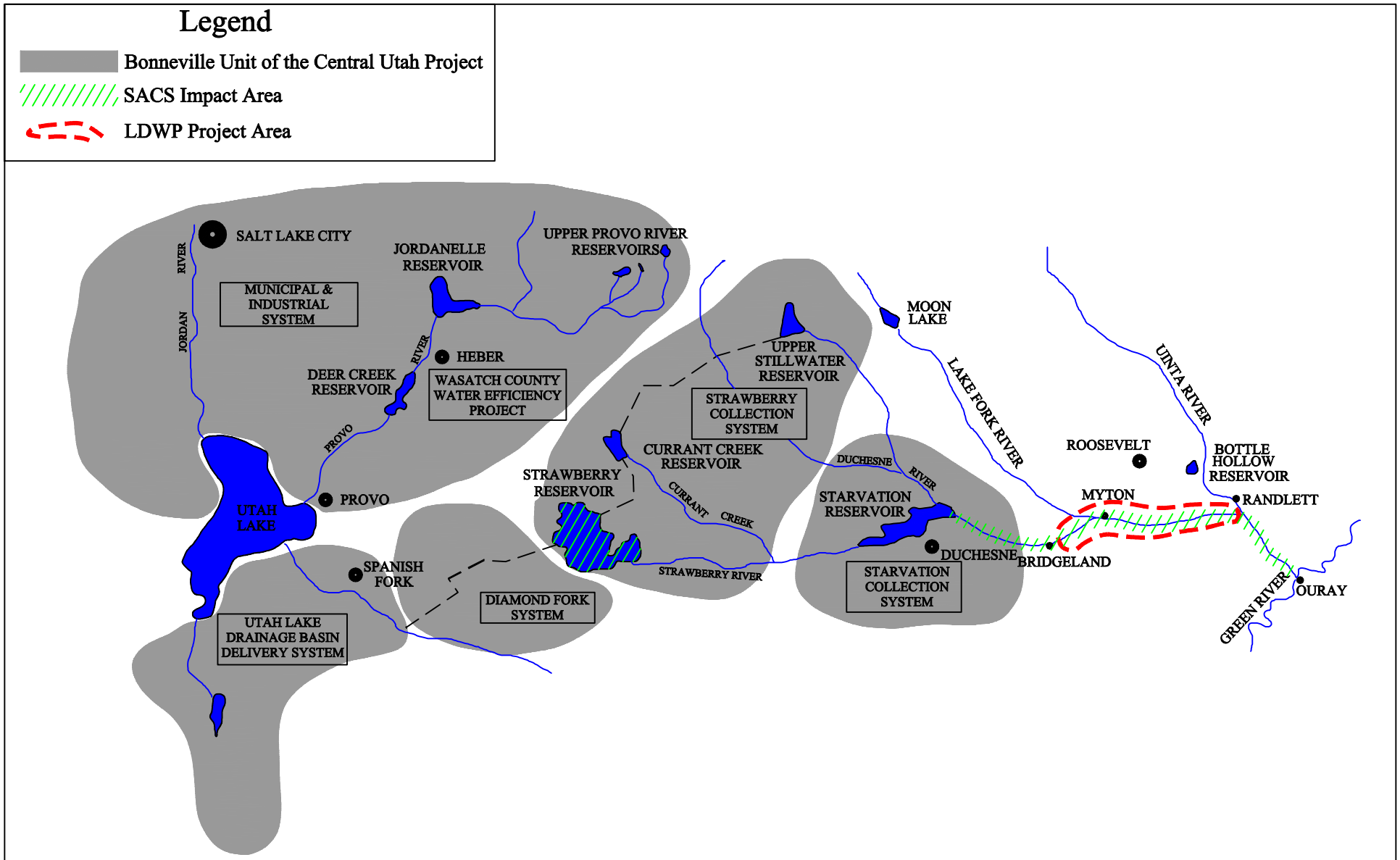


Figure 1-1. Location of the Lower Duchesne Wetlands Mitigation Project in Relation to the Bonneville Unit and the Strawberry Aqueduct and Collection System Impact Area

1.2.2 Purposes of the Proposed Action

The alternatives described in this DEIS are designed to meet the project need and the following specific purposes:

- Restore historical riverine wetland features on or associated with the Duchesne River,
- Implement a plan that contains a diversity of wetland and riparian habitat types,
- Achieve consensus support for mitigation measures among the Planning Team, especially the Tribe, Mitigation Commission and DOI, and
- Remain within funding authorization identified in the Mitigation Commission's Mitigation and Conservation Plan (2002).

1.3 HISTORY AND BACKGROUND

1.3.1 Statutory Background

The origins of the LDWP can be traced to the CUP Bonneville Unit Definite Plan Report (BOR 1964), which predicted substantial wetland impacts from SACS, and a 1965 FWS recommendation that management areas totaling 6,640 acres be developed to replace wetland and waterfowl habitat and provide additional benefits to the Tribe through waterfowl hunting. The identified waterfowl management areas would have consisted of approximately 59 percent (3,915 acres) of marsh or open water habitat and 41 percent (2,725 acres) supporting upland or cropland (FWS 1965). The plan adopted by Reclamation was for 6,640 acres of waterfowl habitat, of which 45 percent (3,000 acres) would be wetlands (BOR 1964). The recommendation was adopted by Reclamation as a project feature in its September 1965 Supplement to the 1964 Definite Plan Report. The 1988 Definite Plan Report for the Bonneville Unit continued to recognize the same requirement.

The Central Utah Project Completion Act (CUPCA, Public Law 102-575) created the Mitigation Commission to coordinate funding and implementation of fish, wildlife and related recreation mitigation measures for the CUP. CUPCA specifically directs the Mitigation Commission to implement, on a priority basis, unfulfilled mitigation commitments of past CUP decision documents. Section 304 states that ". . . the fish, wildlife and recreation projects identified or proposed in the 1988 Definite Plan Report which have not been completed . . . shall be completed in accordance with the 1988 Definite Plan Report." Completion of the unfulfilled SACS wetland mitigation requirement is listed in the 1988 Definite Plan Report.

The project area is located within Duchesne and Uintah Counties, both of which have emphasized a "no net loss of private land" policy in their respective land use plans. Duchesne County's plan and policy were adopted in 1997 and Uinta County's in 1996, both many years after the requirements for completion of the CUP were established in federal law.

In 1992, the State of Utah and its elected officials in Congress supported passage of the Central Utah Project Completion Act (CUPCA), which established the terms and conditions for completion of the CUP,

including mitigation requirements. A major impetus for CUPCA was the awareness that prior mitigation efforts had lagged behind construction of the CUP or were inadequate when measured against modern environmental standards. It was the intent of Congress to balance the mitigation debt within Utah resulting from such development and to provide mitigation an equal footing compared to other project purposes. As such, Congress prescribed the completion of the mitigation responsibilities described in the 1988 Definite Plan Report. The LDWP is part of the federally-mandated mitigation commitments for the CUP. Reclamation initially committed to this project in the 1964 Definite Plan report for the CUP. Although the project has been revised through time, the commitment nonetheless remains unfulfilled.

1.3.2 Project Approach and History

In 1965, the FWS predicted that SACS would dewater river-connected backwaters along the Duchesne River and recommended that this loss of wetlands be mitigated by the construction of waterfowl habitat. Two general approaches to waterfowl habitat development were evaluated in the 1970s (Call Engineering 1975, Kaiserman Associates 1978). The first was to create a series of large impoundments that would be managed specifically for migrating waterfowl and to enhance fall hunting opportunities for the Tribe. The second was to create a series of small ponds for waterfowl breeding habitat. Neither plan was implemented.

In 1995, the Mitigation Commission provided funding to the Tribe to plan the LDWP. Because the project is being implemented more than 35 years after it was first recommended, project goals, previously-developed plans and the actual nature of SACS impacts were reevaluated in a 1998 feasibility study (WWS 1998). This study identified that the main impacts of SACS construction and operation were:

- The loss of extensive systems of river-connected and annually flooded backwaters, and
- A substantial reduction in the extent, density, composition and regeneration of native riparian scrub-shrub and cottonwood forest.

Although the loss of the flooded backwaters undoubtably impacted waterfowl use of the corridor, habitat was also lost for other wetland and riparian-dependent species such as deer, raptors, wading birds and songbirds. In 1997 the project goals were revised to include mitigation for riparian habitats (including cottonwood forests) to emphasize habitat restoration, wetland diversity and ecosystem management and to examine benefits to wetland and riparian dependent species other than waterfowl. Revised acreage goals for the LDWP are for a project area consisting of 6,640 total acres with 3,000 acres of wetland and riparian-dependent wildlife habitat.

Other considerations in developing a mitigation plan are listed below:

- Recognizing that the majority of the impacts occurred to wetland and riparian habitat on Tribal Trust lands and that mitigation plans need to be consistent with Tribal wildlife management interests.
- Ensuring compliance with the standards identified by CUPCA Section 301(g)(4)(D) and (F) that mitigation

activities complement the existing and future activities of appropriate federal, state and Tribal wildlife agencies and be consistent with the legal rights of the Tribe.

- Ensuring compliance with the project need for 6,640 acres of wildlife habitat within the LDWP project area and the directive that the LDWP project be planned and implemented within the funding limitations allocated for the project by DOI and the Mitigation Commission (7.9 million dollars in 1991 dollars).
- Utilizing the most cost-effective methods to develop wetlands and riparian habitat. This required utilization of existing topographic features to the maximum extent possible with a minimization of excavation and regrading of sites, favoring restoration of wetland and riparian habitats where they historically occurred over creation of habitats in new locations and avoidance of residences and rotation croplands.
- Using a landscape approach to develop alternatives that included looking at connectivity of habitats; providing large blocks of wetland and riparian habitats; including both sides of the Duchesne River in the project area wherever feasible; including entire oxbow systems in individual sites rather than only parts of the formerly contiguous oxbows and trying to ensure close proximity of wetlands to each other.
- Ensuring compliance with the standards identified by CUPCA Section 301(g)(4)(A) that the Mitigation Commission must consider and apply in implementing mitigation and conservation projects. These standards include a requirement to "restore, maintain or enhance the biological productivity and diversity of natural ecosystems within the State which have substantial potential for providing fish, wildlife and recreation mitigation and conservation opportunities."

A final planning consideration in developing project alternatives was the option to combine the mitigation obligations of SACS with wetland mitigation required for the Duchesne River Area Canal Rehabilitation Program (DRACR). The DRACR mitigation obligation was identified by Reclamation in 1982. The Riverdell North property was purchased by the federal government as the site on which the DRACR mitigation was to be conducted. The mitigation goal recommended by the FWS (FWS 1982) is to replace 390 wetland-wildlife habitat units through creation, restoration and enhancement of 450 acres of wetland within the Riverdell North property. The mitigation obligation is unfulfilled. The Riverdell North property is located within the LDWP area (see Figure 1-2).

Although the LDWP and DRACR mitigation obligations are separate, the location of the proposed mitigation sites and wetland-riparian restoration and enhancement goals overlap. Therefore, an alternative was created that would complete both mitigation requirements in a single project. If the LDWP and DRACR mitigation projects were combined, the planning goal would be for a project area consisting of 7,727 total acres with a minimum of 3,450 acres of wetland and riparian habitat. Other LDWP project goals, such as restoration of riverine features, diversity of wetland habitats and providing wetland-wildlife benefits to the Tribe, are

maintained for alternatives combining the two mitigation obligations into a single project.

1.3.3 Duchesne River History

The Duchesne River historically was "highly turbid, strong flowing and turbulent" (Minckley 1973). Historic plat maps depict the river as consisting of numerous secondary channels and abandoned meanders, some of which were described as backwater sloughs (Brink and Schmidt 1996).

Major irrigation canals to divert water locally from the Duchesne River were constructed between 1907 and 1920, and by 1940 much of the Duchesne River floodplain had been converted to cropland (Brink and Schmidt 1996). Two major canals along the lower Duchesne River, the Grey Mountain Canal and the Myton Townsite Canal, currently divert an average annual amount of 81,145 acre-feet. Other local irrigation diversions along the lower Duchesne River divert an additional 56,000 acre-feet.

Trans-basin deliveries of Duchesne River water to the Wasatch Front began in 1915 with the Strawberry Valley Project (SVP). Other trans-basin diversions have been added over time, including diversions from the North Fork Duchesne River by the Provo River Project (PRP) in 1953. The largest and most recent diversions, beginning in 1967, occurred as a result of the CUP. Cumulatively, these water developments deplete a substantial portion of the Duchesne River flows.

For the period of 1943 to 1990, total flow depletions have averaged 43 percent of the natural flow. This percentage has increased over time. For example, from 1973 to 1990, depletions averaged 51 percent of total runoff; after the completion of Stillwater Reservoir in 1987, flow depletions averaged 79 percent with a high of 85 percent in 1990 (WWS 1998).

As a result of diversions from the Duchesne River and clearing of land for agriculture, the wetland and riparian habitat along the Duchesne River has been altered. Historically, the Duchesne River was described as an anastomosing channel with a nearly continuous network of side and backwater channels bordered by willow thickets and cottonwood forests, as stated above. The Duchesne River has also been described as consisting of impenetrable willow thickets and marshy estuaries (Warner 1995). As average streamflow and flood magnitude in the Duchesne River have declined, individual backwater areas and oxbows have become isolated from the river as a result of their entrances being silted in or their being leveled for agricultural development. At the present time, active backwater channels are open only in three locations between Bridgeland and Ouray. Abandoned oxbows exist throughout the study area and are abundant near Bridgeland; however, with few exceptions, these oxbows are isolated from and are rarely, if ever, flooded by the river. The majority of the oxbows still classified as wetland habitat are apparently supported by return flow from irrigated fields.

These changes, together with reductions in streamflow, have resulted in loss of riparian habitat and backwaters formerly used by native fish and wildlife. Currently, the Duchesne River is confined to a single channel with secondary channels in only two locations. River-connected backwater slough habitat and extensive willow thickets no

longer exist. The floodplain cottonwood forest has been dramatically reduced in width, canopy cover, density and vigor. Many of the remnant cottonwoods along the Duchesne River are estimated to be from 100 to more than 150 years old with recent cottonwood establishment limited in the corridor. Additionally, shrub density has increased in the corridor, primarily as a result of Russian olive and tamarisk establishment. Native shrubs of importance to wildlife and the Ute culture have decreased in extent (WWS 1998).

1.4 OVERVIEW OF THE PROPOSED ACTION AND ALTERNATIVES

The DOI, Mitigation Commission, Tribe and other cooperating agencies considered a broad range of approaches or measures that could be implemented to meet the purpose and need for the project. These measures included:

- Rewatering oxbows with a narrow supporting upland corridor,
- Rewatering oxbows with greater development of supporting upland and riparian areas (separate alternatives developed for different configurations of sites),
- Creation of large ponds for migrating waterfowl, and/or
- Release of stored flows from Starvation Reservation in a manner that provides for riparian benefit.

All measures were evaluated for their technical, economic and environmental feasibility. Alternatives were developed that utilized the various measures. Those alternatives selected for evaluation in this DEIS are considered the most feasible when measured against the purpose and need for the project. Alternatives considered but eliminated from detailed analysis are discussed in section 1.5.

1.4.1 Location of Proposed Action and Alternatives

The LDWP area is located within a corridor along the Duchesne River that includes both the current and historic floodplains, including the pre-SACS active secondary channels and oxbows. Because the Duchesne River contained an extensive floodplain and secondary channel system, the corridor extends up to one mile from each side of the river. The 45-mile long corridor is located between the junction of Highways 40 and 89 near Bridgeland, Utah, and the junctions of the Duchesne and Green Rivers just north of Ouray, Utah (Figure 1-2). Elevations in the corridor range from 5,297 to 4,740 feet above mean sea level.

The Proposed Action and alternatives consist of a combination of sites that would be acquired, developed and managed as a single wetland-wildlife area. Four sites, ranging in size from 1,598 to 2,646 acres, make up the various alternatives. These sites are the Flume, Uresk Drain, Riverdell North/South and Ted's Flat sites (Figure 1-2). Each alternative contains a different combination of sites. Figures 2-1 through 2-5 show the location of specific sites included in the various alternatives and their main topographic features. Subsequent discussions of the Proposed Action and alternatives make frequent reference to the specific sites and features shown in these figures.

Flume: The Flume site begins at an active secondary channel of the Duchesne River 4.5 miles west of Myton and 0.75 miles north of Highway 40 (Figures 2-1 and 2-2). The site extends for 3.5 air miles along the Duchesne River corridor, ending at the Myton Townsite Canal. Two configurations were considered for the site. The first configuration consists of 1,598 acres and crosses Highway 40 just west of Myton to connect with the adjacent Uresk Drain site. This configuration is included in the Proposed Action and is depicted in Figure 2-1. The second configuration consists of 2,646 acres and encompasses both sides of U.S. Highway 40 for the entire site length. This configuration is included in the Pahcease and Topanotes Alternatives and is depicted in Figure 2-2.

Uresk Drain: The Uresk Drain site (1,929 acres) begins just north of County Road 8000 South (also known as River Road) which borders the southern edge of the town of Myton. The site extends approximately two miles east of Myton to the Duchesne River and extends south to the Myton Townsite Canal (Figure 2-3). The Uresk Drain site is named after its major topographic feature, the Uresk Drain, a 2.5 mile long drainage ditch constructed in 1936 to remove the high water table from the "marshy land southwest of Myton" (SCS 1959). Hereafter, the site is referred to as the "Uresk Drain" and the drainage ditch as the "Drain."

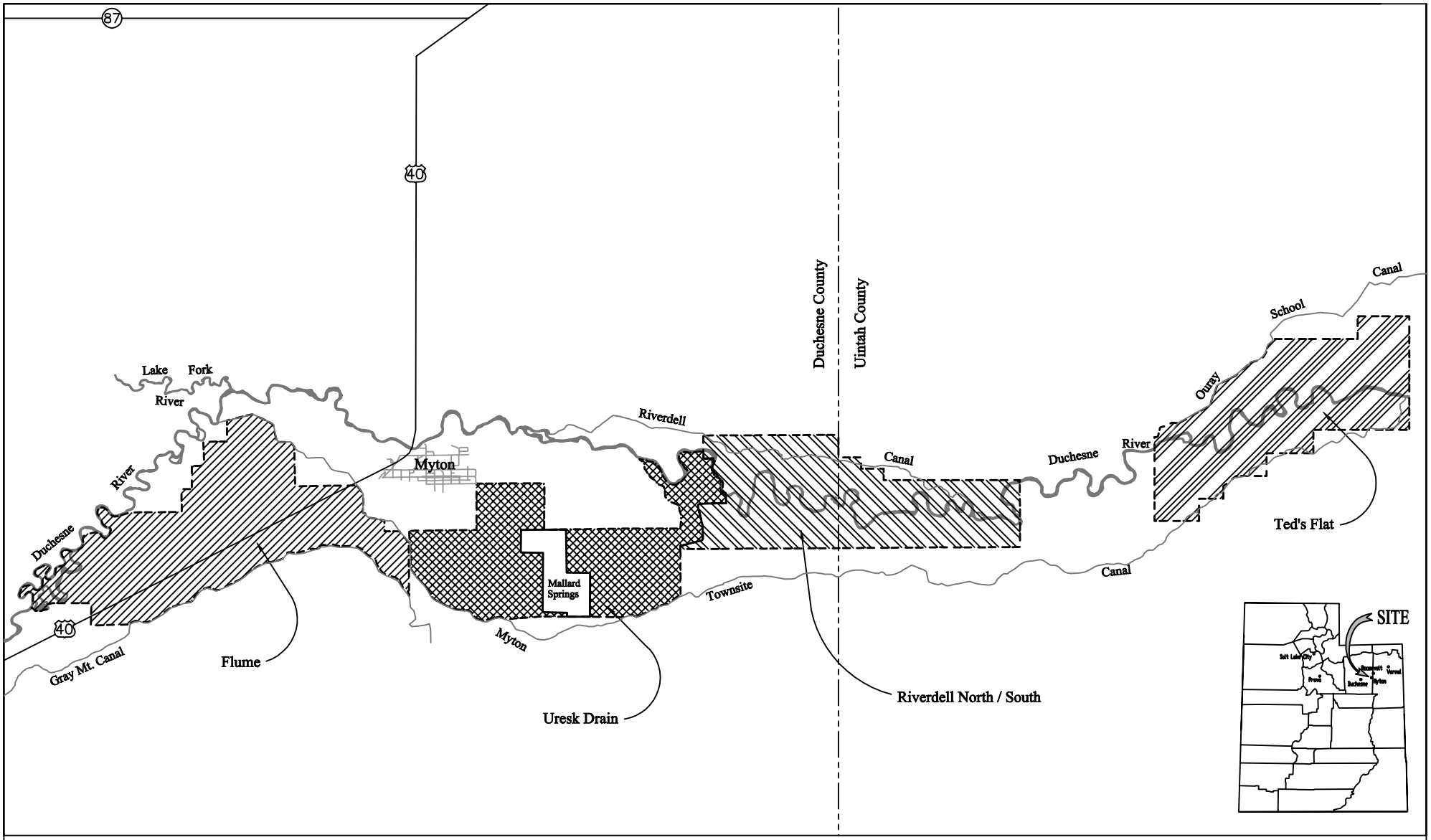
The Uresk Drain site is divided into three subareas:

- The Main Site, consisting of the area directly influenced by the Drain,
- The Goose Ponds, located between the Main Site and the Duchesne River, and
- The West Fields, located between County Road 3000 West and the Myton Townsite Canal.

The Uresk Drain site borders the Duchesne River at its eastern boundary and is hydrologically connected to it through the Drain. The state-owned Mallard Springs Wildlife Management Area (hereafter referred to as Mallard Springs) is located as an enclosure within the Uresk Drain Main Site.

Riverdell North/South: The Riverdell North/South site encompasses both the Riverdell North property, located on the north side of the Duchesne River, and the Riverdell South property, located on the south side. Together these two parcels consist of 2,190 acres (Figure 2-4). The site borders the Uresk Drain site on the south side of the river, extending east for 3.5 miles along River Road. The Riverdell North property, consisting of 1,087 acres of federally-owned property, was purchased in 1990 by Reclamation for the DRACR mitigation. The Riverdell South property is comprised of Tribal Trust and fee lands.

Ted's Flat: The Ted's Flat site consists of 2,073 acres and encompasses both sides of the Duchesne River, extending from the Ouray School Canal on the north property line to the Myton Townsite Canal on the south (Figure 2-5). The site is located in Uintah County, 3.5 miles from the Duchesne-Uintah County line, and is 1.5 miles east of the Riverdell North/South site.

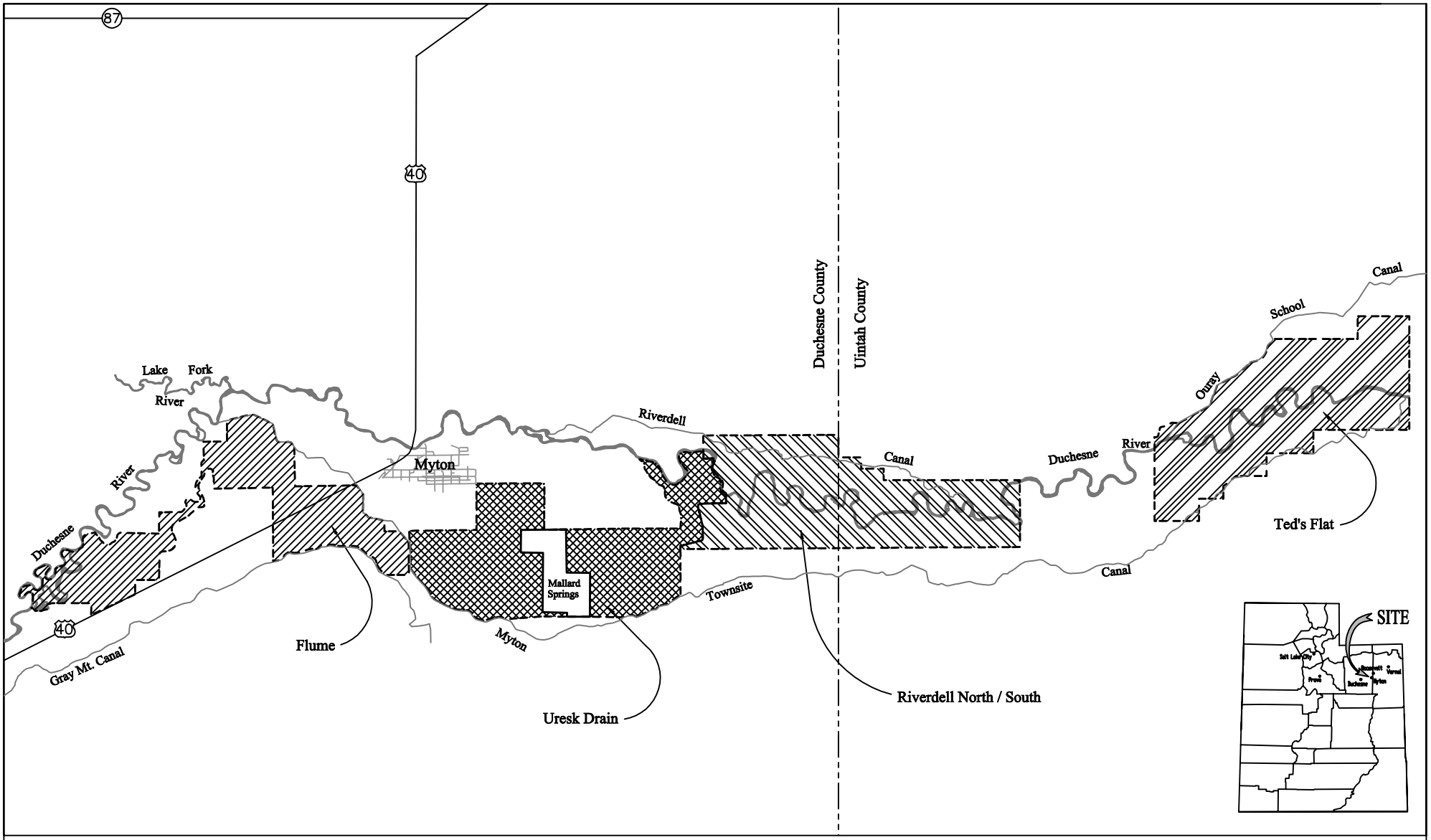


LEGEND
- Site Boundary
- Major Roads
- Rivers
- Streams and Canals
- County Boundary

Figure 1-2. Sites Included in the Proposed Action and Alternatives

GRAPHIC SCALE
8000 0 4000 8000
1 INCH = 8000 FEET

N 16°

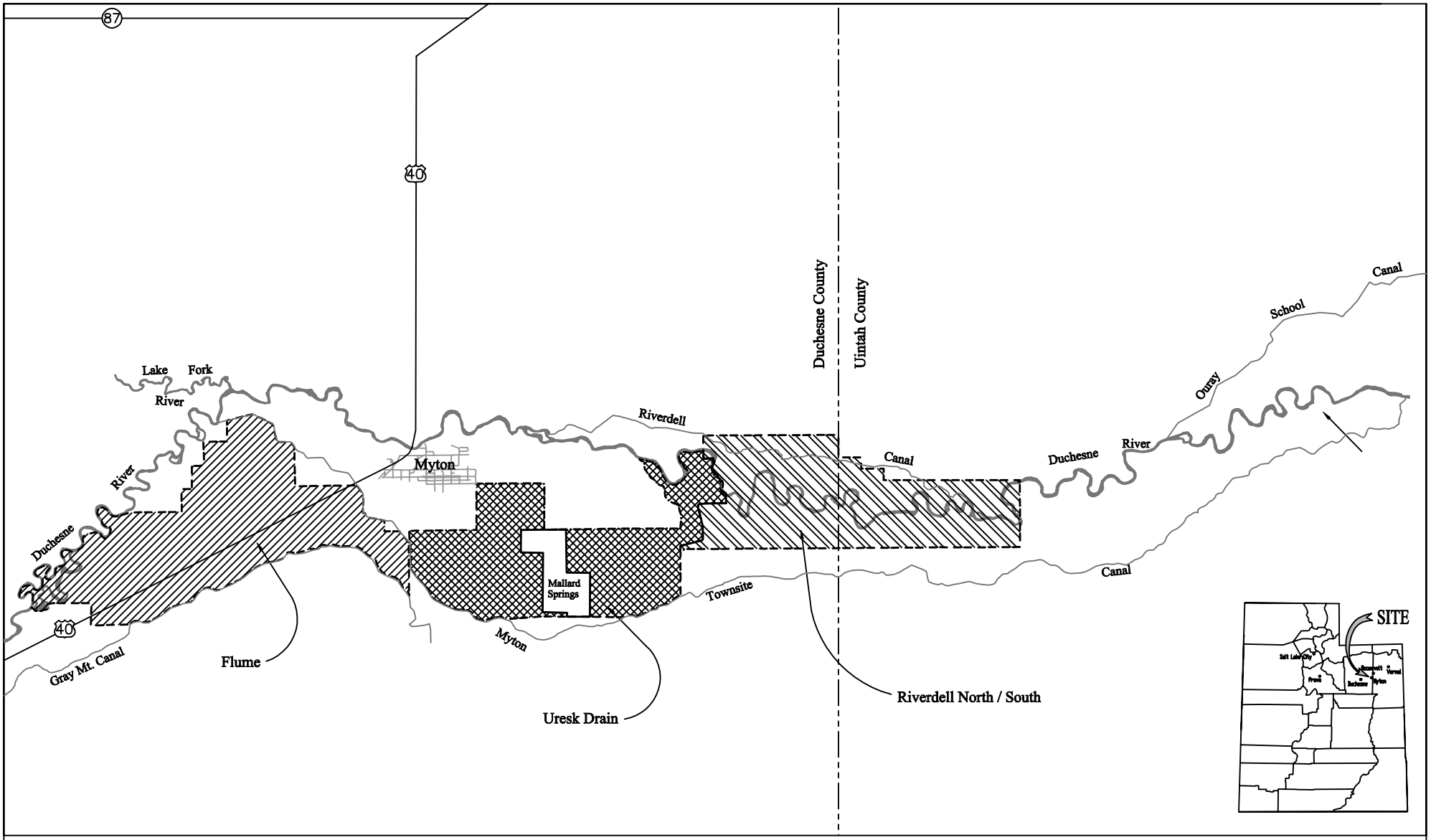


LEGEND
- Site Boundary
- Major Roads
- Rivers
- Streams and Canals
- County Boundary

Figure 1-3. Location of the Proposed Action

GRAPHIC SCALE
8000 0 4000 8000
1 INCH = 8000 FEET

N 16°

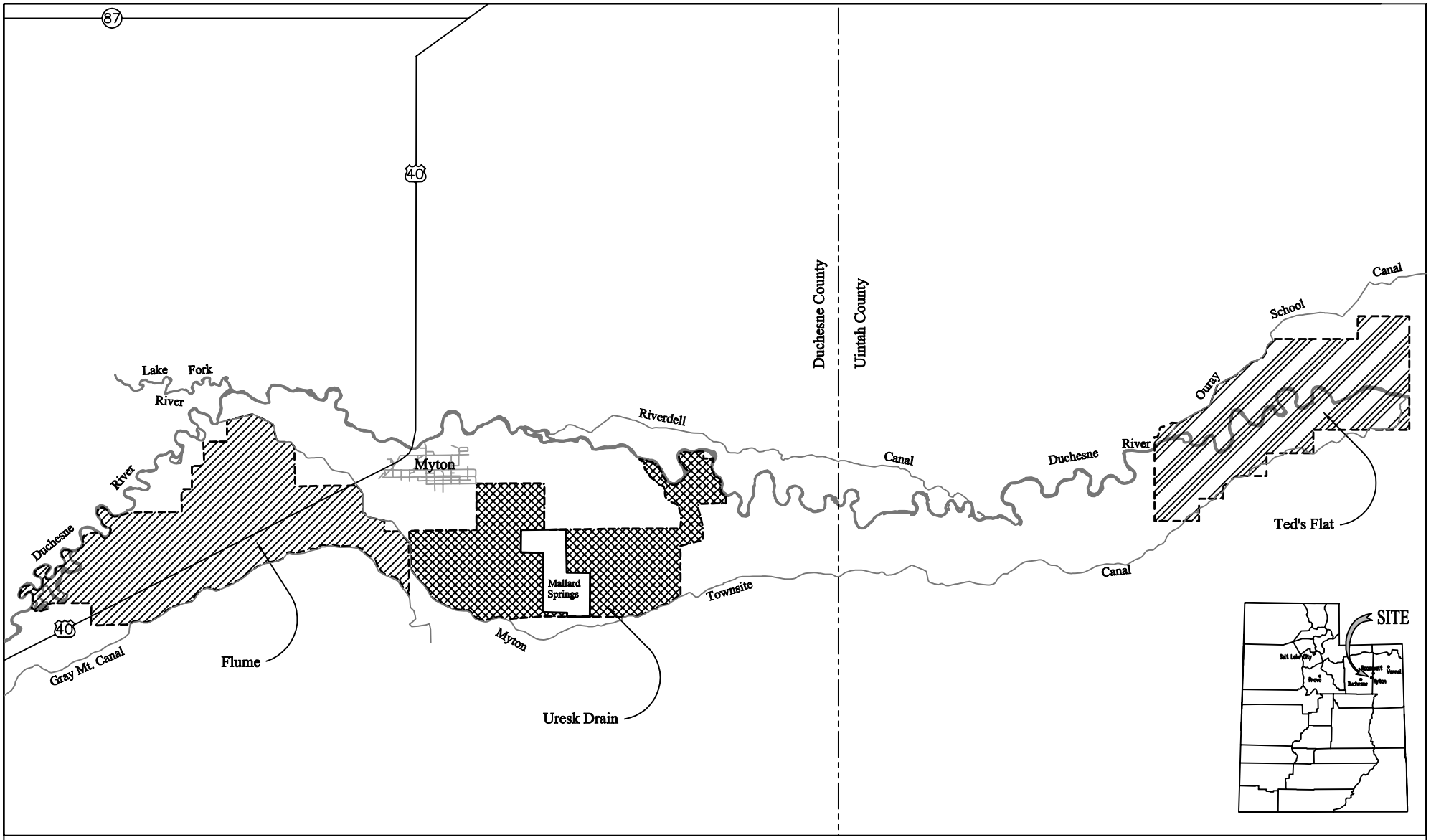


LEGEND
- Site Boundary
- Major Roads
- Rivers
- Streams and Canals
- County Boundary

Figure 1-4. Location of the Pahcease Alternative

GRAPHIC SCALE
8000 0 4000 8000
1 INCH = 8000 FEET

N 16°



LEGEND
- Site Boundary
- Major Roads
- Rivers
- Streams and Canals
- County Boundary

Figure 1-5. Location of the Topanotes Alternative

GRAPHIC SCALE
8000 0 4000 8000
1 INCH = 8000 FEET

N 16°

1.4.2 Description of the Proposed Action

The Proposed Action combines mitigation requirements for DRACR and SACS in a single project that includes both riparian habitat and oxbow restoration. The total project area, as depicted on Figure 1-3, encompasses 7,790 acres, of which 6,640 acres would be required for the SACS mitigation and 1,087 acres for the DRACR mitigation. The Proposed Action would require acquisition of up to 2,154 acres of private land and compensation to the Tribe for loss of income on up to 4,549 acres of Tribal Trust land that would be incorporated into the project. One thousand eighty-seven acres of existing federal land would be used as part of the project. Acquisition is described in detail in section 2.1.3.2. The acreage required for the joint DRACR-SACS mitigation would be 7,727 acres. The Proposed Action would include 3,962 acres of wetland and riparian habitats, or 512 acres more than the joint mitigation planning goal of 3,450 acres. The alternative restores four oxbow systems totaling 15 miles in three sites linked around Myton plus one disjunct site. Three of the oxbows (the Flume, Riverdell North and potentially the Ted's Flat North oxbows) would be connected to the river. Sites included in the alternative are the Flume, Uresk Drain, Riverdell North/South and Ted's Flat.

The Proposed Action would provide approximately equal amounts of wetland and riparian habitats. Riparian habitat would be restored in large blocks on the Riverdell North and Ted's Flat sites. The primary habitats bordering the restored oxbows and large wetland areas would be desert shrub, native shrub and managed grassland, with cottonwood forest bordering most of the Ted's Flat North oxbows.

Mitigation activities include restoring connections among oxbows to create large interconnected oxbow systems, constructing small berms to allow water retention, rewatering abandoned oxbows and replanting native riparian species in the Duchesne River floodplain.

1.4.3 Description of the Pahcease Alternative

The Pahcease Alternative is similar to the Proposed Action in that it combines riparian habitat and oxbow restoration, but it provides mitigation only for SACS. This alternative consolidates lands and habitats around Myton for cost-effective and efficient management. The project area, as depicted on Figure 1-4, encompasses 6,765 acres, of which only 6,640 acres would be required for the SACS mitigation. The Pahcease Alternative would require acquisition of up to 1,787 acres of private land, compensation to the Tribe for loss of income on up to 3,891 acres of Tribal Trust land that would be incorporated into the project and acquisition or transfer of 1,087 acres of the federally-owned Riverdell North property which was purchased for the DRACR mitigation. The LDWP would need to acquire additional lands to replace the Riverdell North property with other property suitable for the DRACR mitigation or compensate Reclamation for the Riverdell North property. The Pahcease Alternative includes 3,055 acres of wetland and riparian habitat, or 55 acres more than the SACS-only planning goal of 3,000 acres. The alternative would restore two oxbow systems comprising nine miles. The Flume oxbow system and the Riverdell North oxbow would be connected to

the river. Sites included in the alternative include the Flume, Uresk Drain and Riverdell North/South sites, all of which are contiguous.

The Pahcease Alternative would provide more wetland than riparian habitat. Riparian habitat would be restored in large blocks only on the Riverdell North property. The primary habitats bordering the restored oxbows and large wetland areas would be desert shrub and managed grassland.

Mitigation activities would be the same as for the Proposed Action.

1.4.4 Description of the Topanotes Alternative

The Topanotes Alternative is similar to the Proposed Action in that it combines riparian habitat and oxbow restoration, but it provides mitigation only for SACS. The project area encompasses 6,648 acres, of which only 6,640 acres is required for the SACS mitigation, as depicted on Figure 1-5. The Topanotes Alternative would require acquisition of up to 2,171 acres of private land and compensation to the Tribe for loss of income on up to 4,477 acres of Tribal Trust land that would be incorporated into the project. The Topanotes Alternative would include 3,175 acres of wetland and riparian habitat, or 175 acres more than the SACS planning goal of 3,000 acres. The Topanotes Alternative differs from the Pahcease Alternative in that it does not utilize the federally-owned Riverdell North property to achieve acreage targets. Instead, the Ted's Flat parcel further to the east is included. The Riverdell North property would be utilized to fulfill DRACR mitigation according to separate plans and schedules that would be determined by the Mitigation Commission.

The Topanotes Alternative would provide more wetland than riparian habitat. Riparian habitat would be restored in large blocks only on the Ted's Flat site. The primary habitats bordering the restored oxbows and large wetland areas would be desert shrub and managed grassland. Cottonwood forest would border the Ted's Flat North oxbows.

Mitigation activities would be the same as for the Proposed Action.

1.4.5 Description of the No Action Alternative

The No Action Alternative would not restore any wetland or riparian habitats impacted by SACS. The mitigation obligations identified in the 1965 FWS Coordination Act Report, the 1964 Definite Plan Report and the 1988 Definite Plan Report would remain unfulfilled.

1.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

The following alternatives were considered but eliminated from further study for the reasons indicated.

1.5.1 Large Ponds Alternative

The Large Ponds Alternative focused on creating large open water areas to be managed specifically for breeding and migrating waterfowl, consistent with plans developed but not implemented in the 1970s (Call Engineering 1975, Kaiserman Associates

1978). The alternative provided mitigation only for SACS. The total alternative project area would have been 3,297 acres, of which 1,409 acres would have been open water/deep marsh wetlands. There would have been no oxbow restoration. Sites included in the alternative were the Uresk Drain and Upper Wissiups. The Upper Wissiups site extends downstream 3.5 miles from the Wissiups Ditch intake (located approximately 3 miles downstream of the Uinta River confluence at Randlett).

Wetlands would have been developed by constructing large berms to create a series of wetland cells and excavating ponds from uplands. There would have been no riparian restoration and existing cottonwood forest would not have been preserved. There would have been a net loss of wet meadow, native scrub-shrub and riparian forest due to conversion to open water. Water requirements for the impoundment operation would have exceeded those acquired with the land and additional water would had to have been acquired at market value. Without the extra water purchase costs, the alternative would have cost 6.9 million dollars. With the costs of the additional water to be purchased, the alternative would have exceeded the available funding.

This alternative represented the alternative closest to the original 1964 recommendations that emphasized waterfowl impoundments. The alternative did not meet the revised project need to replace habitats actually impacted by SACS, which included riparian habitats. The alternative also would not have restored riverine features or provided for a diversity of wetland types.

1.5.2 Riparian Flow Alternative

This alternative concentrated on providing releases from Starvation Reservoir sufficient to provide overbank flooding, rewater oxbow systems and stimulate natural riparian species regeneration. The alternative included acquisition of all land within the current 10- to 25-year floodplain between Duchesne and Ouray.

The primary habitat focus of this alternative was on restoring native riparian shrub and cottonwood forest. The primary mitigation activities would have been to acquire land within the 10- to 25-year Duchesne River floodplain from Duchesne to Ouray, provide for initial excavation of selected oxbow inlets and release stored water from Starvation Reservoir in amounts and at appropriate times to provide for riparian benefit. Several components of the annual river hydrograph (the pattern of river flows) are important to maintaining native riparian vegetation. The native vegetation along the Duchesne River was historically dominated by willows and cottonwoods. These species have very specific hydrologic requirements (Scott et al. 1996, Rood and Mahoney 1990) and require:

- A high spring flood flow to create new surfaces for vegetation establishment, maintain inlets to secondary channels and recharge alluvial aquifers. The spring flood must occur during the time that native willows and cottonwoods disperse seed as the seed is short-lived and will not germinate unless it lands on a bare, moist soil surface shortly after dispersal,
- A gradually declining decrease in flood flows so that newly establishing

seedlings have sufficient water to maintain early growth, and

- Sufficient summer or base flow to maintain both seedlings and established riparian vegetation.

Both local and trans-basin diversions from the Duchesne River have altered the historic hydrograph. This alternative would have released stored water from Starvation Reservoir and/or bypassed natural flows in a manner that addressed all three critical hydrologic components. Specifically, implementation of the alternative would have:

- Released flows during the spring flood so that a peak of 6,000 cubic feet per second (cfs) would be reached at Myton and a peak of 7,000 cfs would be reached at Randlett at three to five year intervals,
- Moderated spring flood flow declines so that declines would not have exceeded 150 cfs per day,
- Increased summer base flows by 100 to 200 cfs, and
- Monitored flow releases so that they remained in the river and were not diverted into irrigation canals.

This alternative met the project need to restore habitats impacted by SACS, with a major emphasis on riparian habitat. Wetland-wildlife benefits to the Ute Tribe would have been less under this alternative than under other alternatives considered.

Land acquisition costs for this alternative were at least 8.3 million dollars. Water requirements were 45,000 acre-feet/year, which exceeded the water that would have been available with land purchase. Additional water would had to have been acquired at market cost, which was estimated at more than 20 million dollars; this amount exceeded the project budget.

The Riparian Flow Alternative was only considered feasible if additional water could have been dedicated to the project. Two additional water sources were investigated: (1) potential use of 44,400 acre-feet of water dedicated to instream fishery flows by the CUP under the Streamflow Agreement of 1980 (as amended in 1990) and (2) proposed flows to assist in the recovery of the Colorado River endangered fish.

Dedication of the 44,400 acre-feet of instream fishery flows to the LDWP was not feasible because water is generally only available upstream of the confluence of the Duchesne and Strawberry Rivers. The Streamflow Agreement does not provide for storage and re-regulation in a manner required under this alternative. Additionally, these flows are released in a relatively uniform pattern across the year, which would not meet the riparian requirements for higher flows during the spring and early summer periods.

In 1990, the FWS recommended that flows be changed in the Duchesne River for the benefit of the Colorado River endangered fish. The recommended flow regime included increases in both the spring flood peak and summer base flows. There is general compatibility between riparian requirements and the proposed endangered fish flows, although some aspects of the hydrograph differ and would have required modifications to meet riparian needs (WWS 2000). As of 2002, there has been no acquisition of water for the Colorado River fish and none is planned for the foreseeable future; therefore, use of the

previously recommended endangered fish flows to also benefit the LDWP is not feasible.

1.5.3 Linear Oxbow Corridor Alternative

The Linear Oxbow Corridor Alternative focused on rewatering 10 miles of oxbows in four sites along the Duchesne River (the Flume, Uresk Drain, Riverdell North/South and Upper Wissiups). The alternative considered a variety of wetland-dependent wildlife groups but emphasized waterfowl habitat; thus, boundaries along the oxbows were truncated at the limit of where open water/marsh habitat could be developed, with a limited amount of supporting upland habitat. Mitigation activities included restoring connections among oxbows, constructing berms to allow water retention and rewatering of abandoned oxbows.

This alternative met the need for restoring wetland habitats impacted by SACS and providing wetland-wildlife benefits to the Tribe, but did not meet the agency-required need for a project area of 6,640 acres.

1.5.4 Expanded Oxbow Systems: Scattered Sites Alternative

The Scattered Sites Alternative combined both riparian habitat and oxbow restoration. The alternative would have restored four oxbow systems totaling 15 miles and one secondary channel system within five sites. The total project area would have been 7,727 acres, of which 4,752 acres (61 percent) would have consisted of wetland and riparian habitats. Of those 4,752 acres, 43 percent would have been wetland habitat, while 57 percent would have been riparian. Mitigation activities would have included restoring connections among oxbows to create large interconnected systems, constructing berms for water retention, rewatering oxbows and replanting native riparian species. Sites included in the alternative were the Flume, Uresk Drain, Riverdell North/South, Ted's Flat and Upper Wissiups.

The Scattered Sites Alternative met the project need of replacing riparian and wetland habitat types impacted by SACS and took advantage of the opportunity to include the DRACR and SACS mitigations into a single project. This alternative would have included all of the same sites as the Proposed Action, but fewer acres would have been acquired and developed on each of the sites than under the Proposed Action. The Scattered Sites Alternative also included 1,300 acres on the Upper Wissiups site. Since the alternative was formulated, oil and gas potential was discovered on the Upper Wissiups site and the site has since been leased for oil and gas exploration. With this leasing of one of the sites, the size of the remaining four sites was increased and became the Proposed Action.

1.6 AUTHORIZING ACTIONS, PERMITS AND/OR LICENSES

The actions or permits required to implement the LDWP are presented in Table 1-1. This table briefly describes the actions, permits and/or licenses and defines the responsible agency or organization. These actions, permits and/or licenses are required to complete the National Environmental Policy Act (NEPA) process and gain approval prior to construction. Operating agreements, management responsibilities and post-

construction agency roles are described in section 2.1.4. If the Pahcease Alternative is selected for implementation, an agreement would be negotiated among the DOI, Mitigation Commission, Reclamation and the Tribe regarding appropriate compensation for the Riverdell North property.

Table 1-1. Possible Authorizing Actions, Permits and/or Licenses for Construction.

Agency or Organization	Actions, Permits and/or Licenses Required	Description
Federal Agencies		
U.S. Department of the Interior (DOI)	Makes decision to accept the Proposed Action or alternative and provides federal acknowledgment of NEPA compliance.	DOI must approve the NEPA compliance document in order to initiate project.
Utah Reclamation Mitigation and Conservation Commission (Mitigation Commission)	Makes decision to accept the Proposed Action or alternative and provides federal acknowledgment of NEPA compliance.	Mitigation Commission must approve the NEPA compliance document in order to initiate project.
Ute Indian Tribe (Tribe)	Makes decision to accept the Proposed Action or alternative and use of Tribal Trust lands for the project. Participates in all historic preservation matters on Tribal Trust lands.	The Ute Tribe Business Committee must approve the NEPA compliance document in order to initiate project.
U.S. Bureau of Indian Affairs (BIA)	Administers leases affecting Tribal Trust lands. Responsible for Indian water delivery to project.	BIA has trust responsibility for management of resources on Tribal Trust lands.
U.S. Fish and Wildlife Service (FWS)	Provides Endangered Species Act (ESA) (Section 7) consultation.	Consultation under Section 7 of ESA may be required to determine if the project would affect threatened or endangered species.
	Prepares Fish and Wildlife Coordination Act (FWCA) Report.	FWS must prepare a FWCA report that identifies whether or not the mitigation obligation is achieved.
	If applicable, determines whether the Proposed Action or alternative completes the DRACR mitigation requirement.	FWS has responsibility for determining whether the specified wildlife habitat units for DRACR are achieved in the proposed joint SACS-DRACR mitigation.
U.S. Bureau of Reclamation (Reclamation)	Authorizes use of Riverdell North property for Proposed Action and Pahcease Alternatives.	Reclamation acquired Riverdell North for the DRACR mitigation.

Agency or Organization	Actions, Permits and/or Licenses Required	Description
U.S. Army Corps of Engineers (COE)	Issues permit pursuant to Section 404 of the Clean Water Act (CWA).	Required for discharge of fill material into waters of the U.S. (including wetlands).
U.S. Environmental Protection Agency (EPA)	Provides oversight authority for Section 404 permits.	EPA will review 404 permit applications and recommend approval or denial of permits. They have authority to veto COE permit approvals.
	Reviews NEPA documents for compliance with federal regulations.	EPA will refer NEPA documents to the CEQ if they find the documents in non-compliance.
	Administers Water Quality Certification (Section 401) and National Pollutant Discharge Elimination System (NPDES) permits (Section 402) on Indian lands.	EPA provides Section 401 certification for any necessary Section 404 (wetlands) permits on Indian lands. EPA issues Section 402 Pollutant Discharge Elimination System permits and Section 402 General Construction Stormwater Discharge permits on Indian lands.
State Agencies		
Utah State Historic Preservation Office (SHPO)	Issues State Antiquities permit according to section 106 of the National Historic Preservation Act. Signatory to a Programmatic Agreement with the DOI, Mitigation Commission and Tribe to guide future studies and mitigation.	The Tribe and SHPO will determine if a proposed project will have an impact on culturally or historically sensitive sites listed, or eligible for listing, on the National Register of Historic Places.
Utah Division of Water Rights (DWRi)	Issues stream alteration permits on non-Indian owned lands outside of the Uintah Indian Irrigation Project.	The DWRi must issue a stream alteration permit for any feature affecting stream beds. The DWRi authority only applies to fee lands acquired for the project, not to any Tribal Trust lands.

Agency or Organization	Actions, Permits and/or Licenses Required	Description
Utah Division of Water Quality (DWQ)	Administers Water Quality Certification (Section 401) and National Pollutant Discharge Elimination System (NPDES) permits (Section 402) on non-Indian lands.	DWQ provides Section 401 certification for any necessary Section 404 (wetlands) permits on non-Indian lands. DWQ issues Section 402 Pollutant Discharge Elimination System permits and Section 402 General Construction Stormwater Discharge permits on non-Indian lands.
Other Agencies or Organizations		
Duchesne/Uintah County Governments	Issues permits to construct in county road right-of-ways.	A permit may be needed to replace culverts, install water control structures, install fencing, construct access roads or construct other work within a county road right-of-way.

1.7 INTERRELATED PROJECTS

This section describes projects that could contribute to cumulative impacts of the Proposed Action and alternatives. These projects are referred to as interrelated projects. The Council on Environmental Quality (CEQ) defines cumulative impacts as "the impact on the environment which results from the incremental impacts of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such action" (Section 1508.7). Cumulative impacts can occur when two or more projects affect the same resource in either time or space.

Only "reasonably foreseeable" projects need to be included in the analysis of cumulative impacts. This means that the project or action is identified and described in an appropriate public document and has a reasonable chance of being approved or funded. A project must be described in sufficient detail to allow a determination of its potential impacts. The determination of cumulative impacts is based on net impacts (those impacts remaining after mitigation has been applied).

1.7.1 Colorado River Salinity Control Program

The Salinity Control Act (P.L. 93-320, 98-569 and 104-20) authorized the DOI to enhance and protect water quality in the Colorado River Basin. Reclamation and the Natural Resources Conservation Service (NRCS) have developed programs in Uintah and Duchesne Counties to reduce salt loading to the Duchesne River, and eventually the Green and Colorado Rivers. The programs reduce salt loading through rehabilitating existing canals and improving the efficiency of on-farm irrigation systems. In the Uinta Basin, the plan is to reduce the salt load into the Colorado River by 111,210 tons per year. As of the 2001 water year, the salt load has been

decreased by 105, 914 tons per year (Draper et al. 2002).

As a result of the program, irrigation-induced wetlands have been lost. The program has an active policy of mitigating for these losses by either on-farm improvements or offsite mitigation. Since 1980, 2,941 acres of wetlands have been impacted by the program with a corresponding increase of 2,606 acres of farmland being managed for wetland wildlife (Draper et al. 2002). Recent projects scheduled and/or completed for Duchesne County and the Uintah and Ouray Salinity Control Projects would affect approximately 211 acres of adjacent wetlands, which are proposed to be mitigated (CH2MHill 1999, BIA 2003).

There are no identified canal rehabilitation or on-farm irrigation projects within the LDWP area, but the area of influence of both projects includes the Duchesne River corridor. Resources to be considered in the cumulative impact analysis include changes in water quality (reduction in salt loading) and temporary losses of wetland and riparian habitat.

Mitigation for some past impacts to wetlands under the Salinity Control Program has been completed or identified for completion within or adjacent to the LDWP project area. These wetland mitigations are the DRACR mitigation and the Mallard Springs wetland mitigation, each of which is described separately below.

1.7.2 Mallards Springs Mitigation Plan

The Mallard Springs Wildlife Management Area is a 270-acre parcel owned by the State of Utah. It is located between the main part of the Uresk Drain and the West Fields area of the Uresk Drain (see Figure 2-3). The Duchesne County Water Conservancy District has developed 38 acres of open water wetlands as mitigation for impacts incurred under the Colorado River Salinity Control Program (see section 1.7.1). The mitigation included plugging the Drain and constructing berms in portions of the site. The Mallard Springs plans are compatible (at a feasibility level review) with the LDWP plans for the Uresk Drain site. Resource impacts from Mallard Springs include an increase of 38 acres of open water wetlands near Myton and potential cultural resource impacts. Resources to be considered in the cumulative impact analysis include wetlands, wildlife and public health and safety.

1.7.3 Duchesne River Area Canal Rehabilitation Mitigation

The DRACR mitigation obligation was identified by Reclamation in 1982 and the Riverdell North property was purchased by the Federal government as the site on which the DRACR mitigation was to be conducted. The mitigation goal recommended by the FWS is to replace 390 wetland-wildlife habitat units through creation, restoration and enhancement of 450 acres of wetland within the Riverdell North property (FWS 1982). The mitigation obligation is unfulfilled. The Riverdell North property is located within the LDWP area (see Figure 1-2). Under the Proposed Action, the DRACR and SACS obligations would be combined into a single project with a larger planning area (7,727 acres) than the 6,640 acres required for the SACS. Under the Pahcease and Topanotes Alternatives, the DRACR mitigation would represent a separate but related project that

would be developed independently of the LDWP. A separate DRACR mitigation plan has not been developed so the impacts can not be quantified. However, the plan would need to replace 390 wetland-wildlife habitat units, which would require development of at least 450 acres of wetland. Resources to be considered in the cumulative impact analysis for the Pahcease and Topanotes Alternatives include wetland and wildlife resources. Additional resources to be considered in the cumulative impact analysis for the Pahcease Alternative only include changes in land use and county taxes through additional federal land purchase.

1.7.4 Riverdell North Property Water System Improvement Project

The Riverdell North property consists of 1,087 acres of land owned by the Federal government primarily on the north side of the Duchesne River east of Myton. The property was acquired for mitigation of wetland losses resulting from the DRACR project. This parcel is included in the Proposed Action and the Pahcease Alternatives for the LDWP as part of the Riverdell North/South property. The Riverdell Property Water System Improvements Project (RWIP) proposes to improve the existing irrigation system on the property.

The RWIP would overlap the LDWP in space as the Proposed Action and the Pahcease Alternative include the Riverdell North property, but not in time as the water system improvements are scheduled to be completed between 2003-2004. Resources to be considered in the cumulative impact analysis include an unquantified loss of wetlands and cottonwoods along 13,420 feet of canals. Mitigation for these losses would be accomplished on the Riverdell North property under a separate plan to be developed by Reclamation.

1.7.5 Section 203(a) Uinta Basin Replacement Project

The Uinta Basin Replacement Project (UBRP), authorized under Section 203(a) of CUPCA, is a proposed water resource project that would change water storage, enlarge an existing reservoir, stabilize 13 high mountain lakes and add new water diversion and distribution facilities for irrigation and municipal water use. The project would also modify existing reservoir outlets to provide water for instream flows on certain portions of the Lake Fork River.

The Section 203(a) UBRP project area of influence includes the Duchesne River downstream of Myton, as input from the Lake Fork River to the Duchesne River would be reduced by 3,345 acre-feet (4 percent of the annual flow) with a corresponding decrease in water quality (average increase of 242 ppm of total dissolved salts in the Lake Fork River). Construction of the project may also occur within the same time period as the LDWP. Water quality and quantity, wetland impacts, socioeconomics, land use changes, transportation and air quality are resources to be considered in the cumulative impact analysis.

1.7.6 Upper Colorado River Endangered Fish Recovery Program

The Upper Colorado River Endangered Fish Recovery Program (CREF) is an interagency partnership developed to recover the

endangered Colorado pikeminnow, razorback sucker, humpback chub and bonytail, while still allowing for water resource development (FWS 2001). Two of the five CREF program elements involve activities in the lower Duchesne River corridor: habitat management and research programs. The habitat management element includes identifying flows and changing reservoir operations to benefit endangered fish. The FWS (1990) recommended instream flows for the Duchesne River but the flows have not been implemented and the future nature of these flows cannot be predicted; therefore, the cumulative effects of this program element cannot be analyzed in this DEIS.

The CREF research program includes collecting data on endangered fish and monitoring population trends in the Duchesne River. Although only the lower three miles of the Duchesne River have been identified as critical habitat, research and monitoring occurs along the Duchesne River from Ouray to Myton. There are no resources to be considered in the cumulative impact analysis for those elements of the program involving the Duchesne River.

A third CREF program element is a habitat development program that includes restoring floodplain habitats through flood easement purchase. The easements grant permission only to increase floodability of the property with minimal land use changes and no change in ownership. A one-time fee is paid that has ranged from $500-1,000 per acre. To date, 550 acres have been placed under easements in Uintah County, all along the Green River. Purchase of additional easements on 450 acres along the Green River is currently under negotiation. There are no other pending easement acquisitions for the foreseeable future and none are planned for the Duchesne River. The CREF floodplain easement acquisition program would overlap the LDWP in space for those resources that include all of Uintah County as their area of influence.

Lower Duchesne River Wetlands Mitigation Project

Draft Environmental Impact Statement

CHAPTER 2

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

CHAPTER 2: DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

2.1.1 Physical and Biological Features

2.1.1.1 Overview

The Proposed Action would use a variety of measures to rehabilitate 2,068 acres of wetland and 1,930 acres of woody riparian habitat in the Duchesne River corridor. These measures include rewatering oxbows, connecting oxbows to form contiguous systems, enlarging oxbows to at least their 1936 widths (as determined from aerial photographs), enhancing water quality in oxbows receiving agricultural return flows, filling drainage ditches to create large marsh complexes, replanting riparian areas with native woody trees and shrubs, seeding of new wetland edges, removing non-native, invasive species and changing management of areas adjacent to wetlands to benefit wildlife.

Where feasible, the oxbow systems would be reconnected to the Duchesne River. Oxbow reconnection was identified as feasible if the oxbow would be flooded by the mean annual flood (the flow that occurs on average every 2.3 years). Because the river has narrowed by up to 40 percent, been downcut by 2-4 feet and has had its flow reduced by diversions, reconnection of all oxbows to the river is no longer feasible without either increased flows or river reconstruction.

Table 2-1 lists the measures that would be completed at each site under the Proposed Action and alternatives. Maps 1 through 5 in the map pocket at the back of the DEIS show the location of the proposed measures. Standard Operating Procedures (SOPs) are listed in Appendix A. These procedures will be followed and are designed to minimize impacts to the human environment.

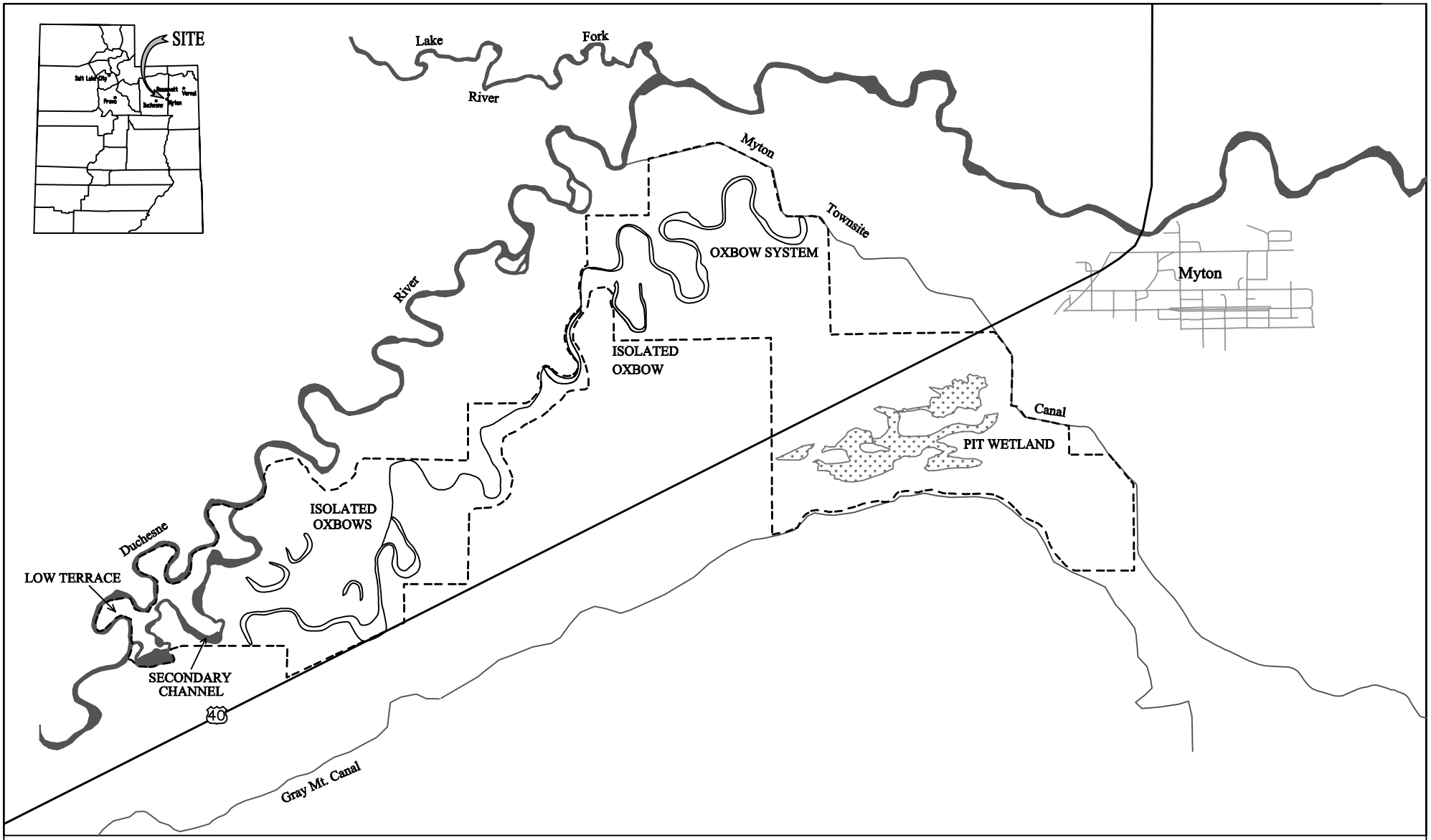
Table 2-1. Summary of Construction Measures for the Proposed Action and Alternatives.			
Type of Measure	**Measure**		
	Proposed Action	**Pahcease Alternative**	**Topanotes Alternative**
Site: Flume			
Biological	• Replant cottonwoods on 175 acres of burned or cleared former cottonwood forest. • Replant riparian shrubs on suitable floodplain point bar habitat; supplementally plant riparian shrubs on 23 acres of secondary channel banks; plant native shrubs along oxbow connection channels (15-30 acres depending on final channel design). • Seed 256 acres of wetland edges along the oxbow system and Pit Wetland complex. • Remove Russian olive and tamarisk from 197 acres. • Plant wildlife cover on 122 acres of upland adjacent to the oxbow system.	All construction measures would be the same as described for the Proposed Action with the following increases in treatment acreage: • Replant cottonwoods on 62 additional acres of burned or cleared former cottonwood forest • Remove Russian olive and tamarisk from 133 additional acres	All construction measures would be the same as described for the Pahcease Alternative
Physical	• Excavate a 440-foot long connection between the secondary channel and the beginning of the oxbow system. • Excavate channels between 4 isolated oxbows to restore a continuous oxbow system. • Recontour portions of 3,500 feet of the former oxbow system that has been ditched. • Construct a series of 11-12 berms with water control structures along the oxbow system to expand wetlands laterally. Berms estimated to average 145 feet long and 4 feet high with a top width of 5 feet and 3:1 slopes. • Install an inverted siphon approximately 50 feet upstream of the junction of the oxbow system with the Myton Townsite Canal. • Replace 4 culverts located under unimproved dirt roads. • Install 10 miles of new fencing to exclude livestock. • Expand 3 disjunct wetland areas into an 82-acre complex by excavating a 500-foot long channel among the wetlands. • Construct temporary access roads to berms (0.5 acre); construct 1 permanent access road to the river-oxbow connection (1,200 feet; 0.34 acre).	All physical measures would be similar to those of the Proposed Action with the following additions: • Rewater 190 acres of dried wetlands	All physical measures would be similar to those of the Pahcease Alternative

Type of Measure	Measure		
	Proposed Action	**Pahcease Alternative**	**Topanotes Alternative**
Management Changes	• Continue to irrigate 452 acres of grassland-wet meadow complexes but eliminate grazing and manage for wildlife nesting and cover. • Eliminate grazing from 471 acres of greasewood/desert shrub as a buffer for wildlife along the highway. • Purchase conservation easements on 51 acres of cropland with a requirement that at least 20 percent of the crop be left for wildlife .	All management changes would be similar to those of the Proposed Action with the following increases in treatment acreage: • Continue to irrigate 361 additional acres of grassland-wet meadow complexes but eliminate grazing and manage for wildlife nesting and cover • Eliminate grazing from 209 additional acres of greasewood/desert shrub as a buffer for wildlife along Highway 40 • Place conservation easements on an additional 61 acres of cropland and convert 14 acres of cropland to wet meadow through an increase in the adjacent water table	All management changes would be similar to those of the Pahcease Alternative
Water Management	• Operate the oxbows as a flow through system with a water quality control factor of 1.5 (see section 2.1.1.8 for a description of the water quality control factor).	• Operate the oxbows as a flow through system with a water quality control factor of 1.5 as described for the Proposed Action	• Operate the oxbows as a flow through system with a water quality control factor of 1.5 as described for the Proposed Action
Site: Uresk Drain			
Biological	• Replant 87 acres of cottonwood forest and 110 acres of native shrub habitat. • Seed 214 acres of wetland edge. • Remove Russian olive and tamarisk from 248 acres.	All construction and management measures would be as described for the Proposed Action.	All construction and management measures would be as described for the Proposed Action

Type of Measure	Measure		
	Proposed Action	**Pahcease Alternative**	**Topanotes Alternative**
Physical	• Plug the Uresk Drain from County Road 1000 West to Mallard Springs with impermeable clay. • Construct 3 berms across the Uresk Drain. Berms to average 2,150 feet long, 5.5 feet high, 10 feet top width with a 3:1 slope and a central water control structure. Construct a small berm with central water control structure 25 feet west of the County Road. • Plug the main Uresk Drain west of Mallard Springs and smaller side drains by small berms. • Install a pipeline through the Mallard Springs portion of the Drain to ensure complete water delivery to the eastern portion of the site. • Construct one berm 1,000 feet long and 2 berms 125 feet long at the head of the Uresk Drain. • Excavate 0.1 acre of upland between the Uresk Drain and an upland peninsula to create a nesting island in the Goose Pond wetland. • Install 4 miles of new fencing and repair 4 miles of fencing to exclude livestock. • Construct a temporary construction access road (1 mile in length) along the south edge of the Uresk Drain on existing fill material, with 3 temporary small stream/ditch crossings. Construct 3 smaller access roads to cross the Uresk Drain on top of the clay plug and 1 access road to the clay borrow pit (500 feet in length).	All construction and management measures would be as described for the Proposed Action.	All construction and management measures would be as described for the Proposed Action
Management Changes	• Continue to irrigate 576 acres of grassland-wet meadow complexes but eliminate grazing and manage for wildlife nesting and cover. • Change the management of 198 acres of cropped grass fields to prevent cutting until after nesting and reserve at least 20 percent of the fields as annually uncut for wildlife use. • Eliminate grazing from 108 acres of desert shrub as a buffer for wildlife.	All construction and management measures would be as described for the Proposed Action.	All construction and management measures would be as described for the Proposed Action
Water Management	• Operate the wetland as a flow through system with a water quality control factor of 1.27 (see section 2.1.1.8 for a description of the water quality control factor).	All construction and management measures would be as described for the Proposed Action.	All construction and management measures would be as described for the Proposed Action

Type of Measure	Measure		
	Proposed Action	**Pahcease Alternative**	**Topanotes Alternative**
Site: Riverdell North/South			
Biological	• Replant 593 acres of degraded or cleared cottonwood forest and riparian shrub. • Seed 247 acres of wetland edges. • Remove Russian olive and tamarisk from 223 acres. • Drill seed grasses, plant crops or otherwise manage for wildlife on 304 acres of fallow land (the terrace is too high above the water table to be suitable for cottonwood restoration). • Rewater dying cottonwoods along the Riverdell Canal. • Maintain 240 acres of desert shrub as a buffer from County Road 7750 South. • Maintain 194 acres of desert shrub as Uinta Basin hookless cactus habitat and an additional 127 acres as other upland wildlife habitat.	All construction and management measures would be as described for the Proposed Action.	N/A
Physical	• Construct 10 berms along the South Oxbow. Berms to average 225 feet long, 4 feet high with 3:1 slopes. Install water control structures in each berm. • Excavate channels between 4 oxbows to restore a contiguous 7 oxbow system. • Construct approximately 1 acre of temporary access roads to the berms. • Remove an existing road blocking flow among oxbows. • Install 9 miles of new fencing to exclude livestock.	All construction and management measures would be as described for the Proposed Action.	N/A
Management Changes	• Continue to irrigate 182 acres of grassland or fallow grass fields but eliminate grazing and manage for wildlife nesting and cover.	All construction and management measures would be as described for the Proposed Action.	N/A
Water Management	• Operate the oxbow as flow through systems with water quality control factors of 1.27 for the south oxbows and 1.5 for the north oxbow (see section 2.1.1.8 for a description of the water quality control factor).	All construction and management measures would be as described for the Proposed Action.	N/A
Site: Ted's Flat			
Biological	• Supplementally plant 664 acres of low terrace and 190 acres of point bars, oxbow connection channels and small channels dissecting the south terrace with riparian shrubs and cottonwoods. • Seed 215 acres of new wetland edges and oxbow connection channels. • Spot treat Russian olive and tamarisk on 105 acres.	N/A	All construction and management measures would be as described for the Proposed Action

Type of Measure	Measure		
	Proposed Action	**Pahcease Alternative**	**Topanotes Alternative**
Physical	• Construct 5 berms along the south oxbow system, each 250-700 feet long, 4 feet high, 3:1 slopes each with a water control structure. Excavate 500 feet of channel to connect 3 currently isolated oxbows to the main system. • Construct 5 berms (averaging 80 feet wide and 3 feet high) along the north oxbow system, each with a water control structure. Recontour approximately 1,000 feet of ditched oxbows south of the Swamp wetland. • Install 2 culverts under County Road 7750 South. • Install a new headgate on the Myton Townsite Canal at the southwest corner of the site to deliver water to the South Oxbow System. • OPTIONAL: Excavate an inlet estimated at 5 feet deep, 10-15 feet wide and 500 feet long to provide a direct river connection to the north oxbows.	N/A	All construction and management measures would be as described for the Proposed Action
Management Changes	• Continue to irrigate 158 acres of grassland-wet meadow complexes but eliminate grazing and manage for wildlife nesting and cover. • Purchase conservation easements on 217 acres of cropland with a requirement that at least 20 percent of the crop be left for wildlife and that existing cottonwoods along the ditches and hedgerows be maintained. • Eliminate grazing from 418 acres of desert shrub and manage as a wildlife buffer.	N/A	All construction and management measures would be as described for the Proposed Action
Water Management	• Operate the oxbows as flow through systems with a water quality control factor of 1.27 (see section 2.1.1.8 for a description of the water quality control factor).	N/A	All construction and management measures would be as described for the Proposed Action



LEGEND

- Site Boundary
- Major Roads
- Rivers
- Streams and Canals
- County Boundary
- Oxbows
- Wetlands

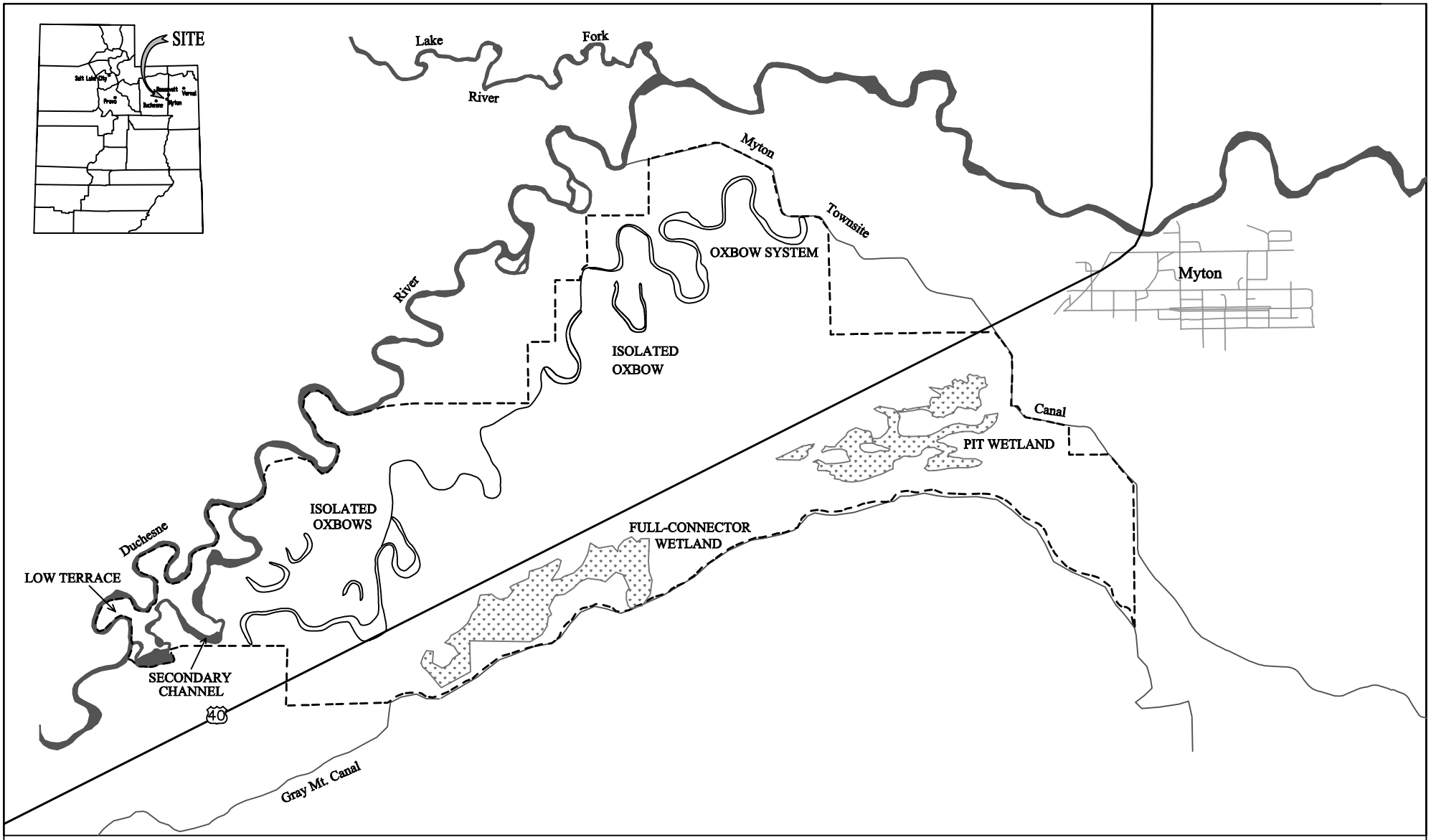
Figure 2-1. Location and Main Features of the Flume Site Under the Proposed Action

GRAPHIC SCALE

3000 0 1500 3000

1 INCH = 3000 FEET

N 16°



LEGEND

- Site Boundary
- Major Roads
- Rivers
- Streams and Canals
- County Boundary
- Oxbows
- Wetlands

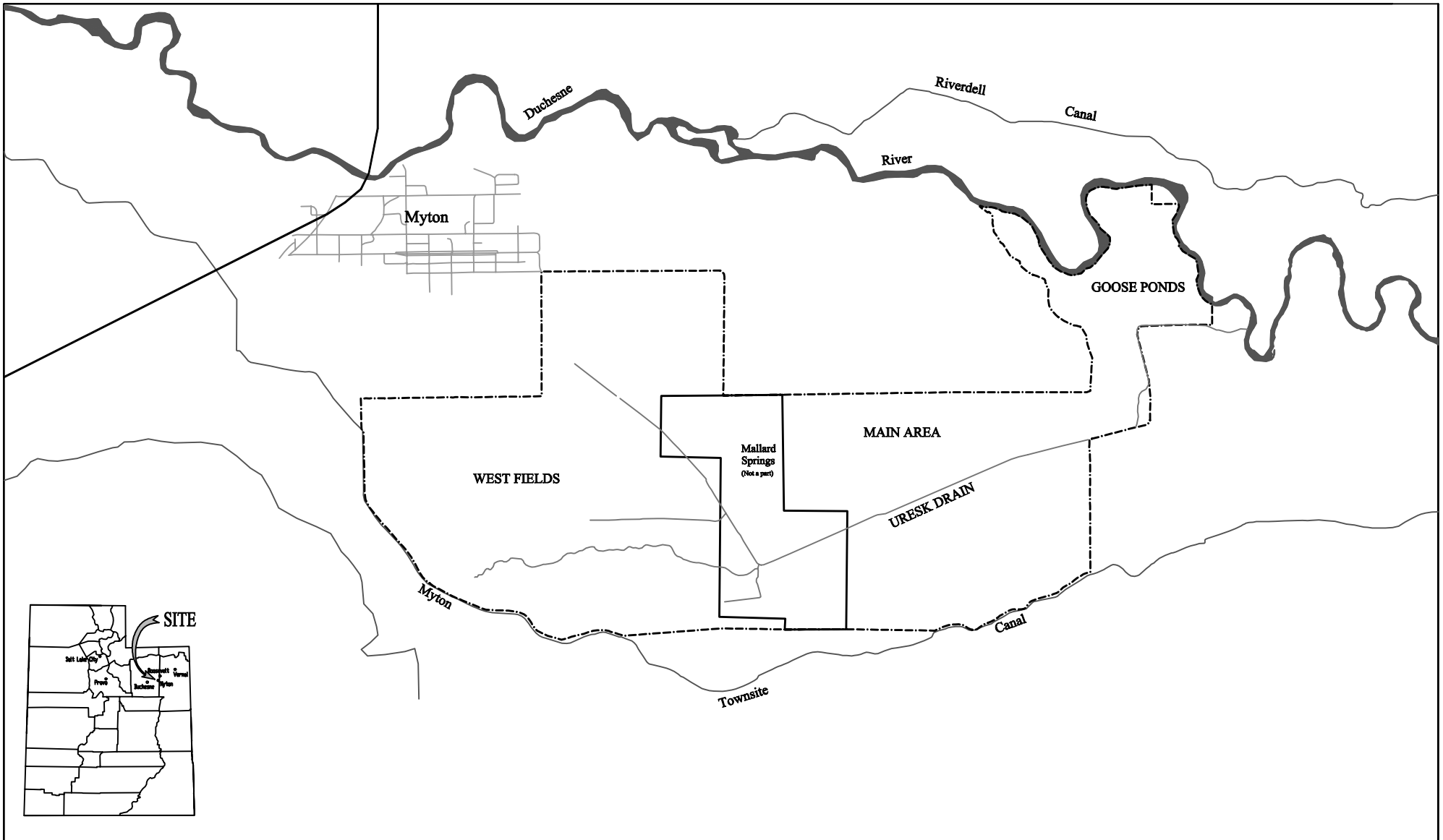
Figure 2-2. Location and Main Features of the Flume Site Under the Pahcease and Topanotes Alternatives

GRAPHIC SCALE

3000 0 1500 3000

1 INCH = 3000 FEET

N 16°



LEGEND

- Site Boundary
- Major Roads
- Rivers
- Streams and Canals
- County Boundary
- Uresk Drain

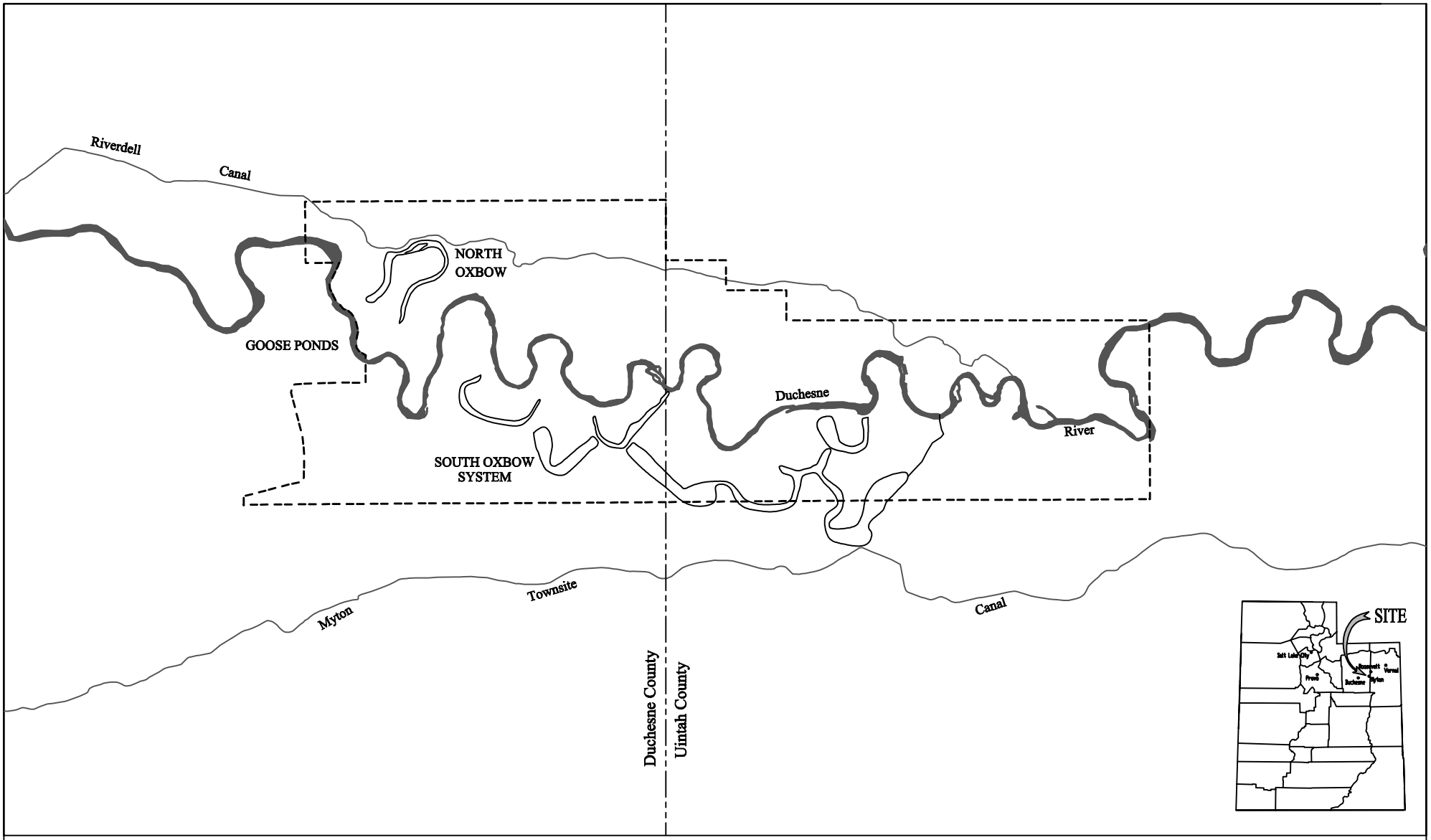
Figure 2-3. Location and Main Features of the Uresk Drain Site Under the Proposed Action

GRAPHIC SCALE

3000 0 1500 3000

1 INCH = 3000 FEET

N 16°



LEGEND

- Site Boundary
- Major Roads
- Rivers
- Streams and Canals
- County Boundary
- Oxbow

Figure 2-4. Location and Main Features of the Riverdell North / South Site Under the Proposed Action

GRAPHIC SCALE

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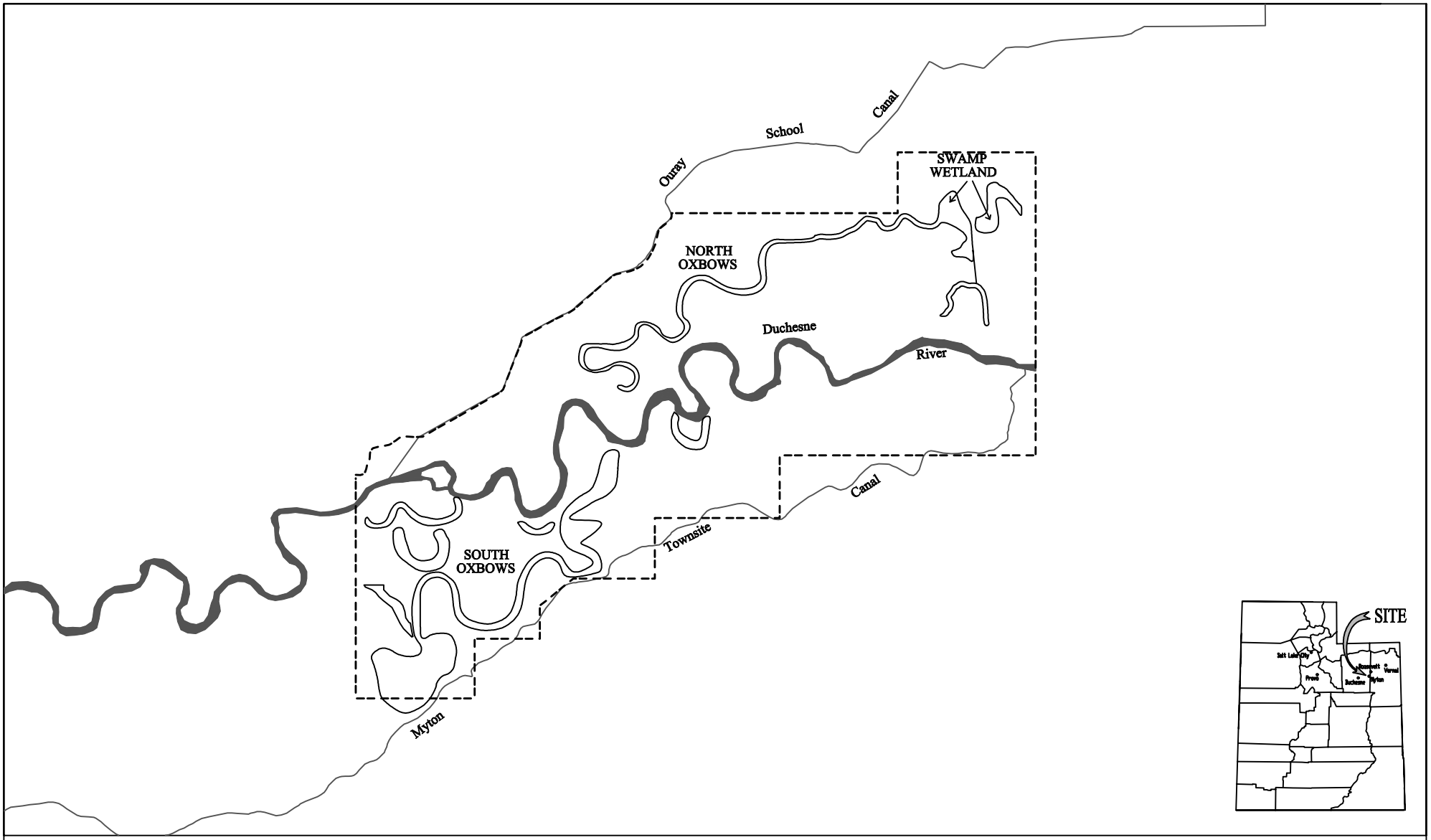
1 INCH = 3000 FEET

N 16°



LEGEND

- Site Boundary
- Major Roads
- Rivers
- Streams and Canals
- County Boundary
- Oxbow

Figure 2-5. Location and Main Features of the Ted's Flat Site Under the Proposed Action

GRAPHIC SCALE

3000 0 1500 3000

1 INCH = 3000 FEET

N 16°

2.1.1.2 Oxbow Restoration

Overview

The sites included in the Proposed Action contain four oxbow systems that historically formed annually flooded, continuous side channels of the Duchesne River. The Proposed Action would connect the four oxbow systems into a continuous backwater channel and expand the oxbow width where ditched.

Oxbow Restoration

Currently isolated oxbows would be physically connected in the Flume, Riverdell South and Ted's Flat (both north and south of the river) sites to form continuous oxbow systems. The width and depth of each connection would vary according to the gradient between oxbows. The material excavated from the connection channel would be used on site as part of the earthen berms. Each connection channel bank would be planted with bare root shrubs and seeded to reduce weed establishment. Four connections would be necessary in the Flume, four in the Riverdell South oxbow system and three in the Ted's Flat South oxbow system.

Oxbow widths would be expanded to their approximate historical width by two measures: recontouring portions of ditched sections and installing a series of berms across the oxbows. The purpose of the berms would be to spread water laterally and create pools of shallow water within the oxbows without significantly affecting the potential for water flow-through. Berms would typically vary in length from 80-250 feet, have a top width of 5 feet, with 3:1 slopes and with an average height of 4 feet. These dimensions are based on a feasibility level of analysis, and dimensions may vary with final design. Actual final dimensions will be designed to provide an undulating shape along contours that blends naturally with the terrain.

The approximate location of berms was based on existing topographic data, feasibility analysis of grade and individual oxbow configurations. Exact berm locations would be determined during detailed design when site topographic and geotechnical survey data are available.

Berms would be constructed of compactable earthen-fill with a spillway designed for a 10-25 year rainfall event with the spillway capacity varying with site and location of the berm within the site. A small, flashboard, canal gate or similar type water control structure would be inserted in the spillway if necessary to allow flexibility in operations to meet desired wetland acreage and habitat goals.

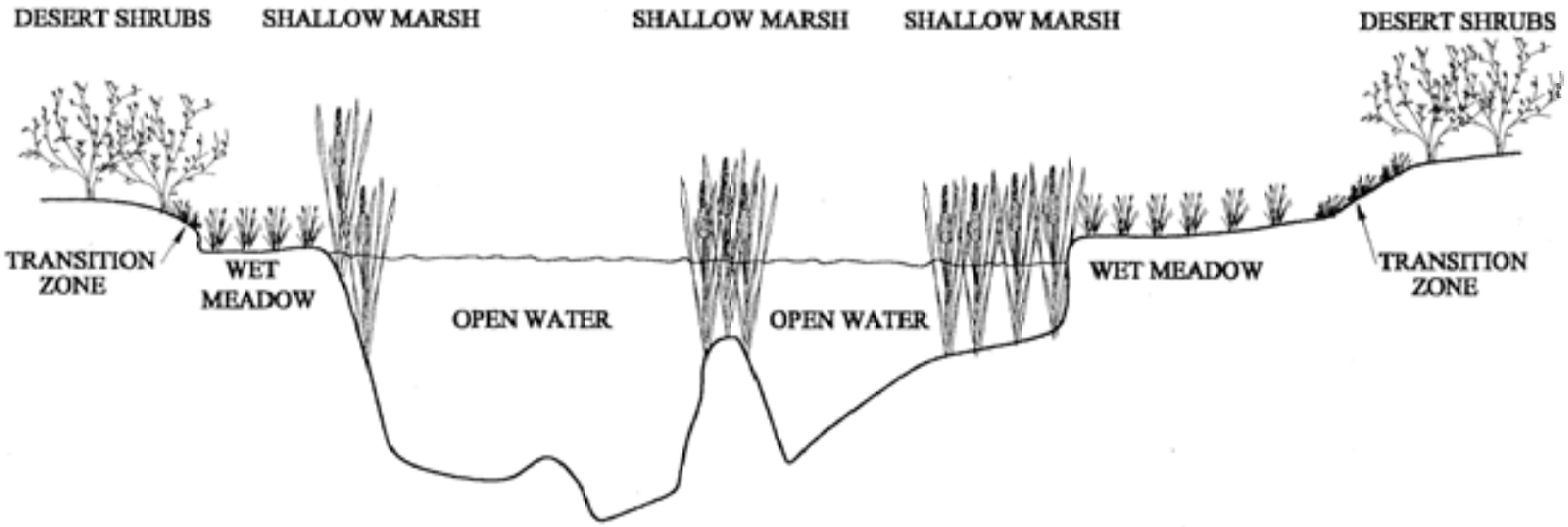


Figure 2-6. Schematic Cross Section of Wetlands Upstream of a Typical Oxbow Berm

There are no existing water delivery points to the Ted's Flat South Oxbows; a new headgate would need to be inserted along the Myton Townsite Canal at the southwest corner of the property to provide the necessary water for the wetland.

Berms would be protected from erosion by a combination of revegetating the berm and by placing riprap along the downstream sides of the berm in selected locations.

Culverts would be replaced where unimproved roads cross the oxbows.

All sites would be fenced to exclude livestock.

River Reconnection of Oxbows

Reconnection of oxbows to the Duchesne River is feasible in the Flume, where the connection would occur via an existing perennial secondary channel. The connection would require excavation of a 440-foot long channel which would allow gravity flow of water from the secondary channel to the oxbows during the spring on an annual basis.

Connection of the Ted's Flat North oxbow system to the Duchesne River is physically feasible but may not be possible within the project budget cap; however, impacts of the connection are analyzed in the DEIS in the event additional funds are secured for the project. Connection would require excavation of an approximately 500-foot long inlet channel.

The Riverdell North oxbow would be connected to the river by excavating a 600-800 foot-long channel that would allow flow of water from the Duchesne River on a mean annual flood basis (i.e., approximately once every 2.3 years).

All connections to the Duchesne River would occur on project lands. Connections to the Duchesne River constructed by the LDWP would be stabilized by the immediate planting of riparian shrubs and/or herbaceous species along the channel banks.

2.1.1.3 Large Marsh Complexes

In 1956 the Uresk Drain site was described by the Soil Conservation Service as a large marshy area south of Myton that should be drained (SCS 1956). The site was altered between 1936-1939 by a 2.5 mile drainage ditch that averages 10 feet in width and ranges in depth from one to six feet below the soil surface. Under the Proposed Action, the Drain would be plugged and a series of berms would be constructed perpendicular to the Drain to recreate a large marsh complex. Figure 2-7 depicts a conceptual plan view of proposed wetlands within the eastern portion of the Uresk Drain site.

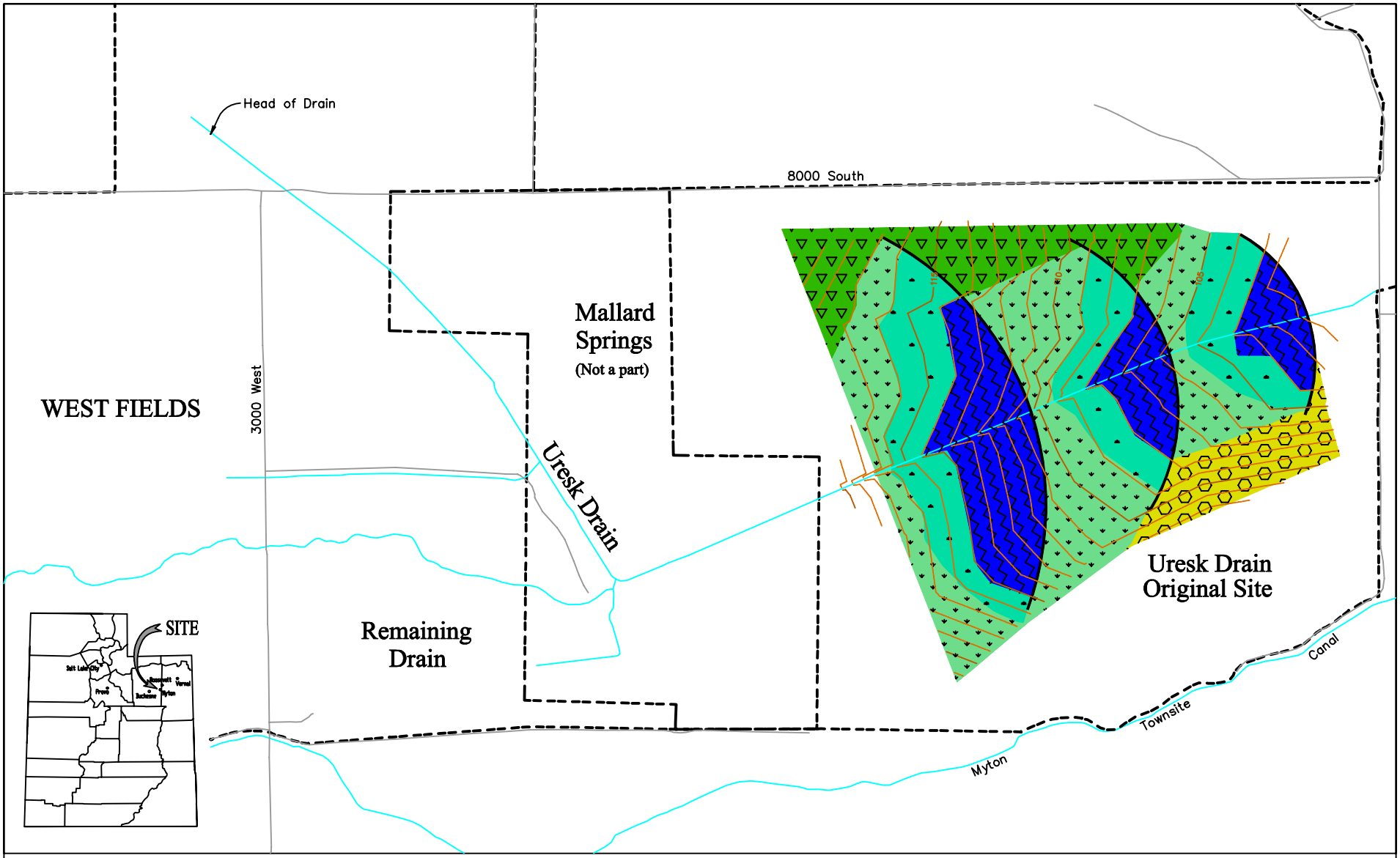
The soils on the Uresk Drain site consist of a layer of silts and clays over cobbles. The Drain on the eastern portion of the site (the one-mile section between Mallard Springs and County Road 1000 West) was constructed so that it intercepted the cobble layer to promote drainage. The cobble-clay contact occurs from 0.5 to 2.5 feet above the base of the Drain. A clay plug would be placed along the entire length of the Drain to seal the exposed cobble contact, but filling of the entire Drain would not be necessary. The clay for the plug would be obtained on site in an area previously identified as consisting of low permeability clays (Kaiserman Associates 1978).

Three large berms would be placed east of Mallard Springs. These berms would typically average 2,150 feet in length and 5.5

feet in height with a 3:1 side slope. Typical berm tops would be 10 feet wide to allow motorized access for maintenance. Berms would be placed perpendicular to the Drain and constructed on topographic contours. Berms would be placed so that the upstream berm would be approximately 12 inches above the high water elevation of the next downstream berm. This would allow a maximum ponded open water depth of four feet directly behind each berm grading to marsh between the berms and to wet meadow on the lateral edges of the open water-marsh complex. Berms would also be placed so that the ponded water behind the last berm would not flood the adjacent Mallard Springs property. Map 3 depicts the approximate location of the proposed berms based on available topographic data. Final berm dimensions and placement would be determined during the design phase of the project. As for the berms along the oxbows, final dimensions would be designed to provide an undulating shape along contours that blends with the natural terrain.

Berms would be constructed of compactable earthen-fill using the material left on site from the original excavation of the Drain. Each berm would contain one or more spillways to ensure that downstream water rights are transferred. Water control structures and spillways would be as described for the oxbow berms.

West of Mallard Springs, the area influenced by the Drain narrows from a maximum of 2,000 feet to less than 500 feet. The Drain construction did not puncture the cobble-clay contact in this area. Clay plugs would not be necessary west of Mallard Springs as the Drain was not excavated deeply enough to break the seal between the upper silts and clays and the underlying alluvial material. Flooding of adjacent lands would be accomplished by placing a series of six berms across the Drain and adjacent ditches. Berm length would vary from 30 feet to 1,000 feet, depending on topography.



LEGEND

- Site Boundary
- Roads
- Streams and Canals
- Contours
- Open Water
- Emergent Marsh
- Shallow Marsh / Wet Meadow
- Riparian Shrub
- Upland Shrub

Figure 2-7. Concept Plan of Wetland Habitat Distribution at the Eastern Edge of the Uresk Drain

GRAPHIC SCALE

1/4 mile 0 1/8 mile 1/4 mile

1 INCH = 1/4 mile , 1320 feet

N 16°

2.1.1.4 Isolated Marsh Complexes

A number of isolated wetlands would be created or enhanced as part of the Proposed Action. Wetlands larger than 50 acres in size can be located on Figures 2-1 through 2-5. These wetlands are referred to as the "Pit Wetland" and the "Swamp Wetland." The Pit Wetland is in the Flume south of Highway 40. The Swamp Wetland is located in the Ted's Flat site north of the river.

The Pit Wetland would connect three separate smaller wetlands that developed in highway borrow pits into a single 86-acre wetland complex consisting of a mix of shallow marsh, deep marsh and shallow open water habitats. The connection would require excavation of an approximately 3-foot deep, 500-foot long channel which would be protected by revegetating with a mix of wetland grasses and sedges.

The Ted's Flat North Oxbow system terminates in an approximately 60-acre wetland locally referred to as "the Swamp," which was not part of the original oxbow system. The Swamp Wetland was developed as an irrigation reservoir for farming on the adjacent Randlett Farms. Randlett Farms is now served by a new pressurized water system and the Swamp Wetland is not currently being used for irrigation. The Swamp Wetland currently consists of a mixture of wetland types and is bordered by a large area of native riparian shrubs. The Swamp Wetland would be maintained in its current condition with the exception of Russian olive removal along portions of the wetland edges.

2.1.1.5 Riparian Restoration

Riparian planting is only proposed for areas located within 10 vertical feet of the bankfull stage at the current grades. No soil excavation or grading is proposed within riparian planting areas. Mechanical removal of noxious weeds and installation of an above-ground temporary irrigation system would be required in some areas; these activities may result in some soil disturbance (see also section 2.1.1.6).

2.1.1.6 Biological Features Common to All Sites

Planting would occur in phases according to the schedule described in section 2.1.5.1. Planting may require mechanical auguring to the high water table so as to place cottonwoods and native shrubs at this depth. Temporary irrigation would be supplied by an above-ground irrigation system that could be moved from planting block to planting block as soon as the native woody species have reached the summer water table. It is estimated that each block would require temporary irrigation for three years.

Non-native and invasive riparian woody species such as tamarisk and Russian olive would be removed through use of a combination of chemical and mechanical means. Methods that could be used include a foliar chemical spray, mechanical removal of plants including all roots or stump cutting followed by immediate application of an appropriate herbicide. Control of some species may require herbicide application in two successive years. Treatment would be in phases corresponding to the planting phases. This would typically require tamarisk and Russian olive on an identified planting block to be: 1) either treated in the fall, with

riparian planting proceeding on the same block the following spring or 2) treated in the spring with riparian planting proceeding on the same block the following spring.

The primary herbaceous noxious weed occurring in the project area is giant whitetop, also referred to as pepperweed, which is beginning to establish along the edges of oxbows receiving return flows. This species would be chemically treated prior to construction.

Edges of wetlands to be expanded or created along the oxbow systems and in the Uresk Drain would be seeded with a mix of rapidly growing wetland species with high wildlife food value (e.g., three-square bulrush and smartweeds). Seeding would be done in the fall prior to flooding of new wetland areas. Upland grasses would be seeded in previously grazed desert shrub areas immediately adjacent to the oxbows.

2.1.1.7 Management Changes

A number of upland habitats would not be completely converted to wetlands, but their value to wetland and riparian species would be enhanced by changes in management. These habitats include portions of currently irrigated wet meadow-grassland complexes, desert shrub and all existing cropland. Irrigated grasslands would continue to be irrigated under the Proposed Action, but grazing would be eliminated unless necessary to achieve specific wildlife management objectives. Grasslands would be managed to provide nesting and foraging sites for wildlife. Active management of the grasslands would be necessary to prevent Russian olive and tamarisk encroachment which has occurred on other abandoned pasture land within the project vicinity. This management may require periodic haying with the cutting timed to avoid critical wildlife nesting periods. Short-term (i.e., less than one week), high intensity grazing or herbicide application may also be used to control Russian olive and tamarisk. The managed grasslands are located primarily adjacent to the Uresk Drain marsh complex and between the Uresk Drain wetlands and the Flume oxbows.

Desert shrub habitats would be maintained as buffers between human activity areas and wetlands. Grazing would be eliminated from all wildlife buffer areas unless necessary to achieve specific wildlife management objectives.

Existing rotation cropland within the immediate vicinity of the proposed wetlands would be retained as cropland. Rotation croplands are defined as existing farms in which corn, small grains or alfalfa are produced with the planting of specific crops varying among years. Conservation easements instead of fee purchase may be used to secure existing croplands. The conservation easements would require that at least 20 percent of the crop be reserved for wildlife, that cropping schedules be compatible with nesting bird requirements and that native trees and shrubs along hedgerows and ditches be maintained and not cut down. Approximately 469 acres of former cropland on the Riverdell North/South property would be replanted to native vegetation and/or cropland to provide wildlife food and cover. Newly planted cropland would be managed entirely for wildlife - there would be no harvest for human or domestic animal consumption.

2.1.1.8 Water Management

The water supply for each site would consist of a mix of sources including ground water, Duchesne River flows during spring run-off, return flows and irrigation water supplied directly from main irrigation canals. Existing turnouts would be used to supply water to all sites except the Ted's Flat site, where a new turnout would be needed on the Myton Townsite Canal. The sources of water for each site are listed in Table 4-37.

Agricultural return flows, some of which contain high levels of salts, enter each site. Under the Proposed Action, return flows would continue to enter the sites. To maintain water quality within tolerable salinity levels for wetland-dependent wildlife, considerable outflow from the wetland is required. Under the Proposed Action, wetlands on all sites would be operated as flow-through systems and not as impoundments that are filled and emptied each year. A water quality control factor would be applied to each site's wetland water budget to cover the flow-through system requirements. Water quality control factors are factors applied to wetland water budgets to account for the extra water required to flow through the wetland to prevent accumulation of salts. Because of incomplete mixing of waters within wetlands, the actual amount of water required to maintain a salt balance at an acceptable limit can only be approximated based upon the salinity of the inflowing water. Water quality control factors for each site were derived from data presented in Christiansen and Low (1970). A water quality control factor of 1.27 was identified as necessary for those sites receiving inflow with TDS levels less than 800-1,000 parts per million (ppm). Sites with TDS concentrations greater than 1,200-1,500 ppm in the inflow water require a water quality control factor of 1.5. This means that the water budget for each site was increased by 27 to 50 percent over that required to meet the consumptive use of water by wetland plants and evaporation. The supplemental water required to operate the wetlands as flow-through systems that control salinity would represent a non-consumptive use of water that would be returned to the Duchesne River.

Water from the canals would continue to be used for irrigation. Water would be delivered to the wetlands according to the interim duty schedule currently being implemented within the project area. There would be no change in the amount or timing of diversion of water from the Duchesne River. Wetland water requirements would be met using water rights leased from the Tribe and/or obtained with the purchase of land. There are sufficient water rights associated with the land in the project area to meet the water requirements of the wetlands and the project would not interfere with the legal water rights of other users. If it became necessary to transfer water rights within the project area, the BIA would follow all administrative procedures necessary for transferring water rights. Additional details regarding water resources can be found in section 4.5.

The proposed river-oxbow connections would be constructed without placement of weirs, sills or other structures in the Duchesne River. As a result, river flows would only enter the oxbows during the high spring run-off periods when the interim duty schedule is not in effect. Section 4.5 describes further details of the timing and flows under which spring run-off peaks would enter the oxbows. Temporary irrigation would be necessary for all plantings outside of the current floodplain. Water would be required to ensure sufficient

irrigation water during the proposed 10-year planting period. Water requirements are described in detail in section 4.5.

2.1.2 Construction Procedures

2.1.2.1 Typical Construction Procedures

Berms would generally be constructed from upstream to downstream with work alternating between wetland and upland sections along the oxbows so that construction in wetlands occurs during the driest portion of the year. Berm construction would be scheduled to the extent possible so that work in wetlands would occur outside the peak irrigation season (May 15 through August 15) when return flows raise water tables to their highest level. Irrigation water would not be supplied to project lands during construction to reduce the amount of return flows originating within the project area and facilitate construction. Agreements could be reached with adjacent landowners or the Mallard Springs Wildlife Management Area to reduce or eliminate irrigation during construction to further lower the water table as up to 60 percent of existing wetlands within individual sites are estimated as being supported by return flows from adjacent properties. A cofferdam (a temporary small dam constructed of native material or plastic tubing or sheeting) would be constructed in portions of wetlands with standing water to temporarily dewater the area during berm construction. No fill would be placed in standing water.

Vegetation, organic soil layers and wetland topsoil would be removed along the foundation for the berms. Topsoil containing native wetland species would be removed with a scraper and temporarily stockpiled. Following berm construction this material would be applied to the sides of the berm and soils disturbed during construction to facilitate wetland plant reestablishment. All clearing would be confined to a specified zone to minimize the expense of reestablishing vegetation and minimize potential for weed establishment on disturbed soils.

The earthen material for the oxbow berms and berms on the western portion of the Uresk Drain would be derived from each individual site immediately upstream and downstream of the berm. The soils along the oxbows have been mapped primarily as consisting of three or more feet of silty clay loam over more coarse-textured alluvial material deposited when the oxbow was part of the active Duchesne River channel system. Only the upper soil layers would be used for berm construction. A minimum of 18 inches of fine-textured material would be required to remain over the underlying alluvial soils. Prior to construction detailed geotechnical analysis of soils would be used to outline exact locations and depths of the borrow zones so that the current seal between silts and clays and more coarse-textured materials would not be punctured during construction. If possible, excavation of soil for the berms would be done so that the borrow zone would provide irregularly shaped deep and shallow water zones upstream of the berm. The estimated width of the disturbance zone for each oxbow berm would be approximately 130 feet, of which up to 100 feet would be temporary disturbance and from 10 to 30 feet (the width of the berm base) would result in permanent disturbance.

At the Uresk Drain, the spoil material removed during original Drain construction

would be used for berm construction on the eastern portion of the site (the portion east of Mallard Springs) if geotechnical analyses identified the material to be of suitable texture and strength. The total disturbance zone along each berm would be approximately 90 feet, of which 40 feet would represent permanent disturbance at the berm base and 50 feet would represent temporary disturbance during construction. Prior to berm construction, the exposed cobble-clay contact in the Drain would be plugged with impermeable clay. The material for the clay plug would be obtained south of the Drain in an upland area. Map 3 shows the location of impermeable clays within the Uresk Drain site as mapped by Kaiserman Associates (1978). The clay borrow pit would be approximately 10 acres in size and four feet deep. Final shaping of excavated sides would be to a minimum of 3:1 slope. The borrow pit would be flooded with completion of the berms and would serve as a deepwater pool within the marsh complex.

Soil excavated during construction of inlets or channels connecting oxbows would be used in berm construction if of suitable texture. Any remaining excess material would be transported to a suitable offsite disposal site. Excess soil would not be disposed of onsite in order to prevent creation of bare areas that weeds could readily invade. Locations for temporary stockpiling of materials would be determined during design and construction to minimize impacts to existing vegetation and wetlands.

Inlets to oxbow systems would be constructed last with river reconnections occurring during the summer under low flow conditions. Water would be gradually introduced through the channels and into the oxbow systems to allow initial vegetation growth prior to operation at full continuous flow conditions. Water in all wetlands would be carefully managed during the first three to five years following construction to allow the desired vegetation to become well established and to minimize erosion until the channels are vegetated. Both interim construction and post-construction water management plans would ensure that all water rights and downstream water delivery obligations would be met during and after construction. Section 2.1.4.3 describes the general operating agreements to be developed to provide for monitoring and post-construction operation.

Construction would not affect any existing utilities. No utilities are buried in the construction zone, but a buried main gas transport line is located adjacent to portions of the project area. The gas line would be staked prior to construction and no construction activity would be allowed in the vicinity of the gas line.

2.1.2.2 Typical Equipment and Specifications

Equipment that could be used to construct the Proposed Action includes:

- Scraper
- Harrow
- Low ground pressure bulldozer
- Grader (to shape slopes)
- Track and rubber tired front end loader
- Bulldozer
- Trackhoe
- Dump truck

- Sheepsfoot roller
- Compactor
- Dragline excavator
- Stinger (modified excavator used specifically for planting in cobbly soils)
- Gas-powered pump (to temporarily dewater areas during construction)
- Low bed tractor trailer (to transport heavy equipment)
- Rubber tired tractor
- Gas-powered auger
- Drill seeder
- Small load cement truck

Table 2-2 presents the typical noise levels and air emissions associated with the types of construction equipment that would be used to construct the Proposed Action and alternatives.

Table 2-2. Typical Noise and Air Emissions Associated with Construction Equipment under the Proposed Action and Alternatives.

Equipment Type	Noise Levels		Typical air emissions based on 8 hour per day operation		
	Range at 50 ft (dBA)	Nominal at 50 ft (dBA)	NOx lb/mo	SOx lb/mo	PM10 lb/mo
Scraper	73-95	85	1,003	106	79
Bulldozer	72-96	84	791	69	34
End-loader, rubber tired	71-96	82	704	64	48
End-loader, tracked	71-96	82	704	64	48
Track hoe	71-93	85	1,248	110	78
Dump truck	70-92	85	1,344	112	84
Compactor	84-90	86	0.5	0.4	6.8
Dragline excavator; stinger	71-93	85	1,248	110	78
Portable pump, diesel	69-81	74	115	13	6.4
Tractor-trailer, transport	70-92	85	1,344	112	84
Portable auger	68-87	81	163	27	14
Flatbed truck	76-85	80	672	56	42
Pickup truck	76-85	80	2.3	0.6	15
Grader	73-95	85	672	64	64
Small load cement truck	70-90	85	960	80	40

2.1.2.3 Temporary Construction Access

Construction workers and equipment would gain access to the sites from existing county and Tribal roads and private roads acquired with property purchase. Additional temporary access roads to berm locations along the oxbow systems would be constructed in portions of each site. The access roads would be constructed within uplands and consist of a cleared and compacted (if necessary) 15 foot-wide travel route. All temporary access roads would be removed following construction and the roads ripped to a minimum depth of six inches, recontoured to natural conditions and seeded with a seed mix similar to that of native species found in nearby communities. The location of temporary construction access roads on the Flume, Riverdell North/South, Ted's Flat and the western portion of the Uresk Drain sites would be determined during final design, but it is anticipated that at each site from one-half to one acre of temporary access roads would be constructed.

At the Flume, a permanent access road to the oxbow-river reconnection point would be constructed. The road would be created by extending an existing road approximately 1,200 feet to the west. The exact location of the access road would be determined during final design.

The Uresk Drain site east of Mallard Springs contains existing wetlands; because of this, temporary access routes have been designated in this document to avoid wetland impacts other than the temporary crossings described below. The approximate locations of temporary construction access routes for the Uresk Drain site are shown on Map 3. Culverts sized to handle expected flows would be placed at temporary crossings and covered with clean gravel fill. Culverts and fill would be removed and original grades restored following construction. The Uresk Drain construction may require larger construction equipment than the other sites included in the LDWP area due to the need to transport clay and other fill within the site from locations not immediately adjacent to the berms. As a result, temporary access roads would be constructed at widths of up to 30 feet.

2.1.3 Land Ownership, Land Acquisition and Land Use

2.1.3.1 Land Ownership

The LDWP is located in the northern portion of the Uintah and Ouray Reservation within the area originally designated as the Uinta Valley Reserve, established by Executive Order on October 3, 1861. Although all the land in the Reservation was originally reserved for Indians, over the years land ownership patterns changed. Within the LDWP there is now Tribal Trust land, allotted land held in trust for individual tribal members, fee owned land, which was either purchased from allottees or homesteaded when the Reservation was opened to non-Indian settlement in 1905, and the federally-owned Riverdell North property. As discussed below in section 2.1.3.2, there are restrictions and limitations on the acquisition of land held in trust for the Tribe or individual tribal member allottees.

Maps 6 through 8 depict existing land ownership in the LDWP Project Area for the Proposed Action and alternatives. Table 2-3 provides a summary of land ownership for the Proposed Action and alternatives. There is no

state-owned land within the project area, but the Uresk Drain site abuts the state-owned Mallard Springs property. The Mallard Springs property is depicted on the project maps for reference but is not incorporated into the project area.

Table 2-3. Summary of Land Ownership by Site and Alternative (acres).

Site by Alternative	Fee	Allotted	Tribal Trust	Federal	Total
Proposed Action [1]					
Flume	363	517	718	0	
Uresk Drain	379	584	966	0	
Riverdell N/S	514	204	385	1,087	
Ted's Flat	898	199	976	0	
Total	2,154	1,504	3,045	1,087	7,790
Pahcease [2]					
Flume	894	639	1,113	0	
Uresk Drain	379	584	966	0	
Riverdell N/S	514	204	385	1,087	
Total	1,787	1,427	2,464	1,087	6,765
Topanotes [3]					
Flume	894	639	1,113	0	
Uresk Drain	379	584	966	0	
Ted's Flat	898	199	976	0	
Total	2,171	1,422	3,055	0	6,648

[1] The total acres within the sites making up the Proposed Action equal 7,790, of which only 6,640 acres would be required for the LDWP and 1,087 acres used for the combined SACS-DRACR mitigation.
[2] The total acres within the sites making up the Pahcease Alternative equal 6,765, of which only 6,640 acres would be required for the LDWP.
[3] The total acres within the sites making up the Topanotes Alternative equal 6,648, of which only 6,640 acres would be required for the LDWP.

2.1.3.2 Land Acquisition

Fee Land Acquisition

Fee property (land and water) required for project implementation and management would be permanently acquired or encumbered in one of several possible ways:

- Fee title purchase from willing sellers
- Donations
- Conservation easements
- Eminent domain (last resort) acquisition of fee title and/or conservation easements

Specific options would be investigated on a parcel-by-parcel basis with each individual property owner. Ownership changes would be associated with purchase of fee title by the United States government. Private property owners would be compensated at the fair market value. No land currently owned by local cities, Duchesne County, Uintah County or the State of Utah would be acquired for the Proposed Action.

The joint lead agencies must comply with the federal requirements to complete the CUP. The acquisition program would be implemented within the narrow scope of the authorized project. Although the Duchesne County Land Use Plan is not binding on the federal government, the joint lead agencies have adopted procedures in an effort to attempt to complete the project acquisitions on a willing seller basis. The procedures follow a standard process required by the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. The purpose of the Act is to provide uniformity and fairness in the treatment of property owners. The process is summarized as follows:

a. A determination is made by the head of the acquiring agency as to the minimum estate and area needed for project purposes.
b. A real estate appraisal is made to determine the fair market value of the highest and best use of the parcel being acquired. This value is to represent what a willing seller would sell the property for and what a willing buyer would pay for the property, neither being under duress to buy or sell.
c. A written offer to purchase the property is made to the landowner. This offer is generally hand delivered along with a brief explanation of the project.
d. Negotiations are conducted with the landowner. Every reasonable effort is made to negotiate an agreement that is fair to both the landowner and the taxpaying public.
e. Only after all reasonable efforts have been made to come to a mutual agreement on a fair and reasonable price would the proposed acquisition be recommended by the agency representative for consideration for condemnation.

The joint-lead agencies would make every reasonable effort to acquire needed properties on a willing seller basis. If needed properties can not be acquired on a willing seller basis, property required to fulfill the project needs would be acquired by eminent domain.

Fee lands acquired by the federal government from private landowners would be owned by the United States and subsequently managed

by the Tribe under an Operating Agreement to be negotiated. This would maintain mixed ownership in the project area. Consolidation of ownership through land exchanges would be a goal to be addressed in the Operating Agreement and Management Plans developed for the project.

Tribal Trust Land Acquisition

As Trust lands, Tribal Trust lands (including both Reservation and allotted lands) are subject to different restrictions on ownership purchase and sale than are fee lands. The Tribe cannot sell land, only exchange, lease or convey an easement. Tribal Trust leases are limited to specific terms (i.e., 25 year renewable or non-renewable lease). Easements on Tribal Trust land are similar to leases in that the land remains in Tribal Trust; however, easements on Tribal Trust land are different from leases in that the length of the easement period can be negotiated for any period and the easements are not limited to specific term periods as are leases.

Tribal Trust easements are different from conservation easements placed on fee lands in that Tribal Trust easements are for a negotiated period of time, whereas conservation easements on fee land are set in perpetuity.

Allotted Lands

The Proposed Action includes 1,504 acres of allotted land which is held in trust by the United States for individual Tribal members. These lands, which are typically held in 40 acre tracts, often have numerous owners with undivided interests in the parcel. Rather than attempting to acquire these lands by purchase, the LDWP proposes to obtain easements on those allotted lands included within the project. Compensation would be at the fair market value for the use of the Trust lands and water rights for the LDWP. Because some project boundaries are located according to topographic features, a portion of a particular allotment may be within the Project with the remainder lying outside the Project. The LDWP would compensate allottees for that portion of a 40-acre allotment included within the Project boundaries and placed under an easement.

Uintah and Ouray Reservation Land

The Proposed Action includes 3,045 acres of Tribal Trust land held by the United States in trust for the Tribe (Tribal Trust lands). Easements would be placed on Tribal Trust lands by the LDWP for construction, habitat restoration and protection, and/or public access. Such easements would be negotiated among the Tribe, Mitigation Commission, BIA and DOI regarding the appropriate compensation and terms of the easement. Compensation for land and associated water rights would be at the fair market value for the use of Trust lands and water rights for the LDWP. To the extent any additional water is required for the LDWP, Tribal water rights may be leased and transferred to those lands with compensation based upon the fair market value for leasing water rights. Under all circumstances easements and leases would have to comply with the applicable legal limitations.

2.1.3.3 Land Use

Most of the land within the project area is either used for grazing or is idle. The BIA (Hansen 2001, BIA 2001) evaluated the current use and production of Tribal (both Tribal Trust and allotted) and Fee land according to the following categories:

- **Crop.** Land currently in production for alfalfa, corn and/or small grains. Production estimates were only made for alfalfa as it is the predominant crop being grown in the LDWP area, with only two or three fields currently planted to corn or grains.
- **Pasture.** Pasture consists only of irrigated or potentially irrigated pasture. Most pasture land in the LDWP area is dominated by saltgrass and is considered unimproved pasture.
- **Other.** All other land including non-irrigated land, wetlands, riparian areas and dry hillsides. Some of the land in the "other category" is grazed and an AUM value was developed for parcels of land in this category.

Under the Proposed Action, there would be no conversion of cropland to another land use type. Conservation easements would be placed on the cropland so that a portion of the crop would be reserved for wildlife use. The management of the irrigated pasture and other lands would be changed as grazing would be restricted.

Table 2-4. Summary of Existing Land Use and Agricultural Production within the Proposed Action Project Area.

Land Use	Acres by Land Ownership			Total Acres	Range of Production Per Acre
	Tribal[1]	Fee	Federal		
Cropland	160	331	0	491	3.5 Tons/Acre
Irrigated Pasture	1,186	1,141	0	2,327	2-3 AUMs/Acre
Other	2,727	1,158	1,087	4,972	0-2 AUMs/acre

Source: Hansen 2001, BIA 2001

[1]Includes all Tribal Trust lands.

2.1.4 Operation and Maintenance

2.1.4.1 Management Objectives

The Ute Tribe and cooperating agencies would develop a detailed Comprehensive Conservation and Management Plan (Management Plan) that specifies the habitat developments, their management and the public uses that would be permitted. The Management Plan would likely be patterned after the Comprehensive Conservation and Management Plan for the nearby Ouray National Wildlife Refuge (FWS 2000). The primary management objective would be to restore and maintain wildlife habitat lost through the construction of the SACS. Recreational uses compatible with the overall wildlife habitat goals would be allowed. Such uses would likely include angling, hunting, environmental education, pedestrian use and wildlife observation. Prohibited uses would include bicycles, equestrian users and off-road motorized vehicle use. The LDWP area would be managed as a special use wetland-

wildlife natural resource area under the Proclamation of the Tribal Wildlife Advisory Board and Tribal Business Committee.

2.1.4.2 Public Access

Public access would be allowed for uses related to wetland-wildlife resources, as specified in the Management Plan. Access to the LDWP area would be via paved county roads, including U.S. Highway 40 and River Road. Internal access would be through existing dirt roads with parking in areas already widened for parking. The dirt roads are typically unimproved, and some require high clearance vehicles for access. Existing parking areas are typically large enough to accommodate no more than one to five vehicles, although up to 25 vehicles could be accommodated at the Goose Ponds area of the Uresk Drain if graded. There would be minimal improvement of existing roads or improvement of parking areas as a result of the LDWP project.

Most internal roads would be closed to motorized vehicles, except those needed for administrative use. Wildlife-related public uses may require walking some distance from parking locations. Access directly to the Duchesne River within less than a half-mile of parking would likely be possible at the following locations:

- Riverdell North property
- The Reconnection point of the Flume to the Secondary Channel
- The Goose Ponds portion of the Uresk Drain
- Ted's Flat North and South along River Road

Other access points within the project area would likely include access to the Uresk Drain and the Riverdell South oxbows at existing roads and small parking areas off River Road. Specific access points and parking areas would be detailed in the LDWP Management Plan.

Restrictions on access may be necessary in some areas to meet the wetland-wildlife management goals. Restrictions could consist of complete area closure where sensitive resources occur. Seasonal closures may also be necessary to protect wildlife during nesting, fawning or other seasonally-sensitive periods. The LDWP Management Plan would identify any necessary access restrictions to meet the wildlife goals.

Hunting and fishing would require the appropriate Tribal permits on all Tribal Trust land placed under easements for the project and all fee land acquired for the project or held in trust for the Tribe. Hunting and fishing would be allowed to occur on the Riverdell North property with State of Utah-issued licenses. Non-Tribal members would not be required to purchase Tribal permits for this portion of the project area. Under an existing agreement with the State of Utah, Tribal members would not be required to purchase State permits for use of the Riverdell North property.

2.1.4.3 Operating Agreements

Local participation in the management of facilities and users of the LDWP area is vital. The Mitigation Commission and DOI would develop operating agreement(s) with the Tribe and possibly other appropriate entities for management of the project area. The Operating Agreements would establish a framework for the LDWP Management Plan

described above. Operating agreements would identify areas of responsibility and authority, specify costs of management, and commit funding to support ongoing development, operation and maintenance, and management of the project. Funding sources, assistance with management and operation and maintenance may include one or more of the following: user fees, volunteer efforts, federal, state or local funds or private donations.

The Operating Agreement and Management Plan would jointly address the following:

- Legal land and real property management,
- Jurisdictional responsibility,
- Routine maintenance of fences, water control structures and other facilities,
- Fish and wildlife law enforcement,
- Traffic laws,
- Peace keeping,
- Public access and use,
- Trespass on private or Tribal Trust lands,
- Consolidation of land for management efficiency,
- Agricultural (crop and grazing) management,
- Search and rescue,
- Fee collection and administration,
- Volunteer management,
- Biological/resource monitoring and management,
- Water management, and
- Weed control, including control of both existing weeds and preventing the establishment of new noxious and/or invasive weeds, with a particular emphasis on preventing cattail domination of the new wetlands.

Management objectives for the alternatives would vary slightly from the Proposed Action according to specific objectives of each alternative, but are generally similar. Additional or differing management considerations, if any, are described under each alternative (sections 2.2 through 2.3).

2.1.4.4 Operation and Maintenance Procedures

The Proposed Action includes measures to control noxious weeds and replant extensive areas of the Duchesne River corridor. The construction period of the project includes temporary irrigation of riparian species and initial control of Russian olive, tamarisk and pepperweed in heavily infested areas. The revegetation and weed control measures would require long-term monitoring and additional weed control to ensure that the wetland and wildlife habitat goals are met through the life of the project. Of particular concern will be that measures are taken to prevent Russian olive, tamarisk and pepperweed from reestablishing, and that measures are also taken to prevent other invasive species such as cattail, reed canary grass and giant reed from establishing.

Routine inspections would be made of all structures to make sure that they are operating properly. Water levels in the wetlands would be monitored on a more intensive basis, with flows adjusted as necessary to allow newly seeded wetland plants to establish, control non-desired species encroachment and

maintain salinity levels within the desired range.

Fencing and water control structures may need regular maintenance and/or repair. Maintenance of irrigation diversions and headgates would continue to be the responsibility of the Uintah and Ouray Irrigation Project.

2.1.4.5 Mosquito Control

Mosquito control would be an important component of the Proposed Action. The LDWP lies within Mosquito Abatement Districts (MADs) located in Duchesne and Uintah Counties. The Proposed Action would increase the area of open water and wetlands, potentially providing increased mosquito habitat (section 4.10 provides additional discussion of mosquito habitat). The LDWP would address mosquito control in a similar manner as the nearby Ouray National Wildlife Refuge, which addresses mosquito control in its Comprehensive Management Plan (FWS 2000) and through special use permits signed with MADs. General principles adhered to by the Ouray National Wildlife Refuge which the LDWP would use as guidance in developing its mosquito control policy include:

- A special use permit would be negotiated between the Ute Tribe Fish and Wildlife Advisory Board, the MADs and other participating agencies specified in the LDWP Management Plan. The special use permit would specify monitoring protocols, acceptable mosquito treatments, areas in which treatment can occur, sensitive areas to be avoided by chemical controls and procedures under which mosquito treatment would occur, including notification and approval measures.
- The appropriate MAD would monitor the LDWP area for both adult and larval mosquito populations. If monitoring indicates mosquito treatment is necessary, the Ute Tribe would be notified prior to treatment for approval according to the procedures outlined in the special use permit.
- Biological control agents, such as *Bacillus thuringiensis* (BTI) or other low impact agents such as "goldenbear oil," would be the primary controls used. Stronger mosquito control agents, such as Malathion, would be used only if encephalitis or other disease-bearing mosquitoes that could provide a threat to human health are detected during the monitoring.
- The maximum number of mosquito control treatments per year would be specified in the special use permit. The number of treatments would likely be similar to that allowed by the Ouray National Wildlife Refuge (i.e., two BTI treatments per year).
- The special use permit would identify special procedures to be followed in the event that infectious disease carrying mosquitoes (adult or larvae) are collected in the LDWP project area. The major mosquitoes of concern would likely be those species that carry human or equine encephalitis.

Certain other biological or physical control procedures could be used to reduce mosquito populations, such as temporary dewatering of some wetland areas to expose mosquito larvae to predation, habitat enhancement for mosquito-eating wildlife (e.g., swallows, bats), controlling weeds that would prevent the planned water flow-through operation, and

increasing water velocity in wetlands to minimize stagnant water conditions in selected locations. The use of mosquitofish (*Gambusia* spp.) would not be allowed because of the potential for these fish to enter the Duchesne River and prey on native and game fish in the river.

2.1.5 Summary of Other Characteristics

2.1.5.1 Construction Schedule

The Proposed Action would be constructed over several years beginning with land acquisition. Implementation of the proposed physical and biological measures would proceed over a minimum 10-year period. During this period, construction would proceed on a site-by-site basis for construction of wetland features necessary to establish oxbow connections, manage water and establish wetland plants along the oxbows. Six to nine months are estimated as being necessary to construct the physical oxbow features on each site, which would be primarily outside of the riparian planting blocks. Riparian planting would occur on a planting-block by planting-block basis with each planting block consisting of an approximately 120-acre area for replanting and up to 200 acres where only supplemental planting is necessary. One planting block of riparian habitat would be planted each year. Riparian planting may extend through multiple seasons on a site if more than one planting block per site is identified. All disturbed land would be planted each year unless disturbances would continue over more than one year. Initial control of noxious weeds is an integral portion of the project and control of tamarisk, Russian olive and pepperweed would likely require treatment in two subsequent seasons.

Construction would proceed according to the success and schedule of land acquisitions. Physical feature construction would not overlap in time among sites, but riparian planting and weed control would likely occur concurrently among the different sites. Figure 2-8 depicts the construction schedule for the Proposed Action.

2.1.5.2 Number of Workers and Employment Opportunities

The Proposed Action would use the services of two construction teams: a planting/weed control team and a physical feature construction team. The planting/weed control team would require the use of both skilled and unskilled labor and would work seasonally. The average size of the planting/weed control team would be 20 workers who would work on a seasonal, not permanent, basis. The construction team would consist of an average work force of 10 workers, who would also work on a seasonal, not permanent, basis. The maximum number of employees onsite at any given time would be 30. There would be no permanent construction jobs associated with the LDWP.

It is estimated that at least 67 percent of the work force would come from the Uinta Basin and that the remaining 33 percent may include residents from Wasatch, Summit, Utah or Salt Lake Counties.

2.1.5.3 Material Used During Construction

Table 2-5 lists material requirements for the Proposed Action. The majority of the

materials necessary for physical construction would consist of earthen fill obtained from local sources. The plant material would be supplied from regional nurseries. A relatively small amount of concrete would be used during construction of water control structures, if these features are necessary.

Figure 2-8. Proposed Action Construction Schedule

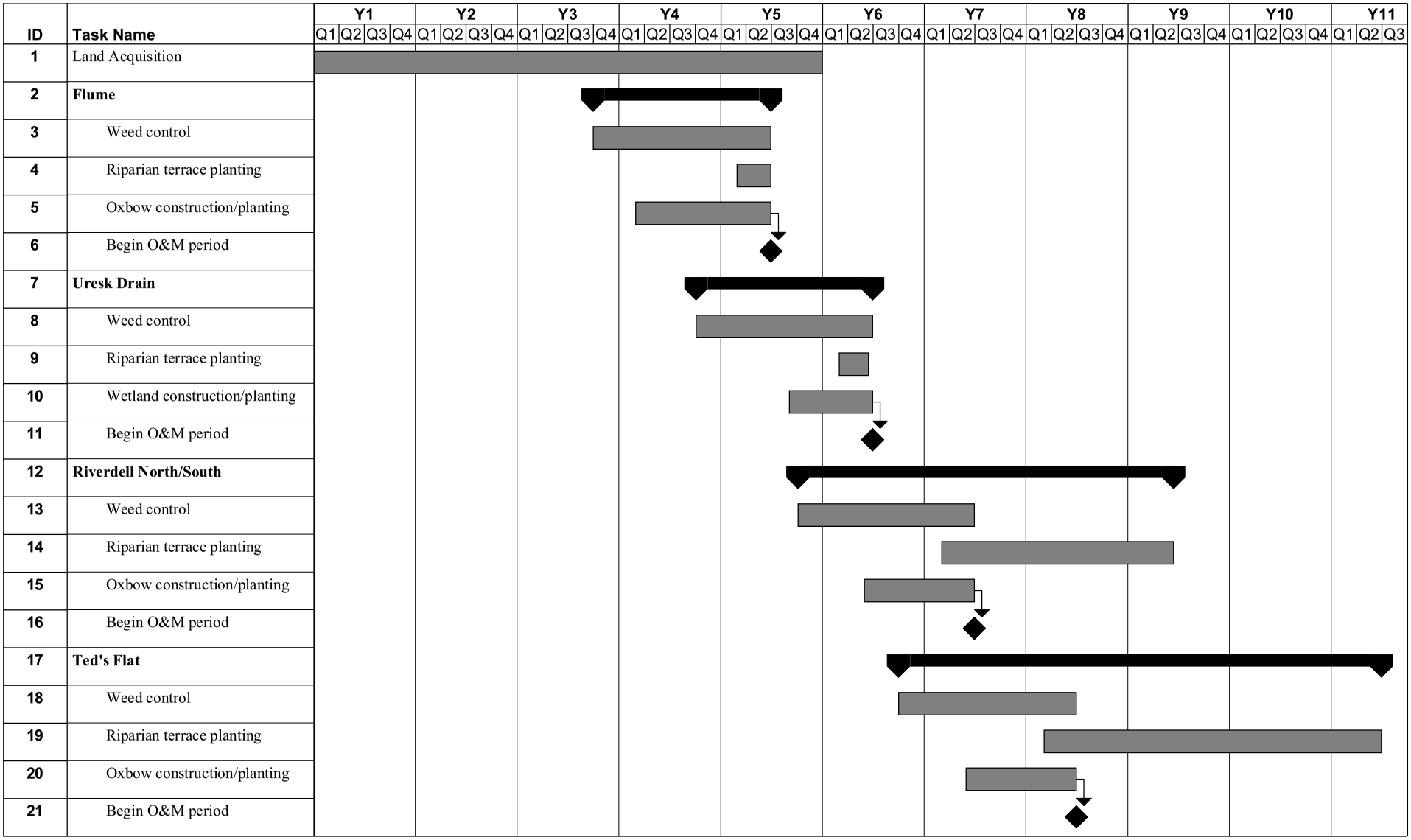


Table 2-5. Construction Material Requirements for the Proposed Action and Alternatives.

Type of Material	Use of Material	Source of Material	Amount of Material by Alternative		
			Proposed Action	Pahcease	Topanotes
Clay	Plug Uresk Drain	On-site	30,000 cu yds	30,000 cu yds	30,000 cu yds
Compactable fill	Build berms	On-site	38,912 cu yds	27,602 cu yds	28,352 cu yds
3-strand wire fence	Exclude livestock	Local source	25 miles	25 miles	14 miles
Concrete	Water control structures	Local source	360 cu yds	260 cu yds	270 cu yds
Rip-rap	Protect sides of water control structures	Local source	360 cu yds	260 cu yds	270 cu yds
Vegetation	Revegetate cottonwood forest	Contract for collection/ propagation	117,040 cottonwood poles	52,250 cottonwood poles	75,130 cottonwood poles
	Revegetate floodplains and oxbow channels	Regional nursery	189,075 bareroot shrubs/trees	140,940 bareroot shrubs/trees	117,735 bareroot shrubs/trees
	Seed new wetland edges	Regional seed company	8,000 pounds	6,100 pounds	5,900 pounds
	Seed upland	Regional seed company	5,480 pounds	5,480 pounds	1,220 pounds

2.2 PAHCEASE ALTERNATIVE

2.2.1 Physical and Biological Features

2.2.1.1 Overview

The Pahcease Alternative would use the same measures as the Proposed Action to rehabilitate 1,923 acres of wetland and 1,132 acres of woody riparian habitat in the Duchesne River corridor. Table 2-1 in section 2.1.1.1 lists the measures that would be made in each site under the Pahcease Alternative. Maps 2 through 4 in the map pocket at the back of the DEIS show the location of the proposed measures. The project would be constructed over a six to eight-year period with construction proceeding as described for the Proposed Action.

2.2.1.2 Oxbow Restoration

The sites included in the Pahcease Alternative contain two oxbow systems that historically formed annually flooded, continuous side channels of the Duchesne River, and the Riverdell North oxbow that is a remnant of the 1964 Duchesne River channel. The Pahcease Alternative would connect the two oxbow systems into a continuous backwater channel and expand the oxbow width where ditched. The alternative would also connect the Riverdell North oxbow to the Duchesne River. Currently isolated oxbows would be connected in the Flume and Riverdell South sites to form continuous oxbow systems. Connections between oxbows, expansion of oxbow width and river reconnection would be as described for the Proposed Action in section 2.1.1.2.

2.2.1.3 Large Marsh Complex Restoration

Large marsh complex restoration would proceed as described for the Proposed Action in section 2.1.1.3.

2.2.1.4 Isolated Marsh Complexes

Isolated wetlands to be created or enhanced as part of the Pahcease Alternative include the Full Connector and Pit Wetlands, which are located in the Flume site south of Highway 40. The proposed Full Connector wetland consists of 190 acres of grassland that was a wet meadow-marsh complex in 1997 when it was being irrigated for grazing. The wetland dried when irrigation ceased. This area would be restored to shallow marsh/wet meadow complex by rewatering the former pasture. No excavation or addition of water control structures would be necessary to restore the wetland. The Pit Wetland would be expanded as described for the Proposed Action in section 2.1.1.4.

2.2.1.5 Riparian Restoration

Riparian restoration would be as described for the Proposed Action in section 2.1.1.5 with slight increases in treatment acres for the Flume site as listed in Table 2-1 in section 2.1.1.1.

2.2.1.6 Biological Features Common to All Sites

Biological features would be as described for the Proposed Action in section 2.1.1.6.

2.2.1.7 Management Changes

Management changes would be as described for the Proposed Action in section 2.1.1.7 with the changes in treatment acres for the Flume site listed in Table 2-1 in section 2.1.1.1.

2.2.1.8 Water Management

Water management for each site included in the Pahcease Alternative would be as described for the Proposed Action in section 2.1.1.8.

2.2.2 Construction Procedures

All construction procedures would be as described for the Proposed Action in section 2.1.2.

2.2.3 Land Ownership, Land Acquisition and Land Use

2.2.3.1 Land Ownership

Existing land ownership within the Pahcease Alternative is listed in Table 2-3 and depicted on Map 7. Land ownership types are described in section 2.1.3.1.

2.2.3.2 Land Acquisition

Land acquisition would proceed as described for the Proposed Action with differences only in the acreage of Tribal Trust land to be placed under easements or fee land to be acquired as listed in Table 2-3. Additionally, approximately 1,087 acres of land would need to be acquired to replace the Riverdell North property with other land suitable for the DRACR mitigation.

2.2.3.3 Land Use

Most of the land within the area is either used for grazing or is idle (97 percent of the project area). Fourteen acres of cropland would be converted to wet meadow through an increase in the adjacent water table to another land use type. Conservation easements would be placed on the remaining cropland so that a portion of the crop would be reserved for wildlife use. The management of the irrigation pasture and other lands would be changed as grazing would be restricted.

Table 2-6. Summary of Existing Land Use and Agricultural Production within the Pahcease Alternative Project Area.					
Land Use	**Acres by Land Ownership**			**Total Acres**	**Range of Production Per Acre**
	Tribal [1]	**Fee**	**Federal**		
Cropland	124	225	0	349	3.5 Tons/Acre
Irrigated Pasture	1,144	1,173	0	2,317	2-3 AUMs/Acre
Other	2,210	802	1,087	4,099	0-2 AUMs/acre

Source: Hansen 2001, BIA 2001

[1]Includes all Tribal Trust lands.

2.2.4 Operation and Maintenance

Operation and Maintenance would be as described for the Proposed Action in section 2.1.4.

2.2.5 Summary of Other Characteristics

2.2.5.1 Construction Schedule

The Pahcease Alternative would be constructed over an 8-year period with work progressing on a site-by-site basis. Construction would be implemented as described for the Proposed Action. Figure 2-9 depicts the construction schedule for the Pahcease Alternative.

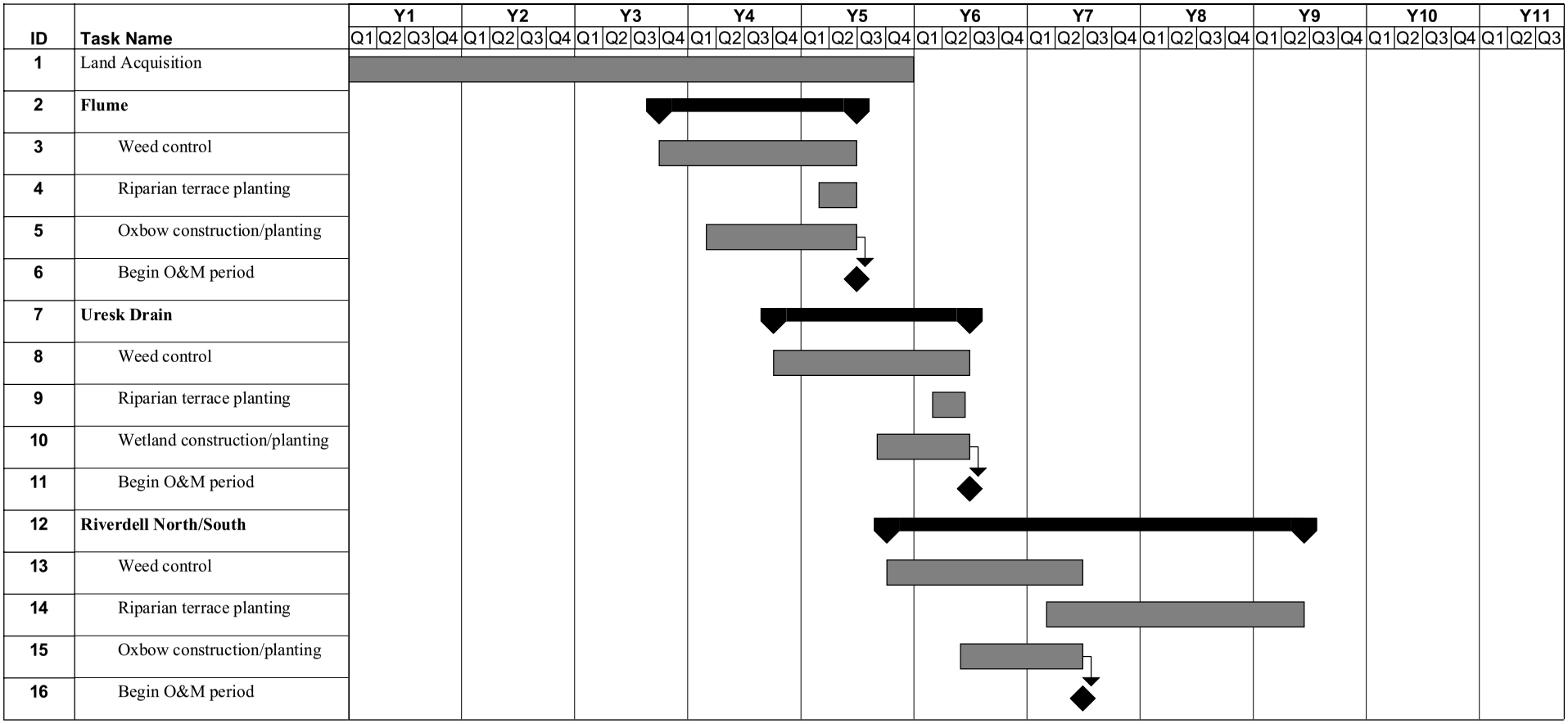
2.2.5.2 Number of Workers and Employment Opportunities

The Pahcease Alternative would use the same number of workers as described for the Proposed Action in section 2.1.5.2 but the length of the construction employment period would be reduced to six to eight years.

2.2.5.3 Material Used During Construction

Table 2-5 lists material requirements for the Pahcease Alternative. The Pahcease Alternative differs from the Proposed Action in that it uses less materials. This is primarily a function of the smaller size of the alternative and the reduced acres of riparian planting.

Figure 2-9. Pahcease Alternative Construction Schedule



2.3 TOPANOTES ALTERNATIVE

2.3.1 Physical and Biological Features

2.3.1.1 Overview

The Topanotes Alternative would use the same measures as the Proposed Action to rehabilitate 1,938 acres of wetland and 1,237 acres of woody riparian habitat in the Duchesne River corridor. Table 2-1 in section 2.1.1.1 lists the measures that would be made in each site under the Topanotes Alternative. Maps 2, 3 and 5 in the map pocket at the back of the DEIS show the location of the proposed measures. The project would be constructed over a six to eight-year period with construction on a site-by-site basis as described for the Proposed Action.

2.3.1.2 Oxbow Restoration

The sites included in the Topanotes Alternative contain three oxbow systems that historically formed annually flooded, continuous side channels of the Duchesne River. The Topanotes Alternative would connect the three oxbow systems into a continuous backwater channel and expand the oxbow width where ditched. Currently isolated oxbows would be connected in the Flume and Ted's Flat sites to form continuous oxbow systems. Connections between oxbows, expansion of oxbow width and river reconnection would be as described for the Proposed Action in section 2.1.1.2.

2.3.1.3 Large Marsh Complex Restoration

Large marsh complex restoration would proceed as described for the Proposed Action in section 2.1.1.3.

2.3.1.4 Isolated Marsh Complexes

Isolated wetlands to be created or enhanced as part of the Topanotes Alternative include the Full Connector and Pit Wetlands, which are located in the Flume site south of Highway 40, and the Swamp, which is located in the Ted's Flat site. These wetlands would be expanded, created or enhanced as described for the Proposed Action in section 2.1.1.4 and for the Pahcease Alternative in section 2.2.1.4.

2.3.1.5 Riparian Restoration

Riparian restoration would be as described for the Proposed Action in section 2.1.1.5 with slight increases in treatment acres for the Flume site as listed in Table 2-1.

2.3.1.6 Biological Features Common to All Sites

Biological features would be as described for the Proposed Action in section 2.1.1.6.

2.3.1.7 Management Changes

Management changes would be as described for the Proposed Action in section 2.1.1.7 with the changes in treatment acres for the Flume site listed in Table 2-1.

2.3.1.8 Water Management

Water management for each site included in the Topanotes Alternative would be as described for the Proposed Action in section 2.1.1.8.

2.3.2 Construction Procedures

All construction procedures would be as described for the Proposed Action in section 2.1.2.

2.3.3 Land Ownership, Land Acquisition and Land Use

2.3.3.1 Land Ownership

Existing land ownership within the Topanotes Alternative is listed on Table 2-3 and depicted on Map 8. Land ownership types are described in section 2.1.3.1.

2.3.3.2 Land Acquisition

Land acquisition would proceed as described for the Proposed Action with differences only in the acreage of Tribal Trust land to be placed under easements or Fee land to be acquired as listed in Table 2-3.

2.3.3.3 Land Use

Most of the land within the area is either used for grazing or is idle (94 percent of the project area). Fourteen acres of cropland would be converted to wet meadow through an increase in the adjacent water table. Conservation easements would be placed on the remaining cropland so that a portion of the crop would be reserved for wildlife use. The management of the irrigation pasture and other lands would be changed as grazing would be restricted.

Table 2-7. Summary of Existing Land Use and Agricultural Production within the Topanotes Alternative Project Area.

Land Use	Acres by Land Ownership			Total Acres	Average Production Per Acre
	Tribal [1]	Fee	Federal		
Cropland	160	381	0	541	3.5 Tons/Acre
Irrigated Pasture	1,127	954	0	2,081	2-3 AUMs/Acre
Other	2,810	1,216	0	4,026	0-2 AUMs/acre

Source: Hansen 2001, BIA 2001

[1]Includes all Tribal Trust lands.

2.3.4 Operation and Maintenance

Operation and Maintenance would be as described for the Proposed Action in section 2.1.4.

2.3.5 Summary of Other Characteristics

2.3.5.1 Construction Schedule

The Topanotes Alternative would be constructed over a six to eight-year period with work progressing on a site-by-site basis. Figure 2-10 depicts the construction schedule for the Topanotes Alternative.

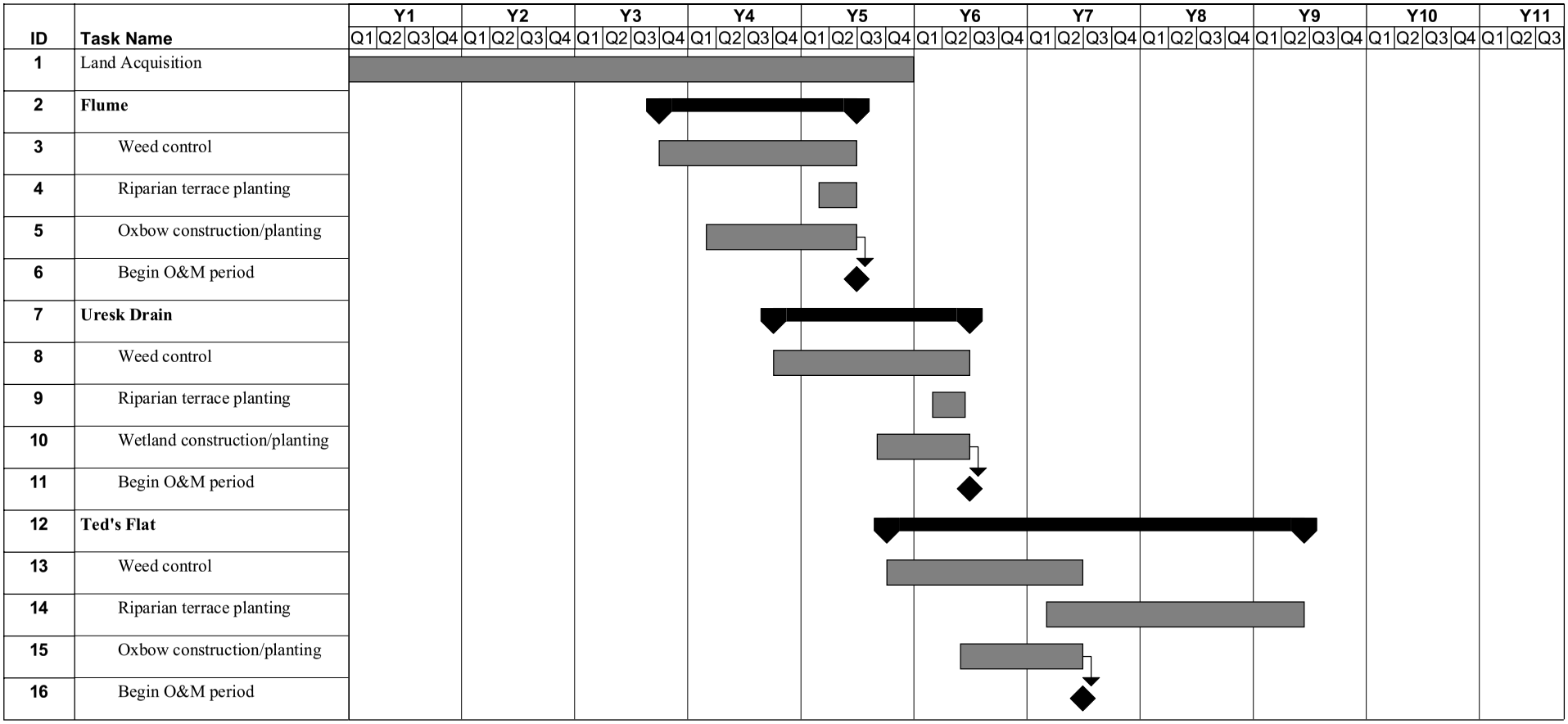
2.3.5.2 Number of Workers and Employment Opportunities

The Topanotes Alternative would use the same number of workers as described for the Proposed Action in section 2.1.5.2, but the length of the construction employment period would be reduced to six to eight years.

2.3.5.3 Material Used During Construction

Table 2-5 lists material requirements for the Topanotes Alternative. The Topanotes alternative differs from the Proposed Action in that it uses less materials. This is primarily a function of the smaller size of the alternative and the reduced acres of riparian planting.

Figure 2-10. Topanotes Alternative Construction Schedule



2.4 NO ACTION ALTERNATIVE

Under the No Action Alternative, no actions would be taken to fulfill the project purpose and need. No actions would be taken under this program to provide compensation to the Tribe for loss of wetlands on Tribal Trust land.

Implementation of the No Action Alternative would not provide mitigation for the loss of wetland and riparian habitat as a result of the SACS operation. Existing wetlands within the Duchesne River corridor would remain isolated and scattered in the former continuous river side channels. Wetland habitat diversity would remain low, consisting primarily of a single habitat type with no habitat interspersion. Upland habitats adjacent to wetlands would continue to be grazed providing low quality resting and nesting cover for wetland-dependent wildlife. Pepperweed would continue to expand along the edges of wetlands receiving return flows and Russian olive would continue to establish in abandoned pasture. TDS levels would remain high in the existing wetlands.

Under the No Action Alternative, cottonwoods and native shrubs would not be reestablished along the Duchesne River and the non-native tamarisk and Russian olive would continue to establish in the river floodplain and low terraces. The existing cottonwood forest would continue to be scattered and consist mostly of older trees with a grazed understory.

The Mitigation Commission would remain obligated to meet both project needs described in section 1.2 of this DEIS.

Lower Duchesne River Wetlands Mitigation Project

Draft Environmental Impact Statement

CHAPTER 3

COMPARATIVE ANALYSIS OF THE PROPOSED ACTION AND ALTERNATIVES

CHAPTER 3: COMPARATIVE ANALYSIS OF THE PROPOSED ACTION AND ALTERNATIVES

3.1 INTRODUCTION

This chapter presents a summary of the impacts of the Proposed Action, the Pahcease, Topanotes and No Action Alternatives. Detailed impact analysis is located in chapter 4. The impacts depicted in this chapter are the impacts that would occur to baseline conditions. Information on baseline conditions is presented in each resource section of chapter 4.

3.2 THE NO ACTION ALTERNATIVE

The No Action Alternative would result in a continuation of baseline conditions. The No Action Alternative would result in the following impacts.

- The following two project needs would not be met: (1) to acquire, develop and manage 6,640 acres of wildlife areas incorporating sufficient quality and quantity of wetlands to compensate for Tribal and non-Tribal wetland-wildlife losses resulting from construction and operation of SACS, and (2) to provide additional wetland-wildlife benefits to the Tribe through wetland restoration, creation and enhancement.
- The required environmental improvements, which are for partial mitigation of SACS would still have to be implemented by the Mitigation Commission.
- The beneficial and adverse impacts summarized in section 3.3 would not occur.

3.3 COMPARISON OF IMPACTS

Table 3-1 documents the impacts of the Proposed Action and each alternative (with the exception of the No Action Alternative). Impacts are listed in relation to the significance criteria described in chapter 4. Sections 3.3.1 through 3.3.14 discuss the impacts in Table 3-1.

Table 3-1. Summary of Impacts of the Proposed Action, Pahcease Alternative and Topanotes Alternative. Impacts in this table are defined by comparing each alternative to baseline conditions. Increases (+) and decreases (-) represent the change from baseline conditions.

Resource Topics	Proposed Action	Pahcease Alternative	Topanotes Alternative
Wetland and Riparian Habitats			
• Net change in acres	+2,073 created/restored +1,925 enhanced -668 noxious weeds	+2,125 created/restored + 930 enhanced -801 noxious weeds	+1,461 created/restored +1,714 enhanced -578 noxious weeds
• Habitats with greatest increase	Emergent marsh, cottonwood forest	Emergent marsh, wet meadow, cottonwood forest	Emergent marsh, wet meadow
• Change in wetland functions	Increase in all functions	Same as the Proposed Action	Same as the Proposed Action
Wildlife Resources			
• General	Habitat improvement for all nine major wildlife species groups evaluated.	Same as the Proposed Action	Same as the Proposed Action
• Upland wildlife	Temporary impacts to upland songbirds and upland-associated raptors through conversion of 281 acres of grassland, 356 acres of desert shrub and 205 acres of annual weed/fallow habitat to wetlands. The temporary loss would be offset by the enhancement of the remaining upland habitat for nesting and feeding.	Same as Proposed Action with the exception that 111 acres of grassland, 14 acres of cropland, 288 acres of desert shrub habitat, and 361 acres of annual weed/ fallow habitat would be converted to wetlands.	Same as Proposed Action with the exception that 136 acres of grassland, 14 acres of cropland, 347 acres of desert shrub habitat and 196 acres of annual weed/ fallow habitat would be converted to wetlands.
• Effects on important habitats	Increase in value of migratory waterfowl habitat, migratory songbird habitat, deer winter range and fawning habitat.	Same as the Proposed Action	Same as the Proposed Action

Resource Topics	Proposed Action	Pahcease Alternative	Topanotes Alternative
Threatened and Endangered Species			
• General	No permanent impacts to threatened, endangered or candidate species; potential temporary displacement of 1 year for bald eagle	Same as the Proposed Action	Same as the Proposed Action
Water Resources			
• Water requirements (acre-feet)	Total water budget of 12,258 - 14,653	Total water budget of 12,676 - 14,785	Total water budget of 11,325 - 13,514
• Water availability	Water rights available with land.	Same as the Proposed Action	Same as the Proposed Action
• Change in Duchesne River flows	Slight but unmeasurable increase in Duchesne River flows downstream of Ouray School Canal (0.02 cfs).	Slight but unmeasurable increase in Duchesne River flows between Myton Townsite Canal and Ouray School Canal (0.01 to 0.71 cfs).	Same as the Proposed Action
Water Quality			
• Exceedance of wildlife guidelines or federal water quality standards in project area	Operation as flow-through system will reduce boron and TDS concentrations and increase dissolved oxygen	Same as the Proposed Action	Same as the Proposed Action
• Exceedance of wildlife guidelines or federal water quality standards in Duchesne River	Increased flow through the project area will reduce concentrations of boron and TDS entering the Duchesne River	Same as the Proposed Action	Same as the Proposed Action
• Change in Duchesne River salinity load (tons)	+ 1,125 tons of salt annually	Same as the Proposed Action	Same as the Proposed Action
Soil Resources			
• Soil erosion and stability	No measurable change	Same as the Proposed Action	Same as the Proposed Action
• Soil productivity	No measurable change	Same as the Proposed Action	Same as the Proposed Action

Resource Topics	Proposed Action	Pahcease Alternative	Topanotes Alternative
Agriculture and Land Use Patterns			
• Annual production change			
• Potential AUM	-9,250 (-2.8% of county production)	-8,580 (-2.6% of county production)	-7,949 (-2.4% of county production)
• Marketable crop yield (tons)	-264 (-0.1% of county production)	-244 (-0.1% of county production)	-378 (-0.5% of county production)
• Changes in agricultural practices			
• Grazing	Grazing eliminated in project area.	Same as the Proposed Action	Same as the Proposed Action
• Conservation easement	491 acres of cropland under a conservation easement	349 acres of cropland under a conservation easement	541 acres of cropland under a conservation easement
• Agricultural practices	No change in agricultural practices outside of project area	Same as the Proposed Action	Same as the Proposed Action
• Changes in land ownership	2,154 acres of fee land converted to federal government or Tribal Trust ownership; 4,549 acres of Tribal Trust land placed under negotiated easements	1,787 acres of fee land converted to federal government or Tribal Trust ownership; 3,891 acres of Tribal Trust land placed under negotiated easements	2,171 acres of fee land converted to federal government or Tribal Trust ownership; 4,471 acres of Tribal Trust land placed under negotiated easements
• Consistency with land use plans	Inconsistent with Duchesne and Uintah counties "no net loss" of private land policies, but consistent with county policies on rural character, open space, recreation and water quality. Consistent with federal mitigation mandates.	Same as the Proposed Action	Same as the Proposed Action

Resource Topics	Proposed Action	Pahcease Alternative	Topanotes Alternative
Socioeconomics			
• Change in maximum potential gross agricultural revenue			
• Grazing	-$140,640	-$129,990	-$121,290
• Crops	- $23,650	- $13,650	- $26,100
• Change in Uinta Basin economy during construction			
• Peak annual output	+ $890,701 (+0.1%)	+ $915,320 (+0.1%)	+ $683,513 (+0.1%)
• Peak annual personal earnings	+ $436,339 (+0.1%)	+ $441,636 (+0.1%)	+ $322,346 (+0.1%)
• Number of jobs	+ 23 (+0.2%)	Same as the Proposed Action	+ 16 (+0.1%)
• Change in Uinta Basin economy after construction			
• Peak annual output	+ $112,883 (<0.1%)	Same as the Proposed Action	+ $76,888 (<0.1%)
• Peak annual personal earnings	+ $100,434 (<0.1%)	Same as the Proposed Action	+ $87,986 (<0.1%)
• Number of jobs	+ 2.3 (<0.1%)	Same as the Proposed Action	+ 1.4 (<0.1%)
• Change in Tribal employment			
• Number of construction jobs	up to 30 temporary jobs	Same as the Proposed Action	Same as the Proposed Action
• Number of O&M jobs	+3	Same as the Proposed Action	Same as the Proposed Action

Resource Topics	Proposed Action	Pahcease Alternative	Topanotes Alternative
• Change in infrastructure	No change	No change	No change
• Change in annual county tax revenue	-$699 Duchesne County -$909 Uintah County	-$823 Duchesne County -$179 Uintah County	-$641 Duchesne County -$730 Uintah County
Public Health and Safety			
• Net change in potential mosquito-producing habitats (acres)	+ 746 (+ 1 percent of the acres currently treated in two-county area)	+ 912 (+ 1 percent of the acres currently treated in two-county area)	+855 (+ 1 percent of the acres currently treated in two-county area)
• Change in mosquito control practices	Mosquito control under a special operating agreement with anticipated use of same procedures as currently used.	Same as the Proposed Action	Same as the Proposed Action
Recreation			
• Access	No change in current public access to federal or Tribal Trust lands.	Same as the Proposed Action	Same as the Proposed Action
• Recreation use	Small increase in wildlife-related recreational use of the area with use limited by the number of suitable parking spots (estimated at 35 spots for the entire project area).	Same as the Proposed Action	Same as the Proposed Action
Transportation			
• Peak increase in traffic during construction (daily vehicle trips)	+50	Same as the Proposed Action	Same as the Proposed Action
• Change in road levels of service (LOS)	No change	Same as the Proposed Action	Same as the Proposed Action
Air Quality			
• Maximum vehicle emissions during any 12-month construction period (tons)			

Resource Topics	Proposed Action	Pahcease Alternative	Topanotes Alternative
• Nitrogen oxides • Sulfur oxides • Particulates	+50 +4.2 +3.3	+20 +1.7 +1.3	+20 +1.7 +1.3
• Exceedance of air quality standards	None	None	None
Noise			
• Exceedance of "normally unacceptable" noise levels (74-88 decibels) near sensitive receptors	None	None	None
Cultural Resources			
• General	No known cultural resources present in project area that are eligible for the National Register of Historic Places would be impacted. The Uresk Drain is a historic feature that would be impacted by filling, but its eligibility status is unknown. No known sites of cultural or religious significance to the Ute Tribe in project area.	Same as the Proposed Action	Same as the Proposed Action

3.3.1 Wetland and Riparian Habitats

The Proposed Action would temporarily, adversely impact 15.2 acres of non-riparian wetlands and permanently, adversely impact 9.5 acres of wetlands through construction of project features. There would be some conversion of existing wet meadow and emergent marsh habitats to other habitat types, but these losses would be compensated by lateral expansion of wetlands and development of the same habitats elsewhere on individual sites. There would be 3.8 acres of temporary adverse impacts to the cottonwood forest, but there would be no permanent adverse impacts to this habitat type. The Proposed Action would restore or create 2,073 acres and enhance the value of 1,925 acres of wetland and riparian habitats. Wetland and riparian weeds would be removed on 668 acres.

The Pahcease Alternative would temporarily, adversely impact 11 acres of non-riparian wetlands and permanently, adversely impact 8.1 acres of wetland through construction of project features. Impacts would be similar to those described for the Proposed Action except no changes would be made in the Ted's Flat site and there would be no adverse riparian impacts. The Pahcease Alternative would restore or create 2,125 acres and enhance the value of 930 acres of wetland and riparian habitats. Wetland and riparian weeds would be removed on 801 acres.

The Topanotes Alternative would temporarily, adversely impact 13.8 acres of non-riparian wetlands and permanently, adversely impact 8.7 acres of wetlands through construction of project features. There would be 3.8 acres of temporary adverse impacts to cottonwood forest but there would be no permanent adverse impacts to this habitat type. The Topanotes Alternative would restore or create 1,461 acres and enhance the value of 1,714 acres of wetland and riparian habitats. Wetland and riparian weeds would be removed on 578 acres.

Under all alternatives there would be a net increase in wetland functions, particularly hydrologic support, water quality maintenance, sediment stabilization, ground water recharge, wildlife habitat and uniqueness/heritage value.

3.3.2 Wildlife Resources

The Proposed Action would improve habitat for all nine major wildlife species groups evaluated, with the amount of wetland and riparian habitat gained described above in section 3.3.1. There would be some loss of upland habitat (281 acres of grassland, 356 acres of desert shrub and 205 acres of annual weed/fallow habitat), which would represent a temporary impact to some upland songbirds and upland-associated raptors. This temporary loss would be offset by the enhancement of the remaining upland habitat for nesting and feeding. The temporary loss would be experienced for approximately three to five years as the upland habitat is restored.

The Pahcease Alternative would also improve habitat for all nine major wildlife species groups evaluated, with the amount of wetland and riparian habitat gained described above in section 3.3.1.

Upland habitat lost through conversion to wetlands would include 111 acres of grassland, 14 acres of cropland, 288 acres of desert shrub habitat, and 361 acres of annual weed/fallow habitat, which would represent a

temporary impact to some upland songbirds and upland-associated raptors as described for the Proposed Action.

The Topanotes Alternative would also improve habitat for all nine major wildlife species groups evaluated, with the amount of wetland and riparian habitat gained described above in section 3.3.1. Upland habitat lost through conversion to wetlands would include 136 acres of grassland, 14 acres of cropland, 347 acres of desert shrub habitat and 196 acres of annual weed/fallow habitat, which would represent a temporary impact to some upland songbirds and upland-associated raptors as described for the Proposed Action.

All alternatives would improve the value of the following important habitats, both in terms of size and habitat quality: migratory waterfowl habitat, migratory songbird habitat, deer winter range and fawning habitat.

3.3.3 Threatened, Endangered and Candidate Species

Of the nine listed species potentially occurring within the LDWP project vicinity, only seven are known to occur or have potential habitat within the project area of influence. These species include two plants (Uinta Basin hookless cactus and Ute ladies'-tresses), two fish (Colorado pikeminnow and razorback sucker) and three wildlife species (bald eagle, mountain plover and western yellow-billed cuckoo). Impacts to these species are similar for all alternatives. Uinta Basin hookless cactus would benefit from restrictions on vehicle use and grazing in occupied habitat, Ute ladies'-tresses through noxious weed removal on potential habitat, bald eagle through increases in winter roosting and feeding habitat and western yellow-billed cuckoo through increases in riparian habitats. There would be neither adverse nor beneficial impacts to the remainder of the species. There is the potential for temporary impacts to the bald eagle during construction but effects will be limited to a one-year period.

3.3.4 Water Resources

The estimated total annual water requirement for the Proposed Action is 12,258 to 14,653 acre-feet, which includes hydrological support of created and restored wetlands, maintenance of hydrologic support for existing irrigation-induced wetlands, maintenance of irrigated grasslands, supplemental water for water quality control and temporary irrigation of planted cottonwoods. The estimated total annual water requirement for the Pahcease Alternative is 12,676 to 14,785 acre-feet. The estimated total annual water requirement for the Topanotes Alternative is 11,325 to 13,514 acre-feet. For all alternatives, there is sufficient water associated with land in the project area to supply project water requirements.

Under all alternatives there may be less natural flow water delivered to junior water rights holders in the Duchesne River system in dry years than there is under baseline conditions. This situation may require additional calls on CUP water by junior water rights holders.

Project water applied for water quality control will return directly to the Duchesne River as streamflow. Seepage losses from wetlands within the project area will locally recharge the alluvial aquifer of the Duchesne River. Under the Proposed Action and the Topanotes Alternative, this recharge will result in an unmeasurable increases of 0.02 cfs

downstream of the Ouray School Canal. Under the Pahcease Alternative, this will result in an unmeasurable increase of from 0.01 to 0.7 cfs between the Myton Townsite and Ouray School Canals.

3.3.5 Water Quality

The Proposed Action, Pahcease Alternative and Topanotes Alternative would be operated as flow-through systems with a water quality control factor added to each site's water budget to reduce existing concentrations of salts. Under all alternatives, concentrations of boron (an environmental contaminant) and TDS would be reduced, and dissolved oxygen concentrations increased. By increasing the flow through the project area, concentrations of boron and TDS in return flows entering the Duchesne River would be reduced under all alternatives.

Under both the Proposed Action and alternatives, total annual salt loading from wetlands and irrigated pastures in the project area will increase by an estimated 1,125 tons. This equates to an increase of 0.3 percent of the salt load of the Duchesne River. While representing an impact, it is not a significant impact as it represents an amount too small to be measured at Imperial Dam.

3.3.6 Soil Resources

Construction activities may cause a slight temporary increase in soil erosion during and immediately after construction, but all alternatives would result in a long-term reduction in soil erosion. Soils would either retain the same productivity or have a slight gain in productivity where water would be more available. Overall, there would be no measurable change in soil resources under any of the alternatives.

3.3.7 Agriculture and Land Use

Under the Proposed Action, grazing will be eliminated in 6,212 acres which are currently being grazed or open for grazing, with a potential maximum yield of 9,250 AUMs per year. Conservation easements will be placed on 491 acres of active cropland reducing marketable yield by 264 tons per year. These reductions will result in only a slight change in total county wide production. Changes in agricultural production under the Pahcease and Topanotes Alternatives are similar to that of the Proposed Action. Under all alternatives, from 1,787 to 2,171 acres of fee land would be acquired by the federal government, and from 3,891 to 4,549 acres of Tribal Trust land would be placed under a negotiated easement.

3.3.8 Socioeconomics

Construction of the Proposed Action, Pahcease Alternative and Topanotes Alternative would increase the economic output, personal earnings and employment in the local economy. The total increase in revenue would be considerably larger than the decrease in agricultural revenue. Operation of the project would continue to contribute to increased revenue in the local economy. There would be minor decreases in annual tax revenues to Duchesne ($641 to $823) and Uintah Counties ($179 to $909).

3.3.9 Public Health and Safety

Under the Proposed Action, there will be a total increase of 1,027 acres of wet meadow and emergent marsh wetlands. Concurrent with the increase in wetlands, is a decrease in irregularly flooded pastures, which provide the greatest extent of mosquito-producing habitat in the project area. Considering both the increase in wetlands and the decrease in irrigated pasture, there would be a net increase in potential mosquito-producing habitats of 746 acres, or approximately 1 percent of the area currently being treated by the Mosquito Abatement Districts (MADs) in Duchesne and Uintah Counties. Under the Pahcease Alternative, there would be a net increase in potential mosquito-producing habitats of 912 acres, or 1 percent of the area currently being treated by the MADs in Duchesne and Uintah counties. Under the Topanotes Alternative, there would be a net increase in potential mosquito-producing habitats of 855 acres, or 1 percent of the area currently being treated by the MADs in Duchesne and Uintah counties. Under all alternatives, a special use permit would be negotiated with the MADs in Uintah and Duchesne counties to provide mosquito control. Mosquito control is anticipated to be similar to that currently used with the exception that higher impact chemicals, such as Malathion would be used only when disease vectors are present.

3.3.10 Recreation

Recreation impacts would be similar among all alternatives, as the improved wetland, riparian, aquatic and upland habitats will attract and support additional wildlife species, which traditionally attracts recreationists, wildlife watchers, hunters and fishers. The increase in use will be limited, however, by the general lack of parking. The few parking areas within the project area to be improved will be minimally improved and will generally provide parking for one to five vehicles. A larger area may be created overlooking the Goose Ponds area of the Uresk Drain, that could provide parking for up to 20 vehicles or bus. Improvement of this area, would allow the Uresk Drain site to become available to school groups for nature education.

The ability of the general public to enter the area will increase as restricted fee land will become part of a larger wildlife management area administered by the Tribe. Use of the area would require a Tribal permit for access, except on the Riverdell North property where no permit would be required for general access, and either a State or Tribal permit would suffice for fishing or hunting.

3.3.11 Transportation

During the maximum period of construction for the Proposed Action, Pahcease Alternative and Topanotes Alternative, up to 50 daily vehicle trips would occur. This number of vehicle trips would not change the road Level of Service (LOS) under any alternative.

3.3.12 Air Quality

The maximum amounts of pollutants generated during any 12-month period of construction under the Proposed Action would be 57.5 tons per year, of which 50 tons represent nitrogen oxides, 4.2 tons represent sulfur oxides and 3.3 tons represent particulate matter. The maximum amounts of pollutants generated during any 12-month period under the Pahcease Alternative and Topanotes Alternative would be 23 tons per

year, of which 20 tons represent nitrogen oxides, 1.7 tons represent sulfur oxides and 1.3 tons represent particulate matter. None of the emissions would be sufficient to cause a violation of National Ambient Air Quality Standards (NAAQS).

3.3.13 Noise

Noise would be generated by vehicles and heavy equipment during construction of the features of the Proposed Action, Pahcease Alternative and Topanotes Alternative. A few private residences (sensitive receptors) are located within the construction area, but are located at a distance much greater than 50 feet from construction activities (ranging from 300-1000 feet). It is unlikely that noise levels would exceed "normally unacceptable" (above 74 decibels) for residences given the noise attenuation with increased distance from the source of the sound for any of the alternatives.

3.3.14 Cultural Resources

The Proposed Action, Pahcease Alternative and Topanotes Alternative would not impact any known cultural resource sites that are eligible for the National Register of Historic Places. The Uresk Drain is a historic feature that would be impacted by filling, but its eligibility status is unknown. The extent and location of any potential impacts would not be known until complete inventories are conducted before construction. There are no known sites of cultural or religious significance to the Ute Tribe in the project area under any alternative.

Lower Duchesne River Wetlands Mitigation Project

Draft Environmental Impact Statement

CHAPTER 4

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

CHAPTER 4: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter describes the environment affected by the Proposed Action and alternatives and the predicted impacts of the Proposed Action and alternatives. The discussion is organized by resource topic. Issues addressed in the impact analysis are discussed first, followed by a description of the present or baseline condition of each resource and a description of the predicted impacts of the Proposed Action, Pahcease, Topanotes and No Action Alternatives. The assumptions and impact analysis methods for each resource are summarized in Appendix D. The last four sections of this chapter describe measures that would be used to mitigate significant impacts, unavoidable adverse impacts, net cumulative impacts and irreversible and irretrievable commitment of resources.

The impact analysis focuses on issues raised in the public scoping process and during agency consultation, and on documenting environmental impacts at a level of detail matching the intensity, duration and magnitude of impact. Significant impacts on resources are discussed in detail and resource impacts that are not significant are summarized. The impact analysis incorporates the SOPs described in Appendix A, which would be implemented during construction and operation to protect environmental resources.

4.1.1 Common Assumptions and Assessment Guidelines

The following common assumptions and assessment guidelines were followed during the preparation of the DEIS:

- The DEIS is intended to satisfy the requirements of NEPA,
- Project features and operational details were designed only to a conceptual or feasibility level that represents reasonable approximations for assessing potential project impacts,
- Additional analyses will be conducted as a part of the final design process, and
- The data sources and analysis methods used to summarize current conditions in the project area are described in the project feasibility reports (WWS 1998a, WWS 2000).

In addition, the analysis of the Proposed Action represents the impacts, both beneficial and adverse, of an alternative that combines both the DRACR and SACS mitigation obligations into a single mitigation project with a planning goal of 7,727 total acres and 3,450 acres of wetland and riparian habitat. Alternatives to the Proposed Action have a different planning goal that includes only the SACS mitigation obligations. This goal is for a total planning area of 6,640 acres and 3,000 acres of wetland and riparian habitat, but does not include the DRACR obligation. Under these alternatives, the DRACR mitigation

obligation would still be met under different schedules and options to be determined by the Mitigation Commission.

As a result, the analysis presented in sections 4.2 through 4.20 compare alternatives with different planning goals. Section 3.0, Comparative Analysis of Alternatives, summarizes the differences among the alternatives. Section 4.21, Cumulative Impact Analysis, summarizes the differences among alternatives with other related projects including the DRACR mitigation.

There are no current plans for the DRACR mitigation under the Pahcease and Topanotes Alternatives, therefore the following assumptions were made regarding the DRACR mitigation for the cumulative impact analysis:

- The DRACR mitigation would occur either on land currently owned by the federal government or land that would be acquired by the federal government as additional fee land. Acquisition of land to meet the DRACR requirement might require more or less acreage than the 1,087 acre Riverdell North property. Since the amount of the land that would need to be acquired under the alternatives to the Proposed Action is currently unknown, the cumulative impact analysis assumes that the requirement would be equivalent to the size of the Riverdell North property (1,087 acres).
- The DRACR mitigation would provide a minimum of 450 acres of wetlands in addition to the LDWP wetland mitigation.

4.1.2 Project Area of Influence

The direct project area of influence is depicted in Figure 1-2. For some resources, the area of influence extends outside of the project area boundaries. Specific areas of influence, including the areas evaluated for both direct and indirect effects, are discussed separately for each resource.

4.1.3 Environmental Impact Issues Eliminated

The impact analysis focuses on issues raised in the public scoping process and on documenting environmental impacts at a level of detail matching the intensity, duration and magnitude of impacts. Issues to be analyzed in detail in this DEIS were identified by the joint lead and cooperating agencies, public scoping meetings and questionnaires submitted to members of the Ute Tribe and local community residents.

The impact analysis conducted for the DEIS also considered all resources subject to requirements specified in statutes, regulations and executive orders. Resources not present or not affected by the Proposed Action or alternatives may be eliminated from detailed documentation of impacts. The following environmental impact topics have been determined to be not present or not affected by the Proposed Action or alternatives:

- **Prime and Unique Farmland**. The LDWP project area contains land used for livestock grazing, hay production and small grain production. However, based on an analysis of NRCS data, there are no prime or unique farmlands in the project area. Prime farmlands are

those with soils that have the quality, length of growing season and moisture supply needed to economically produce sustainable high crop yields (SCS 1984). Lands within the LDWP project area do not qualify because of a combination of factors, including short length of growing season, high depth to shallow groundwater and soil profile characteristics.

- **Wild and Scenic Rivers.** The Duchesne River is not protected under the Wild and Scenic Rivers Act of 1968, as amended, nor is there any known proposal to protect the Duchesne River under the act.
- **Wilderness Areas.** The nearest wilderness area, the High Uintas Wilderness, is 30 miles northwest of the project area and is outside of the area of influence for all resources except air quality. Potential wilderness impacts are restricted to a discussion of potential air quality impacts on the High Uintas Wilderness Area.
- **Visual Resources**. Neither the Uintah and Ouray Indian Reservation nor the adjacent counties maintain visual quality objectives with which the project needs to comply. The project would not change the overall character of the landscape or produce an obstruction to a vista as the project area would be maintained in open space and the tallest structures would consist of 5-foot berms scattered throughout a 6,640- to 7,727-acre area. Such berms would not detract from the overall landscape view once the sites have been revegetated.
- **Mineral and Energy Resources**. All current oil and gas development and exploration on the Uintah and Ouray Indian Reservation is located outside the boundaries of the Proposed Action and alternatives. There are no plans to develop oil and gas in the LDWP project area in the foreseeable future, therefore the project would not impact known oil and gas resources.

4.2 WETLAND AND RIPARIAN HABITATS

4.2.1 Introduction

The wetland and riparian habitat analysis addresses potential impacts from the construction and operation of the project. The information presented in this section is summarized from technical reports prepared for the Tribe (WWS 1998a and 2000), functional assessment results presented in Appendix C and digitized habitat maps on file at the Tribe office. The analysis addresses both temporary construction impacts and permanent habitat changes resulting from excavation, fill and changes in hydrology. Both beneficial impacts (increases in habitat types) and adverse impacts (loss of habitats) are addressed.

4.2.2 Issues Eliminated from Further Analysis

No issues were eliminated from analysis; all wetland and riparian resource issues raised during public scoping and agency consultation were analyzed.

4.2.3 Issues Addressed in the Impact Analysis

The following wetland and riparian impact topics are addressed in the impact analysis:

- Will there be a change in acres of wetland and riparian habitat types, or a net loss (acres) of any wetland or riparian habitat type in the project area?
- Will the project increase weeds?
- How will the project change wetland and riparian functions?

4.2.4 Area of Influence

The project area of influence for wetland and riparian habitats includes the areas depicted on Figure 1-2 in portions of Duchesne and Uintah Counties in northeast Utah.

4.2.5 Affected Environment

4.2.5.1 Habitat Type Description

4.2.5.1.1 Introduction

The 1965 FWS Coordination Act report and subsequent documents did not provide quantitative assessments of the pre-SACS wetland and riparian habitat types along the Duchesne River or in the area inundated by the enlarged Strawberry Reservoir. However, the following historical information can be summarized from pre-CUP aerial photograph analysis, historical geomorphic analysis and descriptive accounts (WWS 1998a, Brink and Schmidt 1995, FWS 1965, SCS 1955 and anecdotal accounts from Tribal members).

- The Duchesne River consisted of multiple river channels with a series of river-connected oxbows.
- Habitats along the oxbows were flooded annually and consisted of a mix of willow thickets, open water and marshes bordered by cottonwoods. Wetlands were primarily supported by the river in contrast to current conditions in which up to 60 percent of wetlands in the corridor are supported by irrigation return flows with high TDS and boron levels.
- Native shrubs and young cottonwoods dominated point bars.
- Riparian forest extended up to 3,300 feet from the Duchesne River and contained multiple age classes of several tree and shrub species.
- The riparian forest understory on higher terraces was more open and less brushy than current conditions.
- The Uresk Drain was a large marsh bordered by native shrubs and young cottonwoods.
- Wetland functions included high wildlife use, surface water storage and base flow moderation. Other functions likely performed by the wetlands (based on aerial photograph review) include interspersion and connectivity of habitat, high spatial structure of habitat, energy dissipation and water quality improvement.

4.2.5.1.2 Baseline Conditions

Current wetland and riparian habitat types were identified based on 1997 aerial photographic interpretation, 1997-98 field verification and selected additional field

verification during 2002 digitization of habitat maps. The 1997-98 conditions are used in this document to represent baseline conditions.

Under baseline conditions, there are three general categories of wetland and riparian habitats, each containing one or more habitat types: non-riparian wetlands, riparian habitats and wetland and riparian weeds. Wetland and riparian habitat types are described below by general habitat category. Table 4-1 provides a summary of the acres of wetland and riparian habitats both overall and for each site included within the Proposed Action.

- **Non-riparian wetlands**. Non-riparian wetlands are defined as areas containing a water table within 18 inches of the soil surface for a portion of the growing season. These wetlands also contain hydric soils and a dominance of hydrophytic plant species. Hydrologic support, however, is not provided by the Duchesne River or its tributaries. Non-riparian wetlands include:
  - Emergent marsh,
  - Wet meadow, and
  - Mesic shrub.
- **Riparian habitats**. Riparian habitats are defined as habitats occurring within the Duchesne River floodplain that derive their hydrologic support from the river. Portions of riparian habitats often do not meet technical or legal criteria for wetlands. Riparian habitats that flood on a regular basis are considered wetland habitats. Other riparian habitats, such as cottonwood forest, require a high water table for initial establishment of young cottonwoods. Once young cottonwoods have established, they may not require a water table within 18 inches of the soil surface to persist. These habitats would be considered riparian but not wetland habitats. Riparian habitats include:
  - Riparian shrub,
  - Degraded cottonwood forest, and
  - Mature cottonwood forest.
- **Wetland and riparian weeds**. Wetland and riparian weeds include those species listed by the State of Utah and/or Duchesne or Uintah Counties as noxious under Section 4-17-3 of the Utah Noxious Weed Act and other species that are both non-native and invasive. The primary wetland and riparian weed species in the LDWP project area are Russian olive (*Eleagnus angustifolia,* noxious), tamarisk (*Tamarix ramosissima*, non-native invasive) and perennial pepperweed (*Lepidium latifolium*, noxious). All habitats dominated by more than 30 percent cover of weed species are grouped together under the wetland and riparian weeds habitat category.

The project area also includes a number of upland habitats, some of which would be converted to wetland under the project and some of which would be managed to provide adjacent upland habitat (providing important wildlife needs such as nesting habitat, wildlife feeding areas and buffers) for wetland-dependent species. Upland habitat types include grassland, cropland, annual weed/fallow and desert shrub.

4.2.5.1.3 Non-Riparian Wetlands

Emergent Marsh. A mixture of open water and emergent marsh. Open water is defined as areas with permanent standing water deeper than 3.3 feet. Emergent marsh consists of areas where herbaceous vegetation occurs in, and emerges from, standing water. Water depths in emergent marshes can vary, but the soil is generally shallowly flooded throughout the entire growing season. The emergent marsh represents the remnant of the backwater sloughs referred to in historical accounts of the Duchesne River corridor but differs in structural aspects, such as a lack of river connection, lack of open water and lack of species diversity.

Within the project area the emergent marshes consist primarily of a monospecific stand of hardstem bulrush (*Scirpus acutus*) without open water or shallow marsh areas. Emergent marsh occupies the lowest portions of old oxbows and meander scars, which currently receive irrigation return flows. Emergent marsh also occurs in the portion of the Uresk Drain with year round groundwater support.

Wet Meadow. A community dominated by grasses, sedges and rushes that occurs where soils are saturated for a portion of the growing season. In the project area, wet meadows are species-poor and dominated by only one or two species. Characteristic species include saltgrass (*Distichlis spicata*), wiregrass (*Juncus arcticus*) and foxtail barley (*Hordeum jubatum*). Wet meadow occurs along the edges of oxbows receiving irrigation return flows and in irrigated pastures. Most of the wet meadows are grazed.

Mesic Shrub. Native wetland shrubs occur in two topographic positions in the project area: mesic shrubs occur outside of the direct influence of the Duchesne River, whereas the native riparian shrub community, described below, occurs within the area directly influenced by the Duchesne River.

The mesic shrub habitat is not common in the project area. It is typically restricted to ditch edges, fence rows and scattered locations along oxbows that are protected from grazing. The cover type consists of dense clumps of shrubs 6-12 feet in height. Soils are moist to seasonally saturated. This community is best characterized as a wetland edge habitat. The most common native shrub species are silver buffaloberry (*Shepherdia argentea*), oak-leaved sumac (*Rhus aromatica*), red-osier dogwood (*Cornus sericea*), golden currant (*Ribes aureum*), Wood's rose (*Rosa woodsii*) and snowberry (*Symphoricarpos albus*).

4.2.5.1.4 Riparian Habitats

Riparian Shrub. The riparian shrub community occurs in the current 2- to 5-year floodplain of the Duchesne River (WWS 1998a) and along the Flume secondary channel. The native riparian shrub community is not common in the project area as much of the floodplain and secondary channel banks are dominated by non-native species (Russian olive and tamarisk).

Native riparian shrubs within the active floodplain include coyote willow (*Salix exigua*) and young Fremont cottonwoods (*Populus fremontii)*. Cottonwoods and willows establish periodically in relation to flood events, requiring a high spring flow, a gradual water level decline and maintenance of a suitable summer baseflow (Scott et al. 1996, Auble et al. 1997). Scouring and sediment deposition during the high spring flow provide the exposed moist surfaces on which seeds can germinate. A gradual water

level decline promotes root growth, allowing young seedlings to maintain contact with the water table as it recedes. As a result, cottonwood and willow seedlings do not establish above levels at which they can maintain adequate root growth rates, which require contact with the declining water table. Seedlings establish but do not often survive below a certain elevation as they are covered by sediment or scoured by floods during subsequent years. Since the 1930s, the timing, duration and magnitude of spring flood flows have decreased (see section 4.5.5.1). The water table decline following the spring floods has also been more rapid. Prior to 1930, spring flood flows of sufficient magnitude for cottonwood or willow establishment occurred in 40 percent of the years. Since 1965, there have been only 4 out of 33 years in which spring flood flows have been suitable for cottonwood or willow seedling establishment (WWS 1998a). As a result, few native riparian species have established along the Duchesne River since the CUP became operational.

Riparian Forest. Riparian forest habitat is characterized by a native tree canopy layer that provides more than 25 percent cover. In the project area, the dominant native riparian tree is Fremont cottonwood (*Populus fremontii).* The riparian forest habitat type contains two subtypes:

- Mature cottonwood forest characterized by a dominance of vigorous cottonwood in the canopy with either a native shrub or grass understory, and
- Degraded cottonwood forest. Degraded cottonwood forest is identified by the occurrence of any one of the following three conditions: (1) the canopy is dominated by cottonwood but the understory is dominated by upland species such as sagebrush or non-native species such as tamarisk or Russian olive; (2) cottonwoods previously occurred in the community but mature cottonwoods were killed by recent fires; or (3) cottonwoods on higher terraces or along ditch banks appear to be suffering from drought stress. Areas formerly dominated by cottonwoods but now dominated by Russian olive and tamarisk are characterized as "wetland and riparian weed" habitat. Areas formerly dominated by cottonwoods that were cleared for agriculture are characterized according to their habitat condition in 1997 (i.e., annual weed, fallow, grassland or cropland).

4.2.5.1.5 Wetland and Riparian Weeds

The State of Utah lists 18 noxious weed species in the Uinta Basin. Two of the listed noxious weeds, peppergrass (*Lepidium latifolium*) and Russian olive (*Elaeagnus angustifolia*), are wetland/riparian weeds prevalent in the project area. Tamarisk (*Tamarisk ramosissima*) is not listed as a noxious weed but is a non-native invasive species abundant in the project area. Russian olive and tamarisk dominate the active floodplain of the Duchesne River, often providing more cover than the native riparian shrubs. These two species have also established as understory species in portions of the mature cottonwood forest on higher terraces.

Tamarisk is less abundant than Russian olive outside of the riparian zone but has established along portions of the oxbows that receive irrigation return flows. In contrast to native riparian species, tamarisk has less exacting germination requirements and can germinate any time in the growing season

when soils are saturated at or near the surface for a period of several weeks. Russian olive is quite abundant outside of the riparian zone where it dominates abandoned pastures.

Pepperweed is an herbaceous wetland weed that did not provide enough cover in 1997 to be mapped as a separate habitat type (WWS 1998a). It currently occurs along the edges of all the oxbow systems (Gecy 1997).

4.2.5.1.6 Upland Habitat Type Description

Annual Weed/Fallow. The annual weed/fallow community type was identified wherever one of the following two conditions existed in 1997: (1) cropland that did not appear to have been tilled for more than five years that was dominated by annual weeds such as halogeton (*Halogeton glomeratus*), poverty weed (*Iva axillaris*) and annual sunflower (*Helianthus annuus*); or (2) grass fields that did not appear to have been actively managed for production in 1997, but were still dominated by grasses, not annual weeds. The annual weed community type occurs primarily on the Riverdell North property, whereas fallow land is scattered throughout the project area.

Upland Grassland. The upland grassland habitat consists primarily of irrigated and grazed pasture. The dominant species are saltgrass, foxtail barley, smooth brome (*Bromus inermis*), Kentucky bluegrass (*Poa pratensis*) and wheatgrasses (*Elymus* spp.). Most of the grasslands are dominated by saltgrass and foxtail barley, with the other species becoming dominant on the less saline soils of the Uresk Drain West Fields area and at the eastern end of the Flume oxbow system.

Cropland. The cropland community type consists of land that was in production of alfalfa, small grains or corn in 1997. Cropland is not common in the project area, as the project was designed to avoid land in active crop production unless adjacent to a wetland oxbow system.

Desert Shrub. The desert shrub community consists of a mix of greasewood (*Sarcobatus vermiculatus*), sagebrush (*Artemisia tridentata*) and rabbitbrush (*Chrysothamnus nauseosus*). Greasewood occurs more frequently than these other two species and tends to occur on clay and silty loam soils and on areas farmed in the 1940s but since abandoned. The greasewood understory is sparse, consisting mostly of saltgrass and scratchgrass (*Muhlenbergia asperifolia*). Sagebrush and rabbitbrush occur on fairly coarse-textured soils and contain a more diverse, but still relatively sparse, understory.

4.2.5.2 Individual Site Descriptions

4.2.5.2.1 The Flume

Non-Riparian Wetlands. There are 137 acres of wet meadow and emergent marsh wetlands along the Flume oxbow system. The wetlands are dominated primarily by monocultures of either saltgrass or hardstem bulrush. Wetlands occur where irrigation return flows enter the oxbow system; an estimated 60 percent of the existing wetlands are supported primarily by irrigation return flows (WWS 2000). Open water is restricted to small areas (less than 1 acre) along the oxbows and an 8-acre pond created at the junction of the Flume oxbow system with the Myton Townsite Canal. The pond contains excellent growth of submerged aquatic plants preferred by waterfowl (such as sago pondweed [*Potamegeton pectinatus*] and smartweeds [*Polygonum* spp.]), and is bordered by a dense fringe of emergent marsh.

The non-riparian wetlands in the Flume oxbow system are bordered primarily by grazed desert shrub. Ditched sections of the oxbow are bordered by upland grassland and alfalfa fields. Mesic shrubs are limited to scattered patches along fence rows.

There are an additional 22 acres of wetland associated with a borrow pit for Highway 40 construction (the Pit Wetland). This wetland consists primarily of open water with little fringing wetland vegetation.

Riparian Habitat. The northwest corner of the Flume site borders the Duchesne River and the secondary channel. There are 72-86 acres of degraded cottonwood forest (depending on the alternative) and 23 acres of degraded riparian shrub habitat along the secondary channel.

Wetland and Riparian Weeds. Russian olive and tamarisk are the primary weeds of concern on the Flume site, although pepperweed is beginning to establish and expand along the oxbows receiving irrigation return flows. Tamarisk is most abundant adjacent to the secondary channel and the Duchesne River. Russian olive is most abundant on irrigated grasslands where it is rapidly expanding.

4.2.5.2.2 Uresk Drain

Non-Riparian Wetlands. The Uresk Drain contains more wetlands than any of the other sites. There are 568 acres of non-riparian wetlands in the Uresk Drain, with wetland distribution reflecting both the drainage of excess water from the site through the Drain and the irrigation of adjacent lands for pasture. Under baseline conditions (which include a fully operational Drain), 60 percent of the existing wetlands are primarily supported by irrigation. Most of the wetlands (528 acres) occur in the area bisected by the Drain and are a mix of emergent marsh and wet meadow. Open water is restricted to the Drain itself (8 acres), with 1 acre of open water in the Goose Ponds portion of the site. Upland habitats bordering the wetlands include desert shrub and Russian olive, with Russian olive occupying habitats historically dominated by native shrubs.

The remaining 40 acres of non-riparian wetlands occur in the West Fields area of the Uresk Drain. The West Fields area consists of a mosaic of irrigated grassland and irrigation-influenced wet meadow, with Russian olive encroaching along the edges.

Riparian Habitat. The northeast corner of the Uresk Drain site borders the Duchesne River; this is the only portion of the site currently containing cottonwood forest. The forest is characterized as degraded forest due to its dense tamarisk and Russian olive understory.

Wetland and Riparian Weeds. One hundred and twenty-two acres of the Goose Ponds area are dominated by Russian olive and tamarisk. The remaining 126 acres of wetland and riparian weeds consist of Russian olive, which has established in areas dominated by native shrubs in the 1930s and in the grasslands. Tamarisk is a minor component in most of the Uresk Drain main site. Since 1997, pepperweed has established along most of the length of the Drain.

4.2.5.2.3 Riverdell North/South

Non-Riparian Wetlands. There are 90 acres of non-riparian wetlands in the Riverdell North/South site, all of which are located along the south oxbow system. The wetlands are primarily a mix of wet meadow and

emergent marsh and are dominated primarily by monocultures of either saltgrass or hardstem bulrush. Approximately 30 percent of the existing wetlands are supported primarily by irrigation return flows. Uplands along the south oxbow system consist primarily of grazed grassland. Mesic shrubs are limited to scattered patches along fencerows.

In 1982, the FWS identified 100 acres of wetlands on the Riverdell North property. These wetlands dried with the cessation of irrigation.

Riparian Habitat. The Riverdell North/South site differs from the Uresk Drain and Flume sites in that it borders the Duchesne River on both sides of the river. It also contains substantial areas of both existing cottonwood forest and native riparian shrub habitat (162 acres) and areas cleared for agriculture or otherwise degraded that are suitable for restoration of cottonwood forest (366 acres).

Wetland and Riparian Weeds. Russian olive and tamarisk provide high cover along the Duchesne River and dominate 101 acres of former cropland on the Riverdell North property. As on other sites, pepperweed has dramatically expanded cover since 1997 and is now a major weed species on the Riverdell North site.

4.2.5.2.4 Ted's Flat

Non-Riparian Wetlands. In Ted's Flat, extensive wetlands were visible along the oxbows both north and south of the river in 1939. In the Ted's Flat south oxbow system, wetlands south of the county road generally occur in the same position as visible in 1939 aerial photographs. As for other wetlands along old oxbows, habitats are dominated by monocultures of hardstem bulrush with little adjacent wet meadow or other wetland vegetation. Five acres of shallow open water occur adjacent to River Road. In contrast to open water areas in the Flume and Uresk Drain, there is no submerged aquatic vegetation in the open water areas of Ted's Flat. Adjacent uplands are primarily desert shrub.

Wetlands were visible along the entire north oxbow system in 1939, but are now only associated with water backed-up by the Swamp, a created irrigation reservoir that did not exist in 1939. There are approximately 60 acres of open water, emergent marsh and native shrub habitat associated with the Swamp wetland. The remainder of the north oxbow system contains few wetlands.

Table 4-1. Wetland and Riparian Habitats in the Proposed Action Project Area under Baseline Conditions.					
Habitat	**Acres by Site**				**Total Acres**
	Flume	**Uresk Drain**	**Riverdell North/South**	**Ted's Flat**	
Non-Riparian Wetlands					
Emergent marsh	77	312	20	94	503
Wet meadow	60	256	55	75	446
Mesic shrub	3	0	15	20	38
Riparian Habitat					
Riparian shrub	23	0	8	190	221
Mature cottonwood forest	0	0	154	664	818
Degraded cottonwood forest	72	27	366	0	465
Riparian/Wetland Weed					
Russian olive/tamarisk	197	248	223	0	668

Riparian Habitat. The Ted's Flat site encompasses both sides of the Duchesne River and is unique in that the site contains 664 acres of existing cottonwood forest and 190 acres of native riparian shrub habitat. The cottonwood forest consists of a mix of mature forest with a native shrub understory and mature cottonwood forest lacking a native shrub understory.

Wetland and Riparian Weeds. Russian olive and tamarisk are restricted to the native shrub habitat along point bars and provide relatively low cover in comparison to the other sites. No habitats are dominated solely by Russian olive and tamarisk but these species have established in approximately 105 acres to a level that warrants control to prevent expansion.

4.2.5.3 Wetland Functions and Values

4.2.5.3.1 Non-Riparian Wetlands

The existing wetlands have the potential to provide a variety of functions under baseline conditions. Most of the wetlands (except the Ted's Flat north oxbow wetlands) have the ability to improve or maintain downstream water quality at a moderate level. In general, the wetlands have a low to moderate capability to provide wildlife habitat due to the lack of vegetation diversity and interspersion and the high degree of water level fluctuations associated with variability in irrigation return flow input.

The Goose Pond wetland, Ted's Flat south oxbows and the Swamp wetland all have a moderate to high capability to perform most functions, reflecting their lesser degree of

hydrologic alteration and higher degree of existing vegetative diversity and interspersion. Conversely, the other three oxbow systems (Flume, Riverdell South and northern portion of Ted's Flat) and remaining isolated wetlands have a low ability to perform almost all wetland functions except water quality maintenance.

Details of the functional assessment methods and results are provided in Appendix C.

4.2.5.3.2 Riparian Wetlands

The riparian habitats have a relatively low capability to perform hydrologic and biologic functions due to a combination of two factors: (1) hydrologic alteration of the Duchesne River, which has resulted in reduced frequency, depth and duration of overbank flooding and (2) a general low dominance of native riparian vegetation. The exception is the Ted's Flat north terrace, which contains an existing stand of mature cottonwoods. Under baseline conditions, the Ted's Flat north riparian habitat provides moderate wildlife habitat and a high degree of uniqueness/heritage value as this is one of only a few sites along the Duchesne River containing mature cottonwoods – a species with restricted habitat requirements and of high cultural value to the Ute Tribe.

4.2.6 Impact Analysis

4.2.6.1 Significance Criteria

Impacts on wetland and riparian resources would be considered significant if :

- The project would result in a net change (measured in acres) of any existing wetland or riparian habitat type dominated by native species,
- The project would increase wetland and riparian weeds, or
- The project would result in a net change in the ability of an existing wetland or riparian habitat to perform a function at its existing level.

These significance criteria are based on federal laws and the project goal of increasing wetland and riparian wildlife habitat. The Clean Water Act and associated guidelines require a goal of no net loss of wetlands and their functions. Executive Order 11190 requires federal agencies to avoid impacts to wetlands and to take active measures to protect all wetland habitat. Executive Order 11988 requires federal agencies to avoid adverse impacts to floodplain areas. Executive Order 13112 requires federal agencies to control invasive species and provide for restoration of native habitats and species in systems that have been invaded.

Impacts are evaluated in terms of whether they represent an adverse impact (a net decrease in wetland or riparian habitat acres or functions) or a beneficial impact (a net increase in wetland or riparian habitat acres or functions). Both direct and indirect impacts to wetland and riparian habitats are evaluated. Direct adverse impacts are defined as those impacts causing loss of wetland or riparian habitats through fill or vegetation removal during construction. These impacts can be temporary or permanent. An example of a temporary direct impact would be excavation or other soil disturbance adjacent to a berm that is subsequently revegetated with wetland plants. An example of a permanent direct impact would be placement of a permanent

feature, such as a berm, over an existing wetland.

Direct beneficial impacts would also occur as a result of construction activities. An example of a direct beneficial impact would be planting of native wetland species or removal of noxious weeds to increase the extent or functional capacity of wetland or riparian habitats.

Indirect impacts would occur when an existing wetland or riparian habitat is affected by construction activities in a different location. An example of an indirect impact would be a change in wetland habitat type from wet meadow to emergent marsh as a result of a berm causing water to be retained for a longer period of time during the growing season.

4.2.6.2 Proposed Action

4.2.6.2.1 Direct Adverse Construction Impacts (Acres)

Under the Proposed Action, 22.4 acres of wetland would be temporarily impacted and 12.2 acres of wetland would be permanently impacted (see Table 4-2). The impacts would be localized and occur primarily where berms cross existing wetlands. Temporary impacts would be created by disturbing soil adjacent to the location of proposed structures; these areas would be subsequently flooded, revegetated or otherwise returned to usable wildlife habitat. Permanent disturbances would occur where structures such as berms are installed to create the desired habitat. Section 2.1.2.1 outlines the typical procedures to be followed during construction of the LDWP. Soil excavated during construction of inlets or channels connecting oxbows would be used in berm construction if of a suitable nature. Any excess material would be transported to a suitable offsite disposal site. Excess soil would not be disposed of onsite in order to prevent the creation of bare areas that weeds could readily invade. Stockpiled topsoil would be placed on the top and sides of berms and would be seeded with rapidly growing mesic and wetland grasses and sedges.

The largest percentage of the acres impacted under the Proposed Action would occur in the Uresk Drain site. Approximately 8.9 acres of wetland would be temporarily disturbed, with an additional 8.6 acres permanently disturbed. Construction of the three large berms on the eastern portion of the site and the filling of the Drain would cause the majority of the impacts in the Uresk Drain. In Ted's Flat, 8 acres of wetland and riparian habitats would be temporarily impacted by construction with 1.4 acres of permanent construction impacts. Berm construction on both the north and south oxbow systems would cause most of the impacts. Additionally, 3.8 acres of cottonwood forest would be temporarily disturbed through recontouring the ditch south of the Swamp wetland and reconnecting the Ted's Flat north oxbow system to the Duchesne River. Following construction, these areas would be replanted with cottonwoods and other native shrubs. There would be approximately 3 acres of temporary wetland disturbance from berm construction activities in the Riverdell North/South site, with 1.4 acres of permanent wetland disturbance. Wetlands in the Flume would be the least impacted, with 2.6 acres of temporary disturbance and only 0.8 acres of permanent disturbance.

4.2.6.2.2 Direct Beneficial Construction Impacts (Acres)

Under the Proposed Action, wetland and riparian habitats would be changed in three ways during construction: (1) restoration of previously existing wetland and riparian habitats where they formerly occurred, (2) creation of new wetland or riparian habitats where they didn't previously occur or (3) enhancement of existing wetland and riparian habitats. Enhancement differs from restoration and creation in that the proposed enhancement measures would not change the size or type of habitat but would be targeted at improving its existing value. Conversely, restoration and creation would result in a change in the number of wetland and riparian habitat acres.

Table 4-3 summarizes the acres of wetland and riparian habitats to be created and restored under the Proposed Action. Exact acres may change with final design and results of detailed topographic surveys and soil permeability analyses. There would be an increase in all native wetland and riparian habitat types through creation and restoration. The largest increase would be in cottonwood forest and herbaceous wetlands (emergent marsh and wet meadow combined). During restoration, 855 acres of degraded cottonwood forest, cleared cottonwood forest and wetland and riparian weeds would be converted to mature cottonwood forest through removal of riparian weeds and planting of young cottonwoods (1-3 years old). The initial construction would only establish a young stand of cottonwoods. Several decades of growth would be necessary before a mature cottonwood forest is established. The Proposed Action would also increase emergent marsh and wet meadow habitats by 1,027 acres.

In addition to changes in the extent of wetland and riparian habitat in the project area, existing wetland and riparian habitats would be enhanced by a variety of measures including:

- Provision of long-term hydrologic support to wetlands currently subject to drying with changes in irrigation patterns or lining of nearby canals,
- Improvement in water quality,
- Increased cover and habitat interspersion,
- Elimination of grazing (unless needed as a wildlife management tool),
- Supplemental planting of native shrubs in existing riparian habitats, and
- Improved cover on adjacent upland habitats.

These enhancement measures would not change the extent or type of habitat but would improve its wildlife habitat value. Most of the enhancement would occur on the Ted's Flat and Uresk Drain sites. Ted's Flat contains 664 acres of existing cottonwood forest and 190 acres of riparian shrub habitat that would be enhanced by both supplemental planting and by restoration of wetlands along the north oxbow system, which traverses the cottonwood forest. Other enhancements of the Ted's Flat site would include a substantial improvement in the water quality of the south oxbow system as a result of providing a high quality water source from the Myton Townsite Canal (see section 4.6 for a description of water quality changes).

The existing herbaceous wetlands (emergent marsh and wet meadow) on the Uresk Drain are primarily supported by irrigation return

flows and are therefore subject to loss and/or change in functions with changes in local irrigation practices or canal lining. In addition to creating and restoring 309 acres of new herbaceous wetlands, the LDWP would enhance 534 acres of herbaceous wetland by providing a permanent and continuous water supply.

Table 4-4 provides a summary of the acres of wetland and riparian habitats enhanced by either active measures or changes in management on all sites. The acres of wetland to be enhanced in Table 4-4 differ slightly from the baseline acres in Table 4-1 as Table 4-4 accounts for some conversion of existing wetlands to a different habitat type.

4.2.6.2.3 Indirect Impacts (Acres)

Placement of berms in existing wetlands would cause some conversion of wetland habitats from emergent marsh or wet meadow to open water directly behind the berms. This conversion of habitat would be offset by lateral expansion of emergent marsh and wet meadow along the edges of the existing wetlands. Overall, there would be a net increase in wet meadow and emergent marsh (474.3 to 468.2 acres over baseline conditions, respectively) and a net gain in acres of all native wetland and riparian habitats.

4.2.6.2.4 Wetland and Riparian Weeds

The Proposed Action would remove 668 acres of Russian olive and tamarisk and treat pepperweed while populations are still restricted in size. Ongoing weed control would be an integral part of the LDWP Comprehensive Conservation and Management Plan. There would be a net decrease of noxious weeds as a result of the Proposed Action, representing a beneficial impact of the project.

4.2.6.2.5 Changes in Wetland Functions and Values

Non-Riparian Wetlands. Under the Proposed Action, the ability of wetlands to perform a variety of functions would be increased, with most of the wetlands rated as moderate to high for hydrologic support, water quality maintenance, flood flow attenuation, wildlife habitat, aquatic diversity, aesthetics and unique/heritage value. The increases in functional ability would reflect the changes in hydrologic support from return flows to a stable water supply; changes in the size, shape and connectivity of wetlands; removal of ditches; increases in duration of soil saturation and increases in the number of vegetation types, interspersion, plant species diversity and plant density. This represents a beneficial impact of the project. There would be no decrease in any of the functions performed by the wetland complexes from baseline conditions.

Riparian Habitats. The value of the riparian shrub wetlands for energy dissipation and sediment stabilization would increase under the Proposed Action as a result of increased shrub and herb densities and the potential for increased coarse woody debris input by planting cottonwoods on adjacent terraces. The cottonwood forest habitats would continue to remain of generally low value for hydrologic and biogeochemical functions as they are isolated from the floodplain and the LDWP would not change the Duchesne River hydrology. Wildlife habitat would see the greatest increase in function through planting of cottonwoods and associated shrubs, thereby providing an increase in structural diversity, seral stages and the wildlife food value of

vegetation adjacent to the Duchesne River. The increased value of riparian wetlands for energy dissipation, sediment stabilization and wildlife habitat represents a beneficial impact of the project. There would be no decrease in the functional ability of any of the riparian habitats under the Proposed Action.

4.2.6.2.6 Summary of Impacts

The Proposed Action would temporarily adversely impact 15.2 acres of non-riparian wetlands and permanently adversely impact 9.5 acres of wetlands through construction of project features. There would be some conversion of existing wet meadow and emergent marsh habitats to other habitat types, but these losses would be compensated by lateral expansion of wetlands and development of the same habitats elsewhere on individual sites.

There would be 3.8 acres of temporary adverse impacts to the cottonwood forest, but there would be no permanent adverse impacts to this habitat type. The Proposed Action would restore or create 2,073 acres and enhance the value of 1,925 acres of wetland and riparian habitats. Overall, the Proposed Action would provide a large beneficial impact to wetland and riparian habitats by increasing the acres of all native habitat types, decreasing the extent of wetland and riparian weeds by 668 acres and improving the functions and values of the existing habitats.

Table 4-2. Summary of Direct Adverse Construction Impacts to Existing Wetland and Riparian Habitat under the Proposed Action.

Habitat	Acres by Site								Total Acres	
	Flume		Uresk Drain		Riverdell North/South		Ted's Flat			
	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent
Non-Riparian Wetlands										
Emergent marsh	1.6	0.5	4.4	4.5	1.2	0.6	3.6	1.2	10.8	6.8
Wet meadow	1.0	0.3	2.6	2.0	0.2	0.2	0.6	0.2	4.4	2.7
Mesic shrub	0	0	0	0	0	0	0	<0.1	0	<0.1
Riparian Habitat										
Riparian shrub	0	0	0	0	0	0	0	0	0	0
Cottonwood forest	0	0	0	0	0	0	3.8	0	3.8	0
Riparian/Wetland Weed										
Russian olive/ tamarisk	0	0	1.9	2.1	1.5	0.6	0	0	3.4	2.7
Totals	2.6	0.8	8.9	8.6	2.9	1.4	8.0	1.4	22.4	12.2

Table 4-3. Wetland and Riparian Habitats to be Created or Restored under the Proposed Action.

Habitat	Acres by Site				Total Acres
	Flume	Uresk Drain	Riverdell North/South	Ted's Flat	
Non-Riparian Wetlands					
Emergent marsh	131	104	111	112	458
Wet meadow	125	205	136	103	569
Mesic shrub	0	110	45	0	155
Total					**1,182**
Riparian Habitat					
Riparian shrub	30	0	0	6	36
Mature cottonwood forest	175	87	593	0	855
Degraded cottonwood forest	0	0	0	0	0
Total					**891**
Riparian/Wetland Weed					
Russian olive/tamarisk	0	0	0	0	0

Table 4-4. Existing Wetland and Riparian Habitats to be Enhanced by Active Measures or Management Changes (Acres) under the Proposed Action.[1]					
Habitat	**Acres by Site**				**Total Acres**
	Flume	**Uresk Drain**	**Riverdell North/South**	**Ted's Flat**	
Non-Riparian Wetlands					
Emergent marsh	77	312	20	94	503
Wet meadow	46	222	41	45	354
Mesic shrub	3	0	6	20	29
Total					**886**
Riparian Habitat					
Riparian shrub	23	0	8	190	221
Mature cottonwood forest	0	0	154	664	818
Degraded cottonwood forest	0	0	0	0	0
Total					**1,039**
Riparian/Wetland Weed					
Russian olive/tamarisk	0	0	0	0	0

[1] Numbers represent net changes after accounting for some habitat conversion, particularly of wet meadow to emergent marsh.

4.2.6.3 Pahcease Alternative

4.2.6.3.1 Direct Adverse Construction Impacts (Acres)

Table 4-5 summarizes the acres of wetland and riparian habitats under the baseline conditions for the Pahcease Alternative. Direct construction impacts would result in temporary disturbance to 11 acres of non-riparian wetlands and permanent disturbance to 8.1 acres (see Table 4-6). The areas subject to temporary disturbance would be restored as described for the Proposed Action. The types and acres of impacts for individual sites would be the same as for the Proposed Action except that no construction would occur in the Ted's Flat site nor would there be any disturbance to riparian habitats.

4.2.6.3.2 Direct Beneficial Construction Impacts (Acres)

Table 4-7 summarizes the acres of wetland and riparian habitats that would be created and restored under the Pahcease Alternative. There would be an increase in all native wetland and riparian habitat types through creation and restoration. The largest increases would be in cottonwood forest and herbaceous wetlands (emergent marsh and wet meadow combined). During restoration, 917 acres of

degraded cottonwood forest would be converted to mature cottonwood forest through removal of riparian weeds and planting of young cottonwoods (1-3 years old). The initial construction would only establish a young stand of cottonwoods; several decades of growth would be necessary before a mature cottonwood forest is established. The Pahcease Alternative would also create and/or restore 1,023 acres of emergent marsh and wet meadow habitats.

The enhancement measures described in section 4.2.6.2.2 would not change the extent or type of habitat under the Pahcease Alternative but would improve its wildlife habitat value. Most of the enhancement would occur on the Uresk Drain site as described for the Proposed Action. Table 4-8 provides a summary of the acres of wetland and riparian habitats enhanced by either active measures or changes in management.

4.2.6.3.3 Indirect Impacts (Acres)

Placement of berms in existing wetlands would cause some conversion of non-riparian wetland habitats from emergent marsh or wet meadow to open water directly behind the berms. This conversion of habitat would be offset by lateral expansion of emergent marsh and wet meadow along the edges of the existing wetlands. Overall, there would be a net increase in wet meadow and emergent marsh (517 to 435 acres over baseline conditions, respectively) and a net gain in acres of all native wetland and riparian habitats.

4.2.6.3.4 Wetland and Riparian Weeds

The Pahcease Alternative would remove 801 acres of Russian olive and tamarisk and treat pepperweed while populations are still restricted in size. Ongoing weed control would be an integral part of the LDWP Comprehensive Conservation and Management Plan. There would be a net decrease of noxious weeds as a result of the Pahcease Alternative, representing a beneficial impact of the project.

4.2.6.3.5 Changes in Wetland Functions and Values

There would be little difference in the key characteristics affecting wetland and riparian functions between the Pahcease Alternative and the Proposed Action; therefore, there would be no difference in the wetland and riparian functional rankings. As for the Proposed Action, the ability of wetlands to perform a variety of functions is increased over baseline conditions, with most of the wetlands rated as moderate to high for hydrologic support, water quality maintenance, flood flow attenuation, wildlife habitat, aquatic diversity, aesthetics and unique/heritage value.

The value of the riparian shrub wetlands for energy dissipation and sediment stabilization would increase over baseline conditions under the Pahcease Alternative. The cottonwood forest habitats would continue to remain of generally low value for hydrologic and biogeochemical functions as they are isolated from the floodplain and the Pahcease Alternative would not change the Duchesne River hydrology. Wildlife habitat would see the greatest increase in function as a result of planting cottonwoods and associated shrubs, thereby providing an increase in structural diversity, seral stages and the wildlife food value of vegetation adjacent to the Duchesne River.

4.2.6.3.6 Summary of Impacts

The Pahcease Alternative would temporarily adversely impact 11 acres of non-riparian wetlands and permanently adversely impact 8.1 acres of wetlands through construction of project features. Impacts would be similar to those described for the Proposed Action except no changes would be made in the Ted's Flat site nor would there be any adverse riparian impacts. There would be an increase in all native wetland and riparian habitat types. The Pahcease Alternative would restore or create 2,125 acres and enhance the value of 930 acres of wetland and riparian habitats. Overall, the Pahcease Alternative would provide a large beneficial impact to wetland and riparian habitats by increasing the acres of all native habitat types, decreasing the extent of wetland and riparian weeds by 801 acres and improving the functions and values of the existing habitats.

Table 4-5. Wetland and Riparian Habitats in the Pahcease Alternative Project Area under Baseline Conditions.

Habitat	Acres by Site			Total Acres
	Flume	Uresk Drain	Riverdell North/South	
Non-Riparian Wetlands				
Emergent marsh	77	312	20	409
Wet meadow	77	256	55	388
Mesic shrub	5	0	15	20
Total				**817**
Riparian Habitat				
Riparian shrub	23	0	8	31
Mature cottonwood forest	0	0	154	154
Degraded cottonwood forest	86	27	366	479
Total				**664**
Riparian/Wetland Weed				
Russian olive/tamarisk	330	248	223	801

Table 4-6. Summary of Direct Construction Impacts to Existing Wetland and Riparian Habitat (Acres) under the Pahcease Alternative.

Habitat	Acres by Site						Total Acres	
	Flume		Uresk Drain		Riverdell North/South			
	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent
Non-Riparian Wetlands								
Emergent marsh	1.6	0.5	4.4	4.5	1.2	0.6	7.2	5.6
Wet meadow	1.0	0.3	2.6	2.0	0.2	0.2	3.8	2.5
Native shrub	0	0	0	0	0	0	0	0
Riparian Habitat								
Riparian shrub	0	0	0	0	0	0	0	0
Cottonwood forest	0	0	0	0	0	0	0	0
Riparian/Wetland Weed								
Russian olive/ tamarisk	0	0	1.9	2.1	1.5	0.6	3.4	2.7
Totals	2.6	0.8	8.9	8.6	2.9	1.4	14.4	10.8

Table 4-7. Wetland and Riparian Habitats (Acres) to be Created or Restored under the Pahcease Alternative.

Habitat	Acres by Site			Total Acres
	Flume	Uresk Drain	Riverdell North/South	
Non-Riparian Wetlands				
Emergent marsh	226	104	111	441
Wet meadow	241	205	136	582
Mesic shrub	0	110	45	155
Total				**1,178**
Riparian Habitat				
Riparian shrub	30	0	0	30
Mature cottonwood forest	237	87	593	917
Degraded cottonwood forest	0	0	0	0
Total				**947**
Riparian/Wetland Weed				
Russian olive/tamarisk	0	0	0	0

Table 4-8. Existing Wetland and Riparian Habitats to be Enhanced by Actives Measures or Management Changes (Acres) under the Pahcease Alternative.[1]				
Habitat	**Acres by Site**			**Total Acres**
	Flume	**Uresk Drain**	**Riverdell North/South**	
Non-Riparian Wetlands				
Emergent marsh	77	312	20	409
Wet meadow	62	222	41	325
Mesic shrub	5	0	6	11
Total				**745**
Riparian Habitat				
Riparian shrub	23	0	8	31
Mature cottonwood forest	0	0	154	154
Degraded cottonwood forest	0	0	0	0
Total				**185**
Riparian/Wetland Weed				
Russian olive/tamarisk	0	0	0	0

[1] Numbers represent net changes after accounting for some habitat conversion, particularly of wet meadow to emergent marsh.

4.2.6.4 Topanotes Alternative

4.2.6.4.1 Direct Adverse Construction Impacts (Acres)

Table 4-9 summarizes the acres of wetland and riparian habitats under the baseline conditions for the Topanotes Alternative. Direct construction impacts would result in temporary adverse disturbance to 13.8 acres of non-riparian wetlands and permanent adverse disturbance to 8.7 acres (Table 4-10). The areas subject to temporary disturbance would be restored as described for the Proposed Action. The types and acres of impacts for individual sites would be the same as for the Proposed Action, except that no construction would occur in the Riverdell North/South sites.

4.2.6.4.2 Direct Beneficial Construction Impacts (Acres)

Table 4-11 summarizes the acres of wetland and riparian habitats that would be created and restored under the Topanotes Alternative. There would be an increase in all native wetland and riparian habitat types through creation and restoration. The largest increases would be in herbaceous wetlands (emergent

marsh and wet meadow combined [991 acres]). During restoration, 324 acres of degraded cottonwood forest would be converted to mature cottonwood forest through removal of riparian weeds and planting of young cottonwoods (1-3 years old). The initial construction would only establish a young stand of cottonwoods; several decades of growth would be necessary before a mature cottonwood forest is established.

The enhancement measures would not change the extent or type of habitat but would improve its wildlife habitat value. Most of the enhancement would occur on the Ted's Flat site. Ted's Flat contains 664 acres of existing cottonwood forest and 190 acres of riparian shrub habitat that would be enhanced by both supplemental planting and by restoration of wetlands along the north oxbow system traversing the cottonwood forest. Other enhancements of the Ted's Flat site would include a substantial improvement in the water quality of the south oxbow system as a result of providing a high quality water source from the Myton Townsite Canal (see section 4.6 for a description of water quality changes). Table 4-12 provides a summary of the acres of wetland and riparian habitats enhanced by either active measures or changes in management on all sites.

4.2.6.4.3 Indirect Impacts (Acres)

Placement of berms in existing wetlands would cause some conversion of wetland habitats from emergent marsh or wet meadow to open water directly behind the berms. This conversion of habitat would be offset by lateral expansion of emergent marsh and wet meadow along the edges of the existing wetlands. Overall, there would be a net increase in wet meadow and emergent marsh (364 to 511 acres over baseline conditions, respectively) and a net gain in acres of all native wetland and riparian habitats.

4.2.6.4.4 Wetland and Riparian Weeds

The Topanotes Alternative would remove 578 acres of Russian olive and tamarisk and treat pepperweed while populations are still restricted in size. Ongoing weed control would be an integral part of the LDWP Comprehensive Conservation and Management Plan. There would be a net decrease of noxious weeds as a result of the Topanotes Alternative, representing a beneficial impact of the project.

4.2.6.4.5 Changes in Wetland Functions and Values

There would be little difference in the key characteristics affecting wetland and riparian functions between the Topanotes Alternative and the Proposed Action; therefore, there would be no difference in the wetland and riparian functional rankings. As for the Proposed Action, the ability of wetlands to perform a variety of functions is increased over baseline conditions, with most of the wetlands rated as moderate to high for hydrologic support, water quality maintenance, flood flow attenuation, wildlife habitat, aquatic diversity, aesthetics and unique/heritage value.

The value of the riparian shrub wetlands for energy dissipation and sediment stabilization would increase over baseline conditions under the Topanotes Alternative. The cottonwood forest habitats would continue to remain of generally low value for hydrologic and biogeochemical functions as they are isolated from the floodplain and the Topanotes Alternative would not change the Duchesne

River hydrology. Wildlife habitat would see the greatest increase in function as a result of planting cottonwoods and associated shrubs, thereby providing an increase in structural diversity, seral stages and the wildlife food value of vegetation adjacent to the Duchesne River.

4.2.6.4.6 Summary of Impacts

The Topanotes Alternative would temporarily adversely impact 13.8 acres of non-riparian wetlands and permanently adversely impact 8.7 acres of wetlands through construction of project features. Impacts would be similar to those described for the Proposed Action except the Riverdell site would not be affected. There would be 3.8 acres of temporary adverse impacts to cottonwood forest but there would be no permanent adverse impacts to this habitat type. There would be an increase in all native wetland and riparian habitat types. The Topanotes Alternative would restore or create 1,461 acres and enhance the value of 1,714 acres of wetland and riparian habitats. Overall, the Topanotes Alternative would provide a large beneficial impact to wetland and riparian habitats by increasing the acres of all native habitat types, decreasing the extent of wetland and riparian weeds by 578 acres and improving the functions and values of the existing habitats.

Table 4-9. Wetland and Riparian Habitats in the Topanotes Alternative Project Area under Baseline Conditions.

Habitat	Acres by Site			Total Acres
	Flume	Uresk Drain	Ted's Flat	
Non-Riparian Wetlands				
Emergent marsh	77	312	94	483
Wet meadow	77	256	75	408
Mesic shrub	5	0	20	25
Total				**916**
Riparian Habitat				
Riparian shrub	23	0	190	213
Mature cottonwood forest	0	0	664	664
Degraded cottonwood forest	86	27	0	113
Total				**990**
Riparian/Wetland Weed				
Russian olive/tamarisk	330	248	0	578

Table 4-10. Summary of Direct Construction Impacts to Existing Wetland and Riparian Habitats (Acres) under the Topanotes Alternative.

Habitat	Acres by Site						Total Acres	
	Flume		Uresk Drain		Ted's Flat			
	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent
Non-Riparian Wetlands								
Emergent marsh	1.6	0.5	4.4	4.5	3.6	1.2	9.6	6.2
Wet meadow	1.0	0.3	2.6	2.0	0.6	0.2	4.2	2.5
Native shrub	0	0	0	0	0	<0.1	0	<0.1
Riparian Habitat								
Riparian shrub	0	0	0	0	0	0	0	0
Cottonwood forest	0	0	0	0	3.8	0	3.8	0
Riparian/Wetland Weed								
Russian olive/ tamarisk	0	0	1.9	2.1	0	0	1.9	2.1
Totals	2.6	0.8	8.9	8.6	8.0	1.4	19.5	10.8

Table 4-11. Wetland and Riparian Habitats (Acres) to be Created or Restored under the Topanotes Alternative.

Habitat	Acres by Site			Total Acres
	Flume	Uresk Drain	Ted's Flat	
Non-Riparian Wetlands				
Emergent marsh	226	104	112	442
Wet meadow	241	205	103	549
Mesic shrub	0	110	0	110
Total				**1,101**
Riparian Habitat				
Riparian shrub	30	0	6	36
Mature cottonwood forest	237	87	0	324
Degraded cottonwood forest	0	0	0	0
Total				**360**
Riparian/Wetland Weed				
Russian olive/tamarisk	0	0	0	0

Table 4-12. Existing Wetland and Riparian Habitats to be Enhanced by Active Measures or Management Changes (Acres) under the Topanotes Alternative.[1]				
Habitat	**Acres by Site**			**Total Acres**
	Flume	**Uresk Drain**	**Ted's Flat**	
Non-Riparian Wetlands				
Emergent marsh	77	312	94	483
Wet meadow	62	222	45	329
Mesic shrub	5	0	20	25
Total				**837**
Riparian Habitat				
Riparian shrub	23	0	190	213
Mature cottonwood forest	0	0	664	664
Degraded cottonwood forest	0	0	0	0
Total				**877**
Riparian/Wetland Weed				
Russian olive/tamarisk	0	0	0	0

[1] Numbers represent net changes after accounting for some habitat conversion, particularly of wet meadow to emergent marsh.

4.2.6.5 No Action Alternative

There would be no direct adverse construction impacts to wetland or riparian habitats under the No Action Alternative. Likewise, there would be no beneficial increase in the extent of wetland and riparian habitats. Establishment of native riparian species would continue to be limited by depletion of flows from the Duchesne River, and Russian olive and tamarisk would likely continue to increase in extent in the riparian corridor. Over time, there would be an increasing loss of riparian habitat as existing cottonwoods die without replacement. Existing wetlands along oxbows would continue to be fragmented and dominated by single species monocultures. Pepperweed, which has established in the Duchesne River corridor since 1997, would likely continue to increase in extent. Both wetlands and adjacent uplands would continue to be grazed and cover for wetland-dependent wildlife species would remain low. Up to 60 percent of existing wetlands would continue to be supported by irrigation return flows and be subject to loss with changes in irrigation practices. The 290 acres of wetlands that have dried since 1997 because of changes in irrigation would likely remain as uplands.

4.3 WILDLIFE RESOURCES

4.3.1 Introduction

The wildlife resources analysis addresses potential impacts on wildlife species and their habitat from construction and operation of the Proposed Action and alternatives. Construction impacts would be temporary and could cause temporary displacement of some wildlife species. However, since construction of the project would occur one site at a time, wildlife would have adjacent lands in which to find refuge. The information provided in this section regarding the current status of wildlife species was based on wildlife surveys conducted by the Ute Tribe and the FWS (summarized in Koehler 2000), surveys conducted by the CUWCD (1996a) and data summaries provided in WWS 1998a and Ammon 1997. Section 4.2 contains a description and pre- and post-construction acre tabulations of wetland and riparian habitat types for each alternative. Pre- and post-construction acre tabulations for upland habitat types are listed in this Wildlife Resources section. Potential impacts on listed and candidate species are described in section 4.4, Threatened, Endangered and Candidate Species.

4.3.2 Issues Eliminated from Further Analysis

No wildlife issues raised during the public scoping or agency consultation process were eliminated. All were analyzed.

4.3.3 Issues Addressed in the Impact Analysis

The following wildlife resource topics are addressed in the impact analysis:

- Will changes in wetland and riparian habitats and adjacent uplands affect major wildlife groups such as wetland associated species (e.g., shorebirds, waterfowl and furbearers), riparian associated species (e.g., migratory songbirds, some birds of prey [raptors] and big game) and open upland associated species (e.g., upland birds, small mammals and some birds of prey)?
- Will changes in habitats result in permanent removal or expansion of any important habitat (e.g., deer fawning areas, raptor or waterfowl nesting areas, winter range and migratory routes) that could either adversely affect the viability of local populations or increase local populations?

4.3.4 Area of Influence

The project area of influence for wildlife resources includes the areas depicted on Figure 1-2 in portions of Duchesne and Uintah Counties in northeast Utah, including the Duchesne River corridor from the town of Bridgeland to the confluence with the Green River at Ouray.

4.3.5 Affected Environment

4.3.5.1 Introduction

As described in section 4.2.6.2, the LDWP would result in a net increase in all native wetland and riparian habitats. Some conversion of habitat types would occur, as well as improvements to the quality of existing habitats. Some upland areas would be converted from annual weed/fallow, grazed grassland and desert shrub to wetlands and riparian habitat. To assess the impacts of the proposed habitat changes (both beneficial and adverse), nine major groups of wildlife were identified as indicators for how the project would potentially affect wetland associated, riparian associated and upland associated species. These species groups include a mix of game and non-game species and are listed below according to their primary habitat.

- Primarily wetland associated: shorebirds, waterfowl and furbearers
- Primarily riparian associated: migratory songbirds, some birds of prey (raptors) and big game
- Primarily upland associated (desert shrub, grassland and cropland): upland birds, small mammals and some birds of prey

Even though categorized into one primary habitat group for simplicity, most species require a diversity of habitats to successfully complete feeding, resting, nesting and migrating. Therefore, other important supporting habitats used by these species are described throughout this Affected Environment section. Impacts to both primary and other supporting habitats are described in section 4.3.6.

4.3.5.2 Aquatic Species

Aquatic habitat uses are designated by the State of Utah for all surface waterbodies. Associated with the designation are a set of water quality criteria that must be met to maintain the existing aquatic community. The Duchesne River upstream of Myton is rated as 3A, or suitable for cold water fish species such as brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*). Downstream of Myton, the Duchesne River is rated as 3B, or suitable for warm water fish species. Fish species occurring in this reach include channel catfish (*Ictalurus punctatus*), smallmouth bass (*Micropterus dolomieui*), mountain whitefish (*Prosopium williamsonii*), carp (*Cyprinus carpio*), bluehead sucker (*Catostomus discobolus*) and Utah chub (*Gila atraria*) (BOR 2003). Because aquatic use criteria are based on water quality parameters, section 4.6 provides an analysis of how the Proposed Action and alternatives would affect the aquatic habitat criteria; these results are not repeated in this section.

The endangered Colorado pikeminnow (*Ptychocheilus lucius*) and razorback sucker (*Xyrauchen texanus*) also occur in the Duchesne River downstream of Myton; impacts to these and other threatened and endangered fish are addressed in section 4.4, Threatened, Endangered and Candidate Species.

Though there have been no studies of reptile or amphibian use of the project area, the following species have been observed in the project area: northern leopard frog (*Rana pipiens*), Great Basin garter snake (*Thamophis ordinoides vagrans*) and the common bull snake (*Pituophis sayi sayi*).

4.3.5.3 Wetland Associated Species

4.3.5.3.1 Shorebirds

Shorebirds use a variety of habitats including emergent wetlands, wet meadows, shores of rivers and lakes, and mudflats where they feed on small fish, amphibians and insects. Shorebirds include wading birds such as the great blue heron (*Ardea herodias*), egrets (*Egretta* spp.), plovers (*Charadrius* spp.) and sandpipers (*Calidris* spp.). Habitat for shorebirds within the project area consists mainly of the shoreline of the Duchesne River, emergent marsh areas of the Flume and Ted's Flat and wet meadows found in the Uresk Drain. The Flume contains an abandoned great blue heron rookery with an active rookery in close proximity. The adults from the active rookery use wetland habitat within the Flume for feeding. Greater yellowlegs (*Tringa flavipes*) occur on Ted's Flat and Wilson's phalarope (*Phalaropus tricolor*) nest on the site. Shorebirds in the Uresk Drain include common snipe (*Gallinago gallinago*), long-billed curlew (*Numenius americanus*), sandhill crane (*Grus canadensis*) and Virginia rail (*Rallus limicola*). Common snipe and long-billed curlew nest on the site (Koehler 2000).

4.3.5.3.2 Waterfowl

Waterfowl in the project area include Canada geese (*Branta canadensis*), diving ducks (e.g., redhead [*Aythya americana*]) and dabblers (primarily *Anas* spp.). Many of these species nest on the ground within tall grasses and eat seeds, aquatic vegetation, grain, aquatic invertebrates and insects. Although some waterfowl are year-round residents, most use open water in the project area strictly during fall and spring migration as stop-over habitat for resting, foraging and to allow for scanning for potential predators. However, the Uresk Drain receives warm water (50-55 degrees Fahrenheit) from nearby springs, allowing some ducks to overwinter in the area. Some dabbling ducks such as mallards breed in the area.

During the 1998 and 1999 spring migration periods, 1,192 waterfowl comprised of 13 species were observed in the project area. Most of the waterfowl were observed in only a few of the bird sampling points, with waterfowl concentrations located at the downstream end of the Flume oxbow system, a small pond on the Riverdell South property and in the Ted's Flat Swamp wetland. Mallard, northern pintail and green wing teal were the most common species. These three species are also among the most common waterfowl species observed at the nearby Ouray National Wildlife Refuge (ONWR) and Pariette Wetlands (Stone 1998, Faircloth 1998). Gadwall, coots and other species of teals are also quite abundant at the nearby wildlife management areas, contrasting with the relatively low numbers of these species at LDWP. Conversely, widgeons were not observed at the Pariette Wetlands and were relatively uncommon and varied from year to year at ONWR. The relatively high number of widgeons on the Riverdell South site may reflect a local abundance of preferred foods such as stems and leafy parts of aquatic plants and agricultural fields. Dabblers (puddle ducks) made up over 90 percent of the total number of waterfowl observed and 60 percent of the species observed.

Table 4-13. Waterfowl Observed at Potential Mitigation Sites During 1998 and 1999 Surveys.

Waterfowl Species and Type[1]		Site				Total
		Flume	Riverdell	Uresk Drain	Ted's Flat	
Bufflehead (*Bucephala albeola*)	DV	0	0	0	2	2
Canada goose (*Branta canadensis*)	--	6	22	9	102	139
Cinnamon teal (*Anas cyanoptera*)	DD	6	5	0	8	19
Common goldeneye (*Bucephala clangula*)	DV	3	2	0	0	5
Common merganser (*Mergus merganser)*	DV	0	0	0	8	8
Gadwall (*Anas strepera*)	DD	2	5	0	14	21
Greenwing teal (*Anas crecca*)	DD	76	54	0	57	187
Hooded merganser (*Lophodytes cucullatus*)	DV	2	0	0	0	2
Mallard (*Anas platyrhynchos*)	DD	35	179	0	277	491
Northern pintail (*Anus acuata*)	DD	12	53	0	53	118
Redhead (*Aythya americana*)	DV	0	3	0	0	3
Ring-necked duck (*Aythya collaris*)	DV	9	42	0	0	51
Widgeon (*Anas americana*)	DD	0	140	0	6	146
Total		**151**	**505**	**9**	**527**	**1,192**

Source: Koehler 2000

[1] DV=Diving Duck, DD=Dabbling Duck

4.3.5.3.3 Furbearers

Furbearers are a diverse group of mammals that include carnivores and rodents. Many are adaptable species ranging over large geographic areas, but most of the furbearers that occur on the project sites require wetland habitats for their life cycle. Muskrat (*Ondatra zibethica*) and beaver (*Castor canadensis*) are the two most prevalent furbearing species in the project area, though Koehler (2000) observed a long-tailed weasel (*Mustela frenata*) on the Riverdell North/South site and a red fox (*Vulpes fulva*) on the Ted's Flat site.

Muskrat feed on aquatic vegetation, frogs and, on occasion, fish. Muskrat also tend to maintain open water areas within emergent marshes by uprooting and eating the tuber of cattails and bulrushes. Beaver shift from a chiefly woody diet in the winter to an herbaceous diet as new growth appears in the spring. Beaver will utilize grasses, herbs, leaves of woody plants, fruits and aquatic plants during the summer, in addition to their main staple of woody material from willows,

aspens and cottonwoods. Beaver will travel from 300 to 2,500 feet from their lodges to forage for food.

4.3.5.4 Riparian Associated Species

4.3.5.4.1 Migratory Songbirds

Neotropical migratory songbirds are birds that migrate to North America during the spring and back to the tropics or the southern hemisphere in the fall. They tend to be insectivorous and include members of the wood warbler family (*Emberizidae*), vireos (*Vireonidae*) and flycatchers (*Tyrannidae*). Migratory songbirds use a variety of habitats but forested areas and areas with high shrub cover tend to have the highest number of species and density.

Sixty-one bird species, including 36 passerine (songbird) species, were observed in the LDWP project area during surveys conducted in 1989 and 1999 (Koehler 2000). The Flume had the fewest number of species observed (17). Twenty-one species were observed at Ted's Flat, 20 at Uresk Drain, and 18 at Riverdell North/South, as shown on the following table.

Table 4-14. Songbirds Observed at Potential Mitigation Sites During 1998 and 1999 Surveys.

Songbird Species	Site			
	Flume	Riverdell	Uresk Drain	Ted's Flat
American goldfinch (*Carduelis tristis*)		X	X	X
American robin (*Turdus migratorius*)	X	X	X	X
Barn swallow (*Hirundo rustica*)				X
Belted kingfisher (*Ceryle alcyon*)				X
Black-billed magpie (*Pica pica*)	X	X	X	X
Black-capped chickadee (*Poecile atricapillus*)		X	X	X
Black-headed grosbeak (*Pheuticus melanocephalus*)		X		
Brewer's blackbird (*Euphagus cyanocephalus*)			X	
Brewer's sparrow (*Spizella breweri*)			X	
Brown-headed cowbird (*Molothrus ater*)	X		X	X
Bullock's oriole (*Icterus bullockii*)		X		
Cedar waxwing (*Bombycilla cedrorum*)		X		X
Cliff swallow (*Petrochelidon pyrrhonota*)				X
Common yellowthroat (*Geothlypis trichas*)	X		X	
Dark-eyed junco (*Junco hyemalis*)		X		X
Eastern kingbird (*Tyrannus tyrannus*)		X	X	X

Songbird Species	Site			
	Flume	Riverdell	Uresk Drain	Ted's Flat
European starling (*Sturnus vulgaris*)	X			
Gray catbird (*Dumetella carolinensis*)				X
Green-tailed towhee (*Pipilo chlorurus*)	X		X	
House wren (*Troglodytes aedon*)	X			
Marsh wren (*Cistothorus palustris*)	X		X	X
Mourning dove (*Zenaida macroura*)	X	X	X	X
Northern mockingbird (*Mimus polyglottos*)			X	
Red-shafted flicker (*Colaptes auratus*)	X	X	X	X
Red-winged blackbird (*Agelaius phoeniceus*)	X	X	X	X
Savannah sparrow (*Passerculus sandwichensis*)	X		X	
Song sparrow (*Melospiza melodia*)			X	
Spotted towhee (*Pipilo maculatus*)	X	X		X
Tree swallow (*Tachycineta bicolor*)		X		
Western kingbird (*Tyrannus verticalis*)	X	X		
Western meadowlark (*Sturnella neglecta*)	X	X	X	X
Western tananger (*Piranga lucoviciana*)		X		
White-crowned sparrow (*Zonotrichia leucophrys*)	X	X	X	
Wilson's warbler (*Wilsonia pusilla*)				X
Yellow-headed blackbird (*Xanthocephalus xanthocephalus*)	X		X	X
Yellow warbler (*Dendroica petechia*)				X

Source: Koehler 2000

A few species are notable for their habitat needs and their frequency of occurrence within the project area. The brown-headed cowbird is a generalist parasite, laying its eggs in the nests of a wide range of other species, displacing the native eggs with its own. Brown-headed cowbirds pose a threat to the continued survival of bird species such as various warblers and western meadowlarks. The cowbird range has expanded with the increase of pastures and agricultural lands such as the grazed areas found on the project site.

The yellow warbler is often used as an indicator species for ideal riparian habitat by the FWS. Ted's Flat has the most structurally diverse riparian habitat within the project area and is the only site where the yellow warbler was found. Other riparian obligate species

(species with 90 percent or more of their nesting sites in riparian habitat) that occur in the project area that indicate good riparian habitat condition include common yellowthroat (*Geothypis trichas*), which nest in reeds and marshy areas, and Wilson's warbler (*Wilsonia pusilla*), which nests in trees (riparian canopy).

4.3.5.4.2 Raptors

Koehler (2000) observed seven riparian associated raptor species during surveys in 1999. Red-tailed hawks (*Buteo jamaicencis*) were the most common raptor species. Other species included bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), great horned owl (*Bubo virginianus*) and rough-legged hawk (*Buteo lagopus*). Habitat needs of these raptors vary and each of the four sites included in the Proposed Action offer a slightly different suite of habitat characteristics to support raptors. Most riparian associated raptors within the project area prefer to nest in trees (except for northern harrier) and feed on rodents, small mammals and insects.

Red-tailed hawks and golden eagles generally forage on rodents in upland habitats and usually nest in or near mature riparian trees. Two red-tailed hawk nests and one golden eagle nest have been observed within the Riverdell North property. Rough-legged hawks will nest in tall trees, if available. They feed on small vertebrates, rodents being their main staple. American kestrels are generally cavity nesters and prefer insects as their main staple. Northern harriers generally nest close to the ground near wetland areas and eat small mammals (mainly rodents). The northern harrier will hunt in marshes but also in agricultural fields and sometimes in sagebrush and shadscale shrublands. The great horned owl nests on ledges, in niches on cliffsides and canyon walls, and in cottonwood trees; it preys upon small mammals.

One measure of raptor density is the number of raptors observed per mile of survey distance. The Uresk Drain and Ted's Flat support 0.6 raptors per mile. The Flume supports 0.5 raptors per mile and the Riverdell North property supports 0.9 raptors per mile. No surveys were made of the Riverdell South oxbows or of the portion of Ted's Flat north of the Duchesne River. The higher density of raptors on the Riverdell North property likely reflects the availability of cottonwood trees for perching in close proximity to a high small mammal prey base.

Table 4-15. Raptors Observed at Potential Mitigation Sites During Winter 1999.				
Raptor Species	**Site**			
	Flume	**Riverdell**	**Uresk Drain**	**Ted's Flat**
American kestrel (*Falco sparverius*)	2	1	2	1
Bald eagle (*Haliaeetus leucocephalus*)	1	10	0	5
Golden eagle (*Aquila chrysaetos*)	0	4	0	0
Great horned owl (*Bubo virginianus*)	1	0	2	0
Northern harrier (*Circus cyaneus*)	0	2	1	4
Red-tailed hawk (*Buteo jamaicencis*)	7	5	3	5
Rough-legged hawk (*Buteo lagopus*)	2	1	1	0
Total	**13**	**23**	**9**	**15**
Source: Koehler 2000				

4.3.5.4.3 Big Game Species

Big game species include mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*) and moose (*Alces alces*). Forest and shrub riparian communities provide valuable escape cover for these species in agricultural areas where other cover is lacking, and some browse and thermal cover for mule deer and elk in the winter. The dense cover in larger forest and shrub riparian areas is used for fawning by mule deer. Riparian areas with shrub understories provide excellent thermal cover during winter for big game species.

Big game distribution in the vicinity of the project area was determined through ground and aerial surveys conducted between 1992 and 2000 and through mapping of habitat by the Division of Wildlife Resources. The entire project area has been mapped as year-round habitat for deer (BIA 2000a). The only big game species observed by Koehler (2000) during wildlife surveys was mule deer: seven mule deer were observed during the winter of 1992-93 between Bridgeland down to the confluence with the Uinta River (CUWCD 1996a). Elk and moose were observed during an aerial wildlife survey in 1997 that concentrated on areas just east of the project area (Corts 2002). Moose may visit the project area, but likely only in severe winters to search for readily available forage.

Pronghorn antelope use an area just south of the project area throughout the year (BIA 2000a). Although Koehler (2000) did not directly observe any mountain lions, he did observe evidence of their presence (e.g., tracks and scat) during his surveys.

4.3.5.5 Upland Associated Species

4.3.5.5.1 Upland Birds and Small Mammals

Upland bird species include game species such as turkey, pheasants, grouse and quail, as well as meadowlarks, horned larks and

sparrows. Upland birds and small mammals often use edge habitats, areas where one habitat type meets another, usually where a wooded area meets an open area such as a field or marsh. Shrub habitat also has high value for these species. Three common small game species occur within all mitigation sites: cottontail rabbits (*Sylvilagus nuttalli)*, ring-necked pheasants (*Phasianus colchicus*) and mourning dove (*Zenaida macroura*). Additionally, California quail (*Callipepla californica*) were observed at the Flume, and a large colony of white tail prairie dogs (*Cynomys gunnisoni*), a badger skull (*Taxidea taxus*) and a coyote (*Canis latrans*) were observed on the Riverdell North property.

4.3.5.5.2 Raptors

Upland associated raptors found within the project area include the ferruginous hawk (*Buteo regalis*) and prairie falcon (*Falco mexicans*). Both these species need open upland areas in which to hunt for prey such as rodents and rabbits. The ferruginous hawk prefers to nest in tall trees, but will nest in shrubs and on the ground, and populations are often tightly associated with rising and falling prey populations. The prairie falcon generally nests in high cliff ledges facing open lands and prefers horned larks for food, but will eat small mammals and other birds.

Table 4-16. Upland Associated Raptors Observed at Potential Mitigation Sites During Winter 1998-99.

Raptor Species	Site			
	Flume	Riverdell	Uresk Drain	Ted's Flat
Ferruginous hawk (*Buteo regalis*)	0	0	1	1
Prairie falcon (*Falco mexicans*)	0	0	2	0
Total	**0**	**0**	**3**	**1**

Source: Koehler 2000

4.3.6 Impact Analysis

4.3.6.1 Significance Criteria

Impacts on wildlife resources would be considered significant if:

- The project resulted in permanent expansion or removal of habitat or habitat quality for wetland or riparian-dependent species, or removal or expansion of native upland habitat important for successful life cycles of these species. Loss or gain of wetland and riparian habitats is included as a significance criteria for wildlife resources because of the extremely high value of these habitat types to wildlife.
- The project would result in permanent removal, expansion or change in quality of any important wildlife habitat (e.g., deer fawning areas, raptor or waterfowl nesting areas, big game winter range or bird migratory resting areas) that could

either adversely affect the viability of local populations or increase local populations.

The wildlife significance criteria are based on the project goals of increasing habitat for wetland and riparian-dependent wildlife species, increasing habitat diversity and restoring historical riverine features. Wildlife species use riparian woodlands and shrublands for their high palatability of forage, high productivity, shade, thermal cover during winter and proximity to other habitat needs. Riparian areas are also frequently used as migration corridors because they provide essential food, cover and water for moving between summer and winter ranges.

The significance criteria are also based on baseline data that indicate that certain key habitat areas are located within the project vicinity. Finally, the significance criteria reflect Executive Order 13186 which requires all NEPA assessments to evaluate potential impacts to migratory birds, with a particular emphasis on wetland habitat used by migratory birds. Executive Order 13186 was issued to address a general decrease in migratory bird habitat over the last 30 years, even for relatively widespread and abundant species.

4.3.6.1.1 Impact Analysis Considerations

As described in section 4.1.2, the Proposed Action differs from the other action alternatives in that it meets *both* the SACS and DRACR wildlife mitigation obligations. As a result, the Proposed Action includes a larger project area. In this section, each alternative is described according to its impacts and benefits. A comparison of each alternative cumulatively with the related DRACR mitigation, which results in a similarly sized cumulative project as the Proposed Action, can be found in section 4.21.

4.3.6.2 Proposed Action

4.3.6.2.1 Wetland Associated Species

4.3.6.2.1.1 Shorebirds. Shorebird habitat along the shoreline of the Duchesne River is not expected to change under the Proposed Action as Duchesne River flows would not be substantially changed. Additional shoreline habitat would be created along the rewatered oxbows with the largest change through creation and restoration of emergent marshes.

Mitigation in the Flume would improve great blue heron nesting habitat as the addition of cottonwood forests would provide increased nesting possibilities. Additionally, enhanced habitat for leopard frogs would provide for a greater food source for both great blue herons and sandhill cranes. Improvement of shorebird habitat would be most notable on the Uresk Drain as shallow water feeding areas would be created at this site. The seeding of wetland edges at Ted's Flat and the Riverdell property would provide improved feeding grounds for shorebirds. Birds such as willets (*Catoptrophorus semipalmatus*), greater yellowlegs (*Tringa melanoleuca*), white-faced ibis (*Plegadis chihi*) and common snipe (*Gallingo gallingo*) would benefit from newly created marshy areas, benefitting more than shorebirds that concentrate their use on muddy flats and shorelines such as the spotted sandpiper (*Actitis macularia*) and killdeer (*Charadrius vociferus*).

4.3.6.2.1.2 Waterfowl. Waterfowl habitat within the active river channel of the Duchesne River is not expected to change as

a result of the Proposed Action as Duchesne River flows would not be substantially changed.

Waterfowl habitat would increase as a result of the Proposed Action, primarily due to increases in emergent wetland and reservation of a minimum of 20 percent of adjacent crops for wildlife use. These increases would occur on all sites.

Habitat historically restored for waterfowl on the downstream end of the Flume oxbow system contains disproportionately high concentrations of waterfowl (151 individuals) in relation to the rest of the oxbow (0 individuals). Similar treatments proposed for the remainder of the Flume oxbow system and associated uplands are expected to provide a large increase in waterfowl by providing improved feeding, resting and nesting areas. However, much of the open water habitat in the Flume would be surrounded by greasewood, which is not a preferred waterfowl habitat.

The Uresk Drain would create ponded areas bordered by wet meadows and ungrazed grasslands. The creation of open water areas and enhancement of adjacent uplands would increase waterfowl use dramatically from its present state (only 9 individuals, all Canada geese observed). Additionally, improvements to nearby grassland areas would provide nesting cover.

As described for the Flume, rewatering of the Riverdell South oxbows would provide improved habitat for feeding and resting. Additionally, the primary habitat bordering the oxbows would be grassland, which would provide greater nesting opportunities than along the Flume oxbows.

The main factors limiting waterfowl use of the Ted's Flat South oxbows are lack of adjacent cover and lack of aquatic plants and their associated invertebrates for feeding. The dissolved oxygen level in the oxbows is extremely low and may be the cause of the lack of aquatic vegetation (see section 4.6, Water Quality, Affected Environment). The main effect of the LDWP on waterfowl habitat would be to increase dissolved oxygen in the existing ponded areas and expand the oxbow width to allow adjacent wet meadow development. Additionally, reserving 20 percent of the crop in adjacent cropland areas would provide improved feeding habitat during the critical fall migration period.

The overall increase in emergent marsh habitat and cropland from the Proposed Action would benefit dabbler ducks such as mallard, teal, widgeon and pintail more than it would benefit diving ducks such as redheads, scaups and goldeneyes.

4.3.6.2.1.3 Furbearers. The two main furbearers found within the project area would benefit from the Proposed Action. Muskrat would benefit from an increase in emergent wetland habitat and beaver would benefit from an increase in cottonwood forests. The increase in emergent wetland within the Flume could also benefit furbearers such as mink (*Mustela vison*) and river otter (*Lutra canadensis*) due to improved habitat for prey species such as leopard frog. Land management changes such as exclusion of grazing and establishment of upland vegetation may benefit badger on the Riverdell site as habitat quality improves for small mammals.

Muskrat habitat would improve on all sites as more than 100 acres of emergent marsh would be created or restored on all sites, but the

Uresk Drain would provide the largest increase in muskrat habitat. Ted's Flat would provide the largest increase in beaver habitat due to the combined effects of rewatering the Ted's Flat North oxbow system with supplemental planting of the adjacent cottonwood forest with preferred food plants.

4.3.6.2.2 Riparian Associated Species

4.3.6.2.2.1 Migratory Songbirds. Migratory songbirds would be among the biggest benefactors of the Proposed Action. The increase in cottonwood forest, riparian shrub, emergent marsh and mesic shrub, and improvements of upland grasslands would allow for increases in both the number of species and the density of migratory songbirds within the project area. Two key aspects of the Proposed Action are: (1) restoring, creating or enhancing 1,930 acres of riparian habitat and (2) including both the riparian restoration proposed for the Riverdell North/South and Ted's Flat sites on both sides of the Duchesne River, as many riparian-associated migratory birds require large contiguous tracts of land (Ammon 1997).

The following table lists the bird species in the project area that would be affected by the changes in habitat types under the Proposed Action.

Table 4-17. Birds Found in the Project Area That Would be Affected by Changes under the Proposed Action.

Bird species that would benefit from emergent wetlands restoration	Bird species that would benefit from cottonwood forest restoration	Bird species that would benefit from riparian and mesic shrub restoration	Bird species that would neither benefit nor be negatively impacted by the Proposed Action	Bird species that may be temporarily negatively impacted by the Proposed Action
Barn swallow Common yellowthroat Marsh wren Red-winged blackbird Rough-winged swallow Savannah sparrow Song sparrow Tree swallow Yellow-headed blackbird	American robin Black-capped chickadee Black-headed grossbeak Blue-gray gnatcatcher Bullock's oriole Dark-eyed junco House wren Northern mockingbird Red-shafted flicker Spotted towhee	Bewicks wren Blue grossbeak Dark-eyed junco Eastern kingbird Gray catbird House wren Mourning dove Song sparrow Spotted towhee Western tanager Wilson's warbler White-crowned sparrow Yellow warbler	American goldfinch Black-billed magpie Belted kingfisher Brown-headed cowbird Cliff swallow Western kingbird	Brewer's blackbird Cedar waxwing European starling Western meadowlark Brewers sparrow Lark sparrow Green-tailed towhee

Source: Koehler 2000

Other migratory songbirds that would benefit from an increase in cottonwood forest habitat include the warbling vireo (*Vireo gilvus*), yellow-rumped warbler (*Dendroica coronata*), woodpeckers (*Picoides* spp.) and nuthatches (*Sitta* spp.). Other migratory songbirds that would benefit from the increase in shrub habitat include the yellow-breasted chat (*Icteria virens*), MacGillivray's warbler (*Oporornis tolmiei*) and yellow-rumped

warbler (*Dendroica coronata*). These species occur in the area but were not observed during the 1998 and 1999 surveys.

Some bird species would neither benefit from nor be adversely impacted by the project (see Table 4-17). These species, such as the black-billed magpie, tend to be generalists, utilizing different habitats equally. Other species would temporarily lose suitable habitat as a result of this project. The western meadowlark and the Brewer's sparrow would temporarily lose grassland and desert shrub habitat, respectively (see Table 4-17). However, the present quality of these habitats within the project area is considered sub-optimal for these species, and establishment of higher quality grasslands and other habitat would offset the temporary loss of habitat. For example, the western meadowlark is declining overall within the western United States, with a key factor being disturbance of nests by grazing and/or mowing (Ryser 1985). The LDWP would eliminate grazing and manage mowing around bird nesting periods. As a result, the LDWP would allow greater nesting success even though the total areas suitable for nesting would decline.

Three bird species often associated with ecological disturbance and grazing are brown-headed cowbird, European starling and Brewer's blackbird. Often these species are considered nuisance species and they often pose a threat to other migratory songbirds. As the riparian tree canopy becomes less fragmented and more dense, developing a denser shrub understory under the Proposed Action, the occurrence of these species should become less frequent.

Cedar waxwing (*Bombycilla cedrorum*) are expected to experience a temporary loss of habitat due to the loss of Russian olive on the Riverdell property where they heavily feed on the berries. This loss would be offset by improvements in other habitat types. As Russian olive is replaced by native shrubs, the native shrubs would offer an abundance of food and shelter.

4.3.6.2.2.2 Raptors. All of the raptors observed during the wildlife surveys in 1998 and 1999 use open spaces such as fields, prairies and marshes for feeding; however, some species also use other habitats such as wooded areas for nesting and roosting. Under the Proposed Action, all riparian associated raptor species would either benefit or would not be affected by the LDWP. The increase in cottonwood forest in the Flume would improve habitat for many raptors, especially red-tailed hawks, by increasing roosting areas adjacent to feeding grounds. Species such as the northern harrier and rough-legged hawk would greatly benefit from the increase in emergent wetland habitats that would be created within the Flume and the Uresk Drain. Cottonwoods along the Duchesne River within the Riverdell property presently provide quality habitat for eagles. The protection and enhancement of these cottonwood stands as well as the cottonwood stands within the Ted's Flat site (with associated upland areas) would benefit both golden and bald eagles. Although the great horned owl would temporarily lose habitat from the loss of Russian olive, this would be offset by the increase in cottonwood forest. Table 4-18 illustrates how each riparian associated raptor would be affected by these changes in habitats.

Table 4-18. Impacts to Raptors under the Proposed Action.			
Raptor species that would benefit from emergent wetlands restoration	**Raptor species that would benefit from cottonwood forest restoration**	**Raptor species that would benefit from riparian and mesic shrub restoration**	**Raptor species that would not benefit nor be negatively impacted by the proposed action**
Northern harrier Rough-legged hawk Bald eagle Golden eagle	Red-tailed hawk Bald eagle Golden eagle Great horned owl	None	American kestrel
Source: Koehler 2000			

Other raptors that would benefit from the increase in emergent marsh habitat include the short-eared owl (*Asio flammeus*) and osprey (*Pandion haliaetus*). The western screech owl (*Otus kennicotti*) would also benefit from the increase in cottonwood forest. These species occur within the project area but were not observed during the 1998 and 1999 surveys.

4.3.6.2.2.3 Big Game Species. Big game species would benefit from all aspects of the Proposed Action: the increase of cottonwood forest, riparian and mesic shrub habitat; reduction of grazing; and increased availability of croplands for wildlife use (see Table 4-19). Although the entire project area has been mapped as year-round habitat for mule deer, a key limiting factor for the species in the area may be the historical loss of winter thermal cover (Nelms 1997). As a result, the largest benefit to mule deer may occur on the Riverdell North and Ted's Flat sites where large blocks of cottonwood forest and shrubby browse would be restored for a combined total of 6 miles along the Duchesne River.

Although moose are not expected to visit the project area on a consistent basis, particularly the Flume or Uresk Drain because of their proximity to Myton, this species would benefit from the increase in open water and aquatic vegetation in the Uresk Drain.

An increase of 210 acres of grassland and cropland managed specifically for wildlife would benefit mule deer, elk and pronghorn antelope.

Table 4-19. Impacts to Big Game Species under the Proposed Action.				
Big game species that would benefit from cottonwood forest restoration	**Big game species that would benefit from riparian and mesic shrub restoration**	**Big game species that would benefit from different management and increased quality of cropland**	**Big game species that would not benefit nor be negatively impacted by the proposed action**	**Big species that may be negatively impacted by the proposed action**
Elk Mule deer	Moose Mule deer	Elk Mule deer Pronghorn antelope	None	None
Source: Koehler 2000				

4.3.6.2.3 Upland Associated Species

All upland habitat types (grassland, cropland, annual weed and desert shrub) would be affected under the Proposed Action and would be placed under a different and advantageous wildlife management scheme that would eliminate grazing, change the mowing of grasslands to that necessary to maintain the habitat and to avoid bird nesting periods, remove weedy species and reserve 20 percent of the crop production for wildlife use. Under the Proposed Action, there would be a loss of 281 acres of grassland, a loss of 356 acres of desert shrub habitat, and a loss of 205 acres of annual weed/fallow habitat.

Table 4-20. Total Acres of Upland Habitats under the Proposed Action (Net Changes [Acres] Listed in Parentheses).

Habitat	Acres by Site				Total Acres
	Flume	Uresk Drain	Riverdell North/South	Ted's Flat	
Grassland	452 (+19)	576 (-91)	142 (-92)	158 (-117)	1,328 (-281)
Cropland	51	198	25	217	491
Desert shrub	471 (-157)	108 (-110)	561 (-15)	418 (-74)	1,558 (-356)
Annual weed/fallow	0 (-40)	0 (0)	304 (-165)	40	344 (-205)

Source: Koehler 2000

4.3.6.2.3.1 Upland Birds and Small Mammals. Upland birds and small mammals would show very similar gains under the Proposed Action as big game species since they often utilize the same habitat. Within the Uresk Drain, 201 acres of upland small mammal habitat would be temporarily lost due to the expansion of open water. However, upon habitat restoration, enhancement and improved management within the area, the remaining 882 acres of upland habitat would be of higher quality and therefore would ultimately benefit small mammal populations. The elimination of grazing on the Riverdell South and Uresk Drain sites would also improve upland habitat for many small mammals including the prairie dog and long-tailed weasel. A gain of 922 acres in cottonwood forest and 61 acres of riparian shrub habitat within the Flume and Riverdell North/South sites would provide edge areas and shrub habitat which upland birds and small mammals such as the ring-necked pheasant, wild turkey and California quail often use. The 2,163 total acres of managed croplands and grasslands for wildlife would also benefit the California quail, ring-necked pheasant, cottontail rabbit and mourning dove.

Table 4-21. Impacts to Upland Birds and Small Mammals under the Proposed Action.				
Upland birds and small mammals that would benefit from cottonwood forest restoration	**Upland birds and small mammals that would benefit from riparian and mesic shrub restoration**	**Upland birds and small mammals that would benefit by increases in cropland**	**Upland birds and small mammals that would not benefit nor be negatively impacted by the proposed action**	**Upland birds and small mammals that may be temporarily negatively impacted by the proposed action**
Cottontail rabbit Ring-necked pheasant Mourning dove Wild turkey	California quail Cottontail rabbit Ring-necked pheasant Mourning dove	California quail Cottontail rabbit Ring-necked pheasant Mourning dove	None	None
Source: Koehler 2000				

Ruffed grouse were not seen during the 1998 and 1999 wildlife surveys but are found in the area and would benefit from cottonwood forest improvements.

4.3.6.2.3.2 Raptors. Upland associated raptors such as the prairie falcon and ferruginous hawk use fields and prairies and may be temporarily negatively impacted from the loss of 281 acres of grassland habitat under the Proposed Action. However, this loss of habitat would be offset by a gain of 3,721 acres of improved upland habitat quality within the project area. A temporary negative effect on the ferruginous hawk and prairie falcon may occur as 91 acres of upland grassland would be converted to more mesic habitats within the Uresk Drain; however, this temporary loss would be offset by a gain in quality of the remaining adjacent upland habitat, which would benefit small mammal populations, which would in turn benefit these raptors. The remaining 576 acres of grassland habitat within the Uresk Drain would be improved by the elimination of cattle grazing and removal of invasive Russian olives. Improved habitat quality within the grassland, cropland and annual weed vegetation types within the Riverdell North property and the Uresk Drain would indirectly benefit the prairie falcon and ferruginous hawk by providing quality habitat for their prey. The Flume would provide 452 acres of grassland for hunting grounds for the prairie falcon and the ferruginous hawk.

4.3.6.2.4 Summary of Impacts

- The Proposed Action would improve habitat for all nine major wildlife species groups evaluated (shorebirds, waterfowl, furbearers, migratory songbirds, riparian associated raptors, big game, upland birds, small mammals and upland raptors).
- There would be some loss of upland habitat (281 acres of grassland, 356 acres of desert shrub and 205 acres of annual weed/fallow habitat) which would represent a temporary impact to some upland songbirds and upland-associated raptors. This temporary loss would be offset by the enhancement of the remaining upland habitat for nesting and feeding. The temporary loss would be experienced for approximately three

to five years as the upland habitat is restored.

- The value of the following important habitats would be increased, both in terms of size and habitat quality: migratory waterfowl habitat, migratory songbird habitat and deer winter range and fawning habitat.

Together, these represent significant beneficial impacts of the Proposed Action.

4.3.6.3 Pahcease Alternative

4.3.6.3.1 Wetland and Riparian Associated Species

Impacts to wetland and riparian associated species would be similar to impacts under the Proposed Action as described in section 4.3.6.2.1 and section 4.3.6.2.2; however, the number of habitat acres would be different as a result of different planning goals and project configurations as described in section 4.1.2 and section 4.21, Cumulative Impacts.

The two primary groups of species in which impacts would differ from those described for the Proposed Action are riparian associated migratory songbirds and big game: there would be differences in both the total acres and the degree of protected riparian corridor along the Duchesne River. Although both species groups would benefit from the Pahcease Alternative, the benefits associated with the restoration of the riparian corridor in the Ted's Flat site would not be included, with a total cottonwood forest restoration of 1,102 acres. Although riparian habitat would be restored in two large blocks, these blocks would be separated by more than 5 miles.

4.3.6.3.2 Upland Associated Species

As described for the Proposed Action, all upland habitat types (grassland, cropland, annual weed and desert shrub) would be affected under the Pahcease Alternative and would be placed under a different and advantageous wildlife management scheme. Under the Pahcease Alternative, there would be a loss of 111 acres of grassland, 14 acres of cropland, 288 acres of desert shrub habitat and 361 acres of annual weed/fallow habitat.

Table 4-22. Total Acres of Upland Habitats under the Pahcease Alternative (Net Changes [Acres] Listed in Parentheses).

Habitat	Acres by Site			Total Acres
	Flume	Uresk Drain	Riverdell North/South	
Grassland	813 (+72)	576 (-91)	142 (-92)	1,531 (-111)
Cropland	112 (-14)	198	25	335 (-14)
Desert shrub	770 (-163)	108 (-110)	561 (-15)	1,439 (-288)
Annual weed/fallow	0 (-196)	0 (0)	304 (-165)	304 (-361)

Source: Koehler 2000

4.3.6.3.2.1 Upland Birds and Small Mammals. Cottonwood forest habitat would be improved on 1,102 acres for upland birds and small mammals. The Flume would gain 236 acres of cottonwood forest and 813 acres of managed grassland that would potentially benefit the California quail, cottontail rabbit, ring-necked pheasant and mourning dove. Impacts to upland birds and small mammals within the Uresk Drain and Riverdell properties would be similar to those described in section 4.3.6.2.3.1. Under the Pahcease Alternative, 2,170 total acres of managed croplands and grasslands for wildlife would benefit the California quail, ring-necked pheasant, cottontail rabbit and mourning dove.

4.3.6.3.2.2 Raptors. Upland associated raptors would realize benefits under the Pahcease Alternative similar to those described in section 4.3.6.2.3.2 within the Uresk Drain and Riverdell sites. The Flume would provide 813 acres of grassland for hunting grounds for the prairie falcon and the ferruginous hawk under the Pahcease Alternative. No additional benefits would be realized at the Ted's Flat site for upland associated raptors.

4.3.6.3.3 Summary of Impacts

- The Pahcease Alternative would improve habitat for all nine major wildlife species groups evaluated.
- There would be some loss of upland habitat (111 acres of grassland, 14 acres of cropland, 288 acres of desert shrub habitat and 361 acres of annual weed/fallow habitat) which would represent a temporary impact to some upland songbirds and upland associated raptors. This temporary loss would be offset by the enhancement of the remaining upland habitat for nesting and feeding. The temporary loss would be experienced for approximately three to five years as the upland habitat is restored.
- The value of the following important habitats would be increased, both in terms of size and habitat quality: migratory waterfowl habitat, migratory songbird habitat and deer winter range and fawning habitat.

Together, these represent significant beneficial impacts of the Pahcease Alternative.

4.3.6.4 Topanotes Alternative

4.3.6.4.1 Wetland and Riparian Associated Species

Impacts to wetland and riparian associated species would be similar to those under the Proposed Action as described in section 4.3.6.2.1 and section 4.3.6.2.2; however the number of habitat acres would be different as a result of different planning goals and project configurations as described in section 4.1.2 and section 4.21, Cumulative Impacts.

The two primary groups of species for which impacts would differ from those described for the Proposed Action are riparian associated migratory songbirds and big game, as there would be differences in both the total acres and the degree of protected riparian corridor along the Duchesne River. Although both species groups would benefit from the Topanotes Alternative, the benefits associated with the restoration of the riparian corridor in the Riverdell North/South site would not be included, for a total riparian restoration of 1,237 acres. Although riparian habitat would be restored in two large blocks, these blocks would be separated by more than seven miles.

4.3.6.4.2 Upland Associated Species

As described for the Proposed Action, all upland habitat types (grassland, cropland, annual weed and desert shrub) would be affected under the Topanotes Alternative and would be placed under a different and advantageous wildlife management scheme. Under the Topanotes Alternative, there would be a loss of 136 acres of grassland, 14 acres of cropland, 347 acres of desert shrub habitat and 196 acres of annual weed/fallow habitat.

Table 4-23. Total Acres of Upland Habitats under the Topanotes Alternative (Net Changes [Acres] Listed in Parentheses).

Habitat	Acres by Site			Total Acres
	Flume	Uresk Drain	Ted's Flat	
Grassland	813 (+72)	576 (-91)	158 (-117)	1,547 (-136)
Cropland	112 (-14)	198	217	527 (-14)
Desert shrub	770 (-163)	108 (-110)	418 (-74)	1,296 (-347)
Annual weed/fallow	0 (-196)	0 (0)	40	40 (-196)

Source: Koehler 2000

4.3.6.4.2.1 Upland Birds and Small Mammals. Benefits to upland birds and small mammals within the Flume and Uresk Drain under the Topanotes Alternative would be similar to those described for the Proposed Action in section 4.3.6.2.3.1, but would differ in extent of benefits. Cottonwood forest habitat would be improved on 987 acres for upland birds and small mammals, but much of this habitat would not be contiguous. The

2,114 total acres of managed croplands and grasslands for wildlife would benefit the California quail, ring-necked pheasant, cottontail rabbit and mourning dove. No land management changes or improvements on the Riverdell property under the Topanotes Alternative would benefit small mammals such as the prairie dog and long-tailed weasel.

4.3.6.4.2.2 Raptors. Upland associated raptors would realize benefits under the Topanotes Alternative similar to those described for the Proposed Action (section 4.3.6.2.3.2) within the Uresk Drain site. The Flume would provide 813 acres of grassland for hunting grounds for the prairie falcon and the ferruginous hawk under the Topanotes Alternative. One hundred and fifty-eight acres of grassland and 217 acres of cropland at Ted's Flat would further benefit upland associated raptors. The exclusion of the Riverdell property would not improve habitat for the prey of raptors.

4.3.6.4.3 Summary of Impacts

- The Topanotes Alternative would improve habitat for all nine major wildlife species groups evaluated.
- There would be some loss of upland habitat (136 acres of grassland, 14 acres of cropland, 347 acres of desert shrub habitat and 196 acres of annual weed/fallow habitat) which would represent a temporary impact to some upland songbirds and upland associated raptors. This temporary loss would be offset by the enhancement of the remaining upland habitat for nesting and feeding. The temporary loss would be experienced for approximately three to five years as the upland habitat is restored.
- The value of the following important habitats would be increased, both in terms of size and habitat quality: migratory waterfowl habitat, migratory songbird habitat and deer winter range and fawning habitat.

Together, these represent significant beneficial impacts of the Topanotes Alternative.

4.3.6.5 No Action Alternative

4.3.6.5.1 Wetland Associated Species

4.3.6.5.1.1 Shorebirds. Shorebird habitat within the project area consists of emergent marsh, wet meadows, and mudflats currently existing on the four mitigation sites and along the shoreline of the Duchesne River. Under the No Action Alternative, no habitat improvements would be made and there would be no change in current shorebird habitat. Pepperweed would likely continue its recent expansion into existing wetlands, reducing habitat value for shorebirds where habitat currently occurs.

4.3.6.5.1.2 Waterfowl. Current waterfowl habitat within the project area consists of the active river channel of the Duchesne River and approximately 875 acres of emergent wetland habitat and 535 acres of cropland that currently exist at all of the four potential mitigation sites. Under the No Action Alternative, no change in waterfowl habitat would occur. No emergent wetlands would be improved, no change would occur in the amount of cropland, nor would the management of the currently existing cropland change. Waterfowl use would be restricted to only a few small areas within the corridor.

4.3.6.5.1.3 Furbearers. Under the No Action Alternative, there would be no increases in emergent marsh habitat or cottonwood forest habitat. Cottonwood forests would continue to decline, as would habitat for beaver. There would be no change in emergent marsh habitat for muskrat.

4.3.6.5.2 Riparian Associated Species

4.3.6.5.2.1 Migratory Songbirds. Under the No Action Alternative, native cottonwood forest and native shrub habitats would continue to decline and be replaced by less valuable non-native species such as Russian olive and tamarisk. As a result, nesting habitat and reproductive success would continue to decline for migratory songbirds.

4.3.6.5.2.2 Raptors. Under the No Action Alternative, none of the raptor habitat types would be improved and current management would continue. The continued decline in cottonwood forest would decrease nesting and perching habitat for raptors.

4.3.6.5.2.3 Big Game Species. Under the No Action Alternative, overall big game habitat would continue to decline as native cottonwood forest and shrub habitats die and are replaced by less valuable non-native species such as Russian olive and tamarisk. Current management of croplands would continue without regard to benefits for wildlife.

4.3.6.5.3 Upland Associated Species

4.3.6.5.3.1 Upland Birds and Small Mammals. Under the No Action Alternative no habitat improvements would be conducted and no benefits to upland birds and small mammals would be realized. Native cottonwood forest and native shrub habitats would continue to decline and be replaced by less valuable non-native species such as Russian olive and tamarisk. Current management of croplands would continue without regard to benefits for wildlife.

4.3.6.5.3.2 Raptors. No improvement of habitat for upland associated raptors would occur under the No Action Alternative. Prey species for raptors would decline as non-native species would continue to provide lower quality habitat.

4.3.6.5.4 Summary of Impacts

- The No Action Alternative would not improve habitat for any of the nine major wildlife species groups evaluated.
- Under the No Action Alternative, no areas would be managed for wildlife benefits; there would therefore be no continuity among sites. Wetlands would continue to be small and isolated, and consist mostly of patches of small wetlands interspersed among grazed wetlands.
- The riparian forested corridor would continue to be limited to widths of a few hundred feet, much less than the minimum recommended width to protect area-sensitive riparian species. This width would be reduced as older cottonwoods die and are replaced by non-native species. There would be no interconnection of habitats managed for wildlife.
- There would be no increase in the size or habitat quality of migratory waterfowl habitat, migratory songbird habitat or deer winter range or fawning habitat.

4.4 THREATENED, ENDANGERED AND CANDIDATE SPECIES

4.4.1 Introduction

This section discusses possible impacts to threatened, endangered and candidate species (also referred to as listed species) and critical habitat that may occur in the area of influence of the Proposed Action and alternatives. Appendix E contains official correspondence from the FWS identifying listed species potentially occurring in the project area. Table 4-24 lists these species and identifies their status (endangered [E], threatened [T], proposed threatened [PT], proposed endangered [PE] or candidate [C]). Definitions of each of these terms are provided below.

Endangered Species. Any species that is in danger of extinction throughout all or a significant portion of its range.

Threatened Species. Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Proposed Threatened Species. Any species that has been proposed for listing as threatened on the Federal Register.

Proposed Endangered Species. Any species that has been proposed for listing as endangered on the Federal Register.

Candidate Species. Any species for which substantial biological information exists to support the biological appropriateness of proposing to list the species as endangered or threatened.

Critical Habitat. Specific areas that contain physical or biological features essential for the conservation of a listed species and that may require special management considerations or protection.

The information provided in this section regarding the current status of wildlife species is based on consultation with the FWS Ecological Services - Salt Lake City Office, literature review of the potentially impacted species, wildlife surveys conducted by the Ute Tribe and the FWS (Koehler 2000) and aerial photograph analysis, habitat mapping and habitat surveys conducted during the project feasibility analyses (WWS 1998a, 2000). Readers are also directed to section 4.2, Wetland and Riparian Habitats, for a description of wildlife habitat types and section 4.3, Wildlife Resources, for an analysis of impacts to other wildlife species.

4.4.2 Issues Eliminated from Further Analysis

No listed species issues raised during the public scoping or agency consultation process were eliminated. All were analyzed.

4.4.3 Issues Addressed in the Impact Analysis

The following issues raised during agency consultation are addressed in this analysis:

- Would the project affect listed species through mortality, disturbance during key life history stages or habitat degradation?
- Would the project affect critical habitat for the Colorado River endangered fish?

4.4.4 Area of Influence

The project area of influence for listed species varies according to species. The area of influence for threatened and endangered plant and wildlife species includes the areas depicted on Figure 1-2 in portions of Duchesne and Uintah Counties in northeast Utah. The area of influence for the endangered Colorado River fish species includes the Duchesne River and its active floodplain from the town of Myton to the confluence with the Green River at Ouray.

4.4.5 Affected Environment

4.4.5.1 Introduction

The following table provides a list of all threatened, endangered and candidate species potentially occurring within the project area of influence. The habitat requirements and known distribution of each listed species are described below.

Table 4-24. Threatened, Endangered, Candidate and Proposed Threatened Species Potentially Occurring in the LDWP Vicinity.

Common Name	Scientific Name	Status[1]
Plant Species		
Uinta Basin hookless cactus	*Sclerocactus glaucus*	T
Ute ladies'-tresses	*Spiranthes diluvialis*	T
Fish Species		
Bonytail	*Gila elegans*	E
Colorado pikeminnow	*Ptychocheilus lucius*	E
Humpback chub	*Gila cypha*	E
Razorback sucker	*Xyrauchen texanus*	E
Wildlife Species		
Bald eagle	*Haliaeetus leucocephalus*	T
Mountain plover	*Charadrius montanus*	PT[2]
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	C

Source: Koehler 2000

[1] C = candidate, E = endangered, PT = proposed threatened, T = threatened
[2] The proposed listing for mountain plover was withdrawn on September 8, 2003.

4.4.5.2 Listed Plant Species

4.4.5.2.1 Uinta Basin Hookless Cactus

The Uinta Basin hookless cactus is a threatened species that occurs on alluvial terraces near the confluence of the Green, White and Duchesne Rivers in southeastern Duchesne County and in the Myton area. The species is found between elevations of 4,500-5,900 feet. It occurs on varying exposures, but is more abundant on south facing exposures and on slopes up to 30 percent grade. It is most abundant at the point where terraces change from a relatively level slope to a steeper side slope. The species generally occurs on coarse, cobble, gravel or rock deposits, rarely occupying either fine-textured alluvial deposits or well-developed upland desert soils. Common associates include saltbush (*Atriplex* spp.), black sage (*Artemisia nova*), rabbitbrush (*Chrysothamnus viscidiflorus*) and Indian rice grass (*Achnatherum hymenoides*).

There are three known populations of the Uinta Basin hookless cactus in the LDWP vicinity: (1) at the Ouray National Wildlife Refuge, where the population extends into the adjacent town of Ouray, Utah and south along the Green River to Sand Wash, (2) the bluffs above the upper Wissiups and (3) on the Riverdell North property (FWS 1990a and 1990b, WWS 1998a). The population on the Riverdell North property is the only population within the LDWP area.

4.4.5.2.2 Ute Ladies'-tresses

Ute ladies-tresses is a threatened orchid species that occurs in several population centers in the Intermountain West. In the Uinta Basin, Ute ladies'-tresses has been identified along Currant Creek, the upper Duchesne River and all of its major tributaries (Rock Creek, Yellowstone River, Uinta River, Whiterocks River and Lake Fork River), the lower Duchesne River (near the town of Duchesne) and in the upper Green River watershed (WWS 1998b).

The orchid occurs along stream banks, gravel bars, old oxbows and moist to wet meadows along perennial freshwater streams and springs at elevations ranging from approximately 4,300-6,900 feet (FWS 1992). It has also been found in irrigated and sub-irrigated pastures that are mowed or moderately grazed. In general, the orchid occurs in relatively open grass and forb-dominated habitats and is apparently intolerant of dense shade. Common associates include young willows (*Salix* spp.), redtop (*Agrostis stolonifera*), scouring rush (*Equisetum laevigatum*), annual Indian paintbrush (*Castilleja exilis*), sedges (*Carex* spp.), wiregrass (*Juncus articus*) and glaux (*Glaux maritima*). Non-native competitors of Ute ladies'-tresses include Russian olive, tamarisk, thistles (*Cirsium* spp.), yellow and white sweet-clovers (*Melilotus officinalis* and *M. alba*) and pepperweed.

Soils in occupied habitats are usually described as coarse-textured, cobbly loams, loamy sand, alluvial gravelly loam or as a soil layer overlaying cobblestone. Occasionally the species is found in peaty soils but it has not been found in clays. Ute ladies'-tresses is tolerant of flooding and flood disturbance but not prolonged inundation or drought. Once established, it can tolerate slightly drier conditions (Riedel 1992), but still requires moisture within the rooting zone throughout the growing season. As a riparian wetland species, Ute ladies'-tresses is most often found in the 2-year floodplain, although it has

been observed in areas inundated less frequently (Gecy and Black 1996).

Ute ladies'-tresses is known to occur along the upper Duchesne River, just east of the town of Duchesne and 20 miles upstream of the project area. Potential habitat for the species occurs along the Duchesne River throughout the project area in small scattered floodplain patches; however, extensive surveys of this section of the river have failed to locate the species downstream of the town of Duchesne (Jordan 2002). Ute ladies'-tresses can also occur in non-riparian wet meadows. The potential for non-riparian wet meadows in the LDWP project area to support the species is limited by heavy grazing and the underlying clay soils. Additionally, the species was not observed in these habitats during wetland field assessments conducted during July and August in 1996, 1997 and 1999.

4.4.5.3 Listed Fish Species

4.4.5.3.1 Bonytail

Bonytail is the rarest of the four endangered fish species in the Colorado River system. They occupy pools and eddies within the Green and Colorado Rivers where they feed on terrestrial and aquatic insects. Spawning occurs in large groups over gravel bars in relatively deep water (30 feet deep) in late spring or early summer (Jonez and Summer 1954, Wagner 1955). There are no records of bonytail use of the Duchesne River.

4.4.5.3.2 Colorado Pikeminnow

The endangered Colorado pikeminnow is endemic to the Colorado River basin. It inhabits mainstem waters and medium-sized tributaries including the Duchesne River. The Colorado pikeminnow is the largest cyprinid (minnow family) in North America. Historically, adult pikeminnow attained lengths of more than three feet and individuals exceeding 44 pounds were common. Cranny (1994) observed Colorado pikeminnow in the Duchesne River as far upstream as river mile 13.6, which is near the Ted's Flat site. Modde and Haines (2002) caught Colorado pikeminnow near the Highway 40 bridge over the Duchesne River in Myton (the "Myton Bridge") at river mile 33.4. (River miles indicate the distance along the Duchesne River upstream from its confluence with the Green River.) There is no evidence of Colorado pikeminnow spawning, recruitment or overwintering use of the Duchesne River. Even though the Duchesne River is used by Colorado pikeminnow, it is not designated critical habitat for the species.

4.4.5.3.3 Humpback Chub

Endangered humpback chub populations are concentrated in canyons of the Green and Yampa Rivers. Adult habitat consists of deep pools and shoreline eddies. Young fish occupy warm, quiet habitats such as backwaters and eddies. There are no records of humpback chub use of the Duchesne River and no suitable habitat is believed to exist in the project area.

4.4.5.3.4 Razorback Sucker

The endangered razorback sucker is found in warm water reaches of the Green River and lower portions of major tributaries to the Green River. Razorback sucker primarily occur in flat water sections of the middle Green River between the Duchesne and Yampa Rivers. Adult habitat includes runs, pools, eddies and seasonally flooded lowlands (floodplains).

Cranny (1994) observed razorback sucker in the Duchesne River as far upstream as river mile 12.6, approximately 2 miles downstream from the Ted's Flat site. Modde and Haines (2002) caught one adult razorback sucker near the confluence of the Duchesne and Green Rivers. Researchers believe that razorback sucker primarily use only the part of Duchesne River directly influenced by the Green River (i.e., the lower 2.5 miles). This section may be important for spawning. The lower 2.5 miles of the Duchesne River are designated as critical habitat for the species.

4.4.5.4 Listed Wildlife Species

4.4.5.4.1 Bald Eagle

The threatened bald eagle is often found near water, particularly lakes and rivers. Wintering bald eagles have been observed within the project area at all of the potential mitigation sites except the Uresk Drain (Koehler 2000). During the winter of 1999, 10 eagles were observed on the Riverdell North site in the cottonwood trees bordering the Duchesne River. During the same time period, five eagles were observed on the Ted's Flat site and one on the Flume site. Nesting was not observed and use appears to be restricted to the winter months (December-March). Bald eagles will often perch in large trees, snags or anything that affords a good view of the surrounding area. They often feed on fish but will take small mammals (particularly rabbits), reptiles and waterfowl. Bald eagles will also feed on carrion. Large cottonwoods and other trees located near rivers, lakes, marshes or other wetland areas are often used for nesting, perching and roosting. Bald eagles do not nest in the project area but do nest elsewhere in the state of Utah.

4.4.5.4.2 Mountain Plover

The mountain plover was a proposed threatened species until September 8, 2003. Although the proposed listing was withdrawn, the species is still identified in the FWS letter as a species to be considered. Therefore, the mountain plover is still addressed in this document. Unlike other plovers, mountain plovers show no affinity to water, instead preferring arid habitats such as short dry grassland and low desert shrub. They are often associated with prairie dog communities. They prefer open country with vegetation cover less than four inches tall (FWS 2001). Plover feed almost exclusively on insects, mainly grasshoppers, though beetles and crickets make up a large portion of their diet. They feed in loose flocks and will fly a short distance before landing when disturbed. They migrate south and west for winter. Mountain plovers are not found in areas with dense, matted vegetation, grass taller than four inches or wet soils (FWS 2001). There are approximately 60 acres of unoccupied, but potential habitat on the Riverdell North property.

4.4.5.4.3 Western Yellow-billed Cuckoo

The western yellow-billed cuckoo is a candidate species that has experienced severe declines in the western United States, primarily due to the decline in cottonwood forests and wooded river bottom habitats. The yellow-billed cuckoo nests in riverine woodlands with cottonwood forests, with dense understory constituting the bulk of available habitat in western states. It feeds on insects, especially hair caterpillars, berries and fruit. Occasionally it will eat frogs and lizards. The yellow-billed cuckoo is a migrant, wintering in South America.

Potential habitat within the project area includes cottonwood forest and riparian shrub.

4.4.6 Impact Analysis

4.4.6.1 Significance Criteria

Impacts to listed species would be considered significant if the project were to result in:

- Any adverse effects on listed or candidate species,
- Direct impacts to a listed or candidate species through "take," defined by the Endangered Species Act as "harm, hunting, wounding, killing, or harassment." Harassment includes activities resulting in increased stress during critical life history stages such as nesting, migration or wintering,
- Loss or degradation of designated critical habitat,
- Loss or degradation of occupied or potential listed species' habitat, or
- Activities precluding or reducing the effectiveness of recovery goals or measures.

These significance criteria are based on the Endangered Species Act (ESA) of 1973 (Public Law 93 - 205, as amended), which provides protection to threatened and endangered species from federally authorized or funded actions that may jeopardize their existence. The ESA also prohibits "take"of endangered species through impacts to individuals or their habitat.

4.4.6.2 Proposed Action

4.4.6.2.1 Introduction

Of the nine listed species potentially occurring within the LDWP project vicinity, only two plant species, two fish species and three wildlife species are known to occur or have potential habitat within the project area of influence. Potential impacts as a result of the LDWP construction and operation are described below and summarized in Table 4-25 for these seven species only.

4.4.6.2.2 Uinta Basin Hookless Cactus

The Riverdell North population of the Uinta Basin hookless cactus is located within the desert shrub habitat north of the Riverdell Canal. The soils in this area are not suitable for wetlands and the only restoration activity occurring in this habitat would be the removal of cattle grazing, which would benefit the species as it is susceptible to trampling by cattle (FWS 1990b). The population would be fenced during construction to ensure that no inadvertent access occurs by construction workers or equipment. Additional protection would be afforded during project operation through the restriction of public use of motorized vehicles on the Riverdell North site (see section 2.1.4.2).

Desert shrub habitat on the Flume, Uresk Drain and Riverdell South sites would be affected by conversion to wetlands and/or mechanized seeding. The likelihood of the Uinta Basin hookless cactus occurring in the majority of the desert shrub habitat found on these sites is low due to the predominance of fine-textured soils and the dominance of greasewood, which is not a common associate. Suitable soils could occur on the portion of the Uresk Drain adjacent to the

Myton Townsite Canal and the Ted's Flat North site, where more coarse-textured soils dominated by saltbush and sagebrush desert shrub occur. There are no restoration measures other than cattle exclusion proposed in or near either of these areas.

There would be no conversion of desert shrub habitat containing or potentially containing Uinta Basin hookless cactus to another habitat.

4.4.6.2.3 Ute Ladies'-tresses

The Ute ladies'-tresses orchid has not been observed within the LDWP area. Potential non-riparian wet meadow habitat for the species is limited by the area's underlying clay soils.

Ute ladies'-tresses occur along the Duchesne River 20 miles upstream from the LDWP area, but it has not been found along the Duchesne River within the LDWP area. A small portion of the active floodplain contains open wet meadows that could provide Ute ladies'-tresses habitat, but the majority of the floodplain is dominated by Russian olive and tamarisk. The Proposed Action would remove 668 acres of Russian olive and tamarisk from the Duchesne River floodplain and replant the 2- to 5-year floodplains with native woody riparian species. Since floodplain habitats dominated by Russian olive and tamarisk have little to no potential for Ute ladies'-tresses, these activities would not have any adverse impact. According to the standard operating procedures (SOPs) listed in Appendix A, open wet meadow habitats would be surveyed for Ute ladies'-tresses prior to planting with woody vegetation and planting would be restricted on any floodplain surfaces containing the species.

4.4.6.2.4 Colorado Pikeminnow

Colorado pikeminnow use the Duchesne River up to the Myton Bridge, where a fish barrier precludes pikeminnow from traveling further upstream (Cranny 1994, Modde and Haines 2002). Impacts to the Colorado pikeminnow from the Proposed Action would occur if: (1) Duchesne River flows were altered downstream of Myton, (2) the salinity of the Duchesne River increased downstream of Myton, or (3) if adults were trapped in oxbows that were reconnected to the river. The primary sites where entrapment could occur are in the Flume oxbow system, the Riverdell North oxbow and potentially the Ted's Flat oxbow system. However, the fish barrier above the Myton bridge prevents Colorado pikeminnow from reaching the stretch of the Duchesne River at the Flume site, eliminating any possibility of entrapment in the rewatered oxbows on the Flume site. The possibility of entrapment exists at the Riverdell North and Ted's Flat oxbows, though studies have indicated that most adult fish leave flooded areas when the water starts to recede; therefore, the risk of entrapment is considered minimal (Modde 2002).

The LDWP would not reduce Duchesne River flows. The LDWP would decrease the concentrations of salts and contaminants in the Duchesne River (see section 4.6.6). No impacts to the Colorado pikeminnow are anticipated as a result of the Proposed Action.

4.4.6.2.5 Razorback Sucker

Razorback sucker occur in the Duchesne River as far upstream as the Ted's Flat site, though they most often occur in the lower 2.5 miles of the Duchesne River, which is designated as critical habitat under the Endangered Species Act (Modde and Haines

2002, Archer et al. 1986, Tyus and Saunders 2001). The risk of entrapment in rewatered oxbows is negligible as razorback suckers are very rare above the lower 2.5 miles of the Duchesne River, and the Ted's Flat site is approximately 12 miles upstream of the critical habitat.

The LDWP would not reduce Duchesne River flows. The LDWP would decrease the concentrations of salts and contaminants in the Duchesne River (see section 4.6.6). No impacts to the razorback sucker or its designated critical habitat are anticipated as a result of the Proposed Action.

All of the water to be used for the LDWP is either Uintah and Ouray Irrigation Project water or water associated with the Riverdell North property. Potential effects of use of this water on the Colorado River fish have been addressed in the 1998 Biological Opinion on the Duchesne River (FWS 1998). No other water will be used for the project, nor will any new depletions occur.

4.4.6.2.6 Bald Eagle

The bald eagle would benefit from the Proposed Action. The restoration and creation of cottonwood forest would provide roosting, feeding and possibly nesting habitat. The increase in wetland habitats would provide more areas for feeding. There could be some temporary displacement of wintering bald eagles by construction activities in November and March (primarily weed control and planting) but this effect would be limited by scheduling late fall and early spring activities in areas away from key wintering roosts as much as possible. If weed control would need to occur near key roosts during November or March, the activities would be limited to a single year of short-term disturbance.

4.4.6.2.7 Mountain Plover

A small amount of potential suitable habitat (approximately 60 acres of prairie dog community) exists on the Riverdell North property. There are no records of mountain plovers occupying this habitat and none were observed during songbird and wildlife surveys in 1998 and 1999 (Koehler 2000). This habitat will be avoided to prevent direct project impacts to the prairie dog community within the project area. This habitat may revert back naturally to a native desert shrub community.

4.4.6.2.8 Western Yellow-billed Cuckoo

There are currently approximately 818 acres of cottonwood forest in the project area that are considered potential habitat, though no yellow-billed cuckoos were observed in the project area during the wildlife surveys in 1998 through 1999 (Koehler 2000). Under the Proposed Action, there would be a temporary loss of 4.3 acres of cottonwood forest, but a permanent net gain of 855 acres. There is a possibility for temporary displacement during construction, which would last no longer than one year. Vegetation planting to restore a multi-canopy understory will improve the suitability of cottonwood habitat for the yellow-billed cuckoo.

4.4.6.3 Pahcease Alternative

Impacts to listed species under the Pahcease Alternative would be the same as for the Proposed Action, with the exception that there would be no possibility for entrapment of

endangered Colorado River fish in the Ted's Flat oxbow system.

4.4.6.4 Topanotes Alternative

Impacts to listed species under the Topanotes Alternative would be the same as for the Proposed Action, with the following exceptions:

- There are no known populations of the Uinta Basin hookless cactus in the Topanotes Alternative project area; therefore, there would be no impacts (beneficial or adverse) to existing populations.
- Temporary displacement of wintering bald eagles on the Riverdell North property would not occur.
- There would be no possibility for entrapment of endangered Colorado River fish in the Riverdell North oxbow as a result of the project.

4.4.6.5 No Action Alternative

Under the No Action Alternative, there would be no adverse impacts to listed species associated with the construction and operation of the LDWP. Likewise, the beneficial impacts of the project on the Uinta Basin hookless cactus (restriction on vehicular access and grazing in known populations), Ute ladies'-tresses (potential habitat creation through noxious weed removal), bald eagle (increases in wintering roosting and feeding habitat) and western yellow-billed cuckoo (increases in riparian habitats) would not be realized.

Over the long-term, noxious weeds would increase in wetlands, adversely affecting potential habitat for Ute ladies'-tresses, and mature cottonwoods would die without replacement, adversely affecting the bald eagle and yellow-billed cuckoo.

Table 4-25. Impacts to Species Known to Occur or with Potential Habitat Within the LDWP Project Area under the Proposed Action and Alternatives.

Species	Occurs in LDWP	Potential habitat in LDWP	Potential Impacts			
			Proposed Action	Pahcease Alternative	Topanotes Alternative	No Action Alternative
Uinta Basin hookless cactus	X	X	No adverse effects to occupied or potential habitat. Beneficial impacts through restrictions on vehicle use and grazing.	Same as Proposed Action	No adverse or beneficial impacts	No adverse or beneficial impacts
Ute ladies'-tresses		?	No adverse effects. Increase in potential riparian habitat through noxious weed removal.	Same as Proposed Action	Same as Proposed Action	No adverse or beneficial impacts
Colorado pikeminnow	X	X	No adverse effects through entrapment in oxbows or changes in Duchesne River water quantity or quality.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Razorback sucker		X	No adverse effects through entrapment in oxbows or changes in Duchesne River water quantity or quality.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Bald eagle	X	X	Potential temporary adverse effects through displacement during construction. Long-term benefits through increases in winter roosting and feeding habitat.	Same as Proposed Action	Same as Proposed Action	No short term adverse or beneficial impacts. Long term loss of roosting habitat.
Mountain plover		X	No adverse impacts through the conversion of potential habitat to other habitats.	Same as Proposed Action	No adverse impacts	No adverse impacts
Western yellow-billed cuckoo	X	X	Potential temporary adverse effects through displacement during construction. Long-term benefits through increases in habitats used during migration for feeding and resting.	Same as Proposed Action	Same as Proposed Action	No short-term adverse or beneficial impacts. Long-term loss of potential riparian habitat.

4.5 WATER RESOURCES

4.5.1 Introduction

This analysis addresses potential impacts on surface water and groundwater from the construction and operation of the Proposed Action and alternatives. The following water resource topics are addressed in the impact analysis:

- Changes in Duchesne River flows, and
- Changes in water supply patterns that affect the availability of water for existing water rights.

The hydrologic data used in this analysis is based on mean daily streamflow data for the Duchesne River at Myton. The Flume and Uresk Drain sites are located upstream of the Myton gage, and the Riverdell and Ted's Flat sites are located two to five miles downstream of the Myton gage. Flow data for the Myton gage was previously summarized and presented in WWS (1998a). Streamflow data for the Myton gage are generally of "fair" accuracy (USGS 1995), indicating that about 95 percent of daily discharges are within 15 percent of the true value. In winter months, during ice conditions at the gage, some historical records have been of "poor" accuracy, indicating that recorded flow data are more than 15 percent from their true value. Flow data from the Randlett gage (USGS gage station #09302000) are also used in this report. Streamflow records for the Randlett gage are poor.

4.5.2 Issues Eliminated from Further Analysis

No water resource issues were eliminated from analysis.

4.5.3 Issues Addressed in the Impact Analysis

The following issues raised during public scoping and agency consultation are addressed in this analysis:

- Would Duchesne River flows be affected through changes in the timing or amount of diversions or measurable changes in return flows?
- Would the LDWP change current water supply patterns, reduce water availability to or interfere with the water rights of existing users?

4.5.4 Area of Influence

The area of influence for water resources includes the Duchesne River and its historic floodplain between the Flume site, just east of Bridgeland, and the confluence of the Duchesne and Uinta Rivers near Randlett (Figure 1-2).

4.5.5 Affected Environment

4.5.5.1 Duchesne River Flows

Within the project area, the Duchesne River flows eastward from Bridgeland to Randlett. The river flows through an alluvial valley that averages 1-1 ½ miles in width and consists of

deposits of clay, silt, sand and gravel that are generally less than 15 feet thick. The valley contains numerous off-channel depressions and oxbow lakes that mark former positions of the Duchesne River. In all but a few cases, these oxbows and off-channel depressions are no longer directly connected to the river but are instead supported primarily by irrigation return flows or local groundwater discharge.

The main geologic formation exposed in the project area is the Uinta Formation, which consists mainly of calcareous shale with some beds of limestone, claystone, siltstone and sandstone. Deposits of the Uinta Formation tend to be coarser near the margins of the basin, east and west of the project area, and finer grained within the project area. The Uinta Formation grades upward into the Duchesne River Formation. Beds of the upper Uinta Formation and the lower Duchesne River Formation form a common aquifer that is one of seven known groundwater aquifers within the Uinta Basin (Hood and Fields 1978). The uppermost aquifer consists of shallow, unconsolidated gravels of Quaternary age adjacent to and underlying the major stream valleys. The general direction of flow in this aquifer is to the south and towards the Duchesne River channel. There are three main mechanisms of recharge of this aquifer: direct recharge from surface water during periods of high flow, deep percolation from irrigated fields and deep percolation and seepage from the canal system within the Uinta Basin.

Two major Duchesne River tributaries join the mainstem within the project area. The Lake Fork River joins the Duchesne River near Myton and the Uinta River joins the Duchesne River near Randlett. A few smaller tributary streams enter the Duchesne River from both the north and south within the project corridor. Combined, these smaller streams provide only a very small percentage of the total flow of the Duchesne River. Downstream from Randlett, the Duchesne River flows southeast to its confluence with the Green River.

Flows in the Duchesne River have been successively reduced over time due to both local and inter-basin diversions. Between 1912 and 1930, most diversions were local, although some trans-basin diversions began as early as 1915 (see section 1.3.3). The largest and most recent diversions occurred as a result of the CUP, with the completion of Starvation and Stillwater Reservoirs and the enlargement of Strawberry Reservoir. The most recent change in the magnitude of water diversions has occurred since 1989 following the closure of Stillwater Reservoir on Rock Creek. For this reason, the period of record chosen for the baseline summary of Duchesne River flows is the period from 1989 to 2002. Although only representing a 14-year period of record, streamflows during this period more accurately reflect the current Duchesne River flow regime.

Since 1989, annual discharge of the Duchesne River has averaged 168,142 acre-feet at the Myton gage and 258,361 acre-feet at the Randlett gage. The Myton gage is located 3 miles downstream of the Lake Fork River and 1 mile downstream of the U.S. Highway 40 bridge in Myton. The Randlett gage is located 0.25 miles downstream of the confluence with the Uinta River and 1.2 miles southeast of Randlett. Average streamflow has been 232 cfs at Myton and 357 cfs at Randlett. Annual peak flows have averaged 1,857 cfs at Myton and 2,942 cfs at Randlett. The maximum peak flows have been 5,130 cfs at the Myton gage in June 1999 and 7,000 cfs at the Randlett gage in June 1995. The minimum streamflow

recorded at the Myton gage was 3.1 cfs in April 1992 and the minimum recorded streamflow at the Randlett gage was 0.78 cfs in August 2002.

At the Myton gage, 64 percent (106,880 acre-feet) of the annual discharge occurs during the irrigation season of April 1 through October 31; 43 percent (73,028 acre-feet) of annual discharge occurs from May 1 through July 31 during spring snowmelt. At Randlett, 66 percent (171,346 acre-feet) of annual discharge occurs during the irrigation season and 45 percent (116,340 acre-feet) occurs during spring discharge. Since 1989, the average date of the spring discharge peak has been June 7 at both gage sites, and approximately two-thirds of the spring peaks have occurred within two weeks of this date.

The Myton gage records streamflows resulting from flows in the Duchesne River and Lake Fork River plus return flows from lands irrigated by the Duchesne Feeder, Grey Mountain, Myton Townsite, Pahcease, Midview and Dry Gulch Canals. Flows on the lower Lake Fork River have not been gaged since 1981. In most years, Lake Fork is mostly dewatered in late summer below the Pahcease Canal inlet and only irrigation return flows enter the Duchesne River during the irrigation season. Flows at the Randlett gage includes irrigation return flows occurring between Myton and Randlett plus inflows from the Uinta River. Mean daily flows for the Uinta River near Randlett are available only for water years (October 1 through September 30) 1977-1981 and 1998-2002. For the available period of record, annual discharge from the Uinta River has averaged 73,407 acre-feet per year. In the analysis that follows, baseline flows for the Uinta River for average, wet and dry years are estimated by taking the difference between gaged flows at Randlett and the estimated flow in the Duchesne River below the Ouray School Canal inlet. Water diversions and resulting streamflows within the project area are described more completely in section 4.5.5.2.

4.5.5.2 Local Irrigation Diversions

There are eight major canal systems in the lower Duchesne River that deliver water within the Uinta Basin. Two of these canals, the Grey Mountain Canal and the Duchesne Feeder Canal, have diversion points 3.0 miles and 3.9 miles, respectively, west of the project area boundary. These two canals are responsible for almost 78 percent of the local diversions (WWS 1998a), with annual diversions totaling approximately 113,000 acre-feet. The Grey Mountain Canal traverses the southern boundary of the project area between Bridgeland and Myton. It supplies water mostly to South Myton Bench and Pleasant Valley, both of which are outside of the project area, but the canal also supplies water to land within the Flume. The Duchesne Feeder Canal supplies water to the Midview Reservoir and the Moon Lake Canal, both of which are also outside the project area.

Upstream of Bridgeland, the Duchesne Feeder Canal diverts approximately 44,100 acre-feet of water annually for irrigation of lands within the Duchesne River and Lake Fork valleys. The Grey Mountain Canal diverts an average of roughly 67,800 acre-feet annually, of which about 22,697 acre-feet are used within the project area. The remainder of the Grey Mountain Canal diversions are used outside the Duchesne River floodplain. Since 1989, approximately 19,074 acre-feet of water have been diverted annually by the Myton Townsite Canal. Return flows from the Grey

Mountain and Duchesne Feeder Canals generally re-enter the Duchesne River upstream of the Myton gage site. Return flows from the Myton Townsite Canal re-enter the river downstream of Myton.

Downstream of Myton, and within the project area, the Riverdell Canal has diverted an average 447 acre-feet per year and the Ouray School Canal has diverted an average 10,516 acre-feet per year. Return flows from these diversions re-enter the Duchesne River upstream of the Randlett gage. The diversion point of the Myton Townsite Canal is located 2 miles west of Myton. The diversion points of the Riverdell and Ouray School Canals are located 2 miles east and 9 miles east, respectively, of the town of Myton.

Most of the water diverted from the Duchesne River within the project area boundary is used to irrigate pasture lands. Based on the irrigation duty schedule of 4.0 acre-feet/acre and consumptive use of 1.95 acre-feet/acre for irrigated pastures (Hill 1994), the average return flow percentage is estimated to be 51.1 percent. Duchesne River summer baseflows and irrigation deliveries downstream of the Myton Townsite Canal are dependent on receiving return flows. On average, 52,287 acre-feet of water are diverted from the river for use within the project area of influence and return flows total 26,718 acre-feet. Another 22,535 acre-feet of water occurs as return flows from lands irrigated by the Duchesne Feeder Canal. The average diversion amounts for canals within the project area is shown in Table 4-26. Figure 4-1 shows the location of the major canals, gages, major inflow points and their average contribution to the Duchesne River flow.

Table 4-26. Major Canals Delivering Water within the LDWP Area and Average Diversion Amounts for the Period of 1989 to 2002 (following the closure of Stillwater Reservoir).

Canal	Diversion Point	Average Diversion (acre-feet)	Diversion Ranges (acre-feet)
Uintah and Ouray Irrigation Project			
Grey Mountain	2 ½ mi west Bridgeland	22,697	19,873-26,306
Myton Townsite	2 mi west Myton	19,074	16,703-21,436
Ouray School	3 ½ mi west Duchesne-Uintah County line	10,516	8,777-12,575
Total Uintah and Ouray Irrigation Project		**52,287**	**45,353-60,317**
Other Canals			
Riverdell [1]	1 ¼ mi west Duchesne-Uintah County line	447	0-2029

[1] The number shown for the Riverdell Canal include years in which the canal gage was not operable; total available water rights are 2,267 acre-feet.

The effects of irrigation diversions on Duchesne River streamflows for average, wet and dry years are shown in Tables 4-27 through 4-29. Using data for the Duchesne River at Myton for the period 1989-2002, the average annual discharge is 168,142 acre-feet per year with a standard deviation of 165,668 acre-feet. Using one standard deviation above and below the average discharge results in "dry" year discharge of 2,474 acre-feet and "wet" year discharge of 333,810 acre-feet. For this analysis, the "average" year is 1996 (total discharge of 154,670 acre-feet), the "dry" year is 1990 (total discharge of 41,217 acre-feet) and the "wet" year is 1995 (total discharge of 293,905 acre-feet).

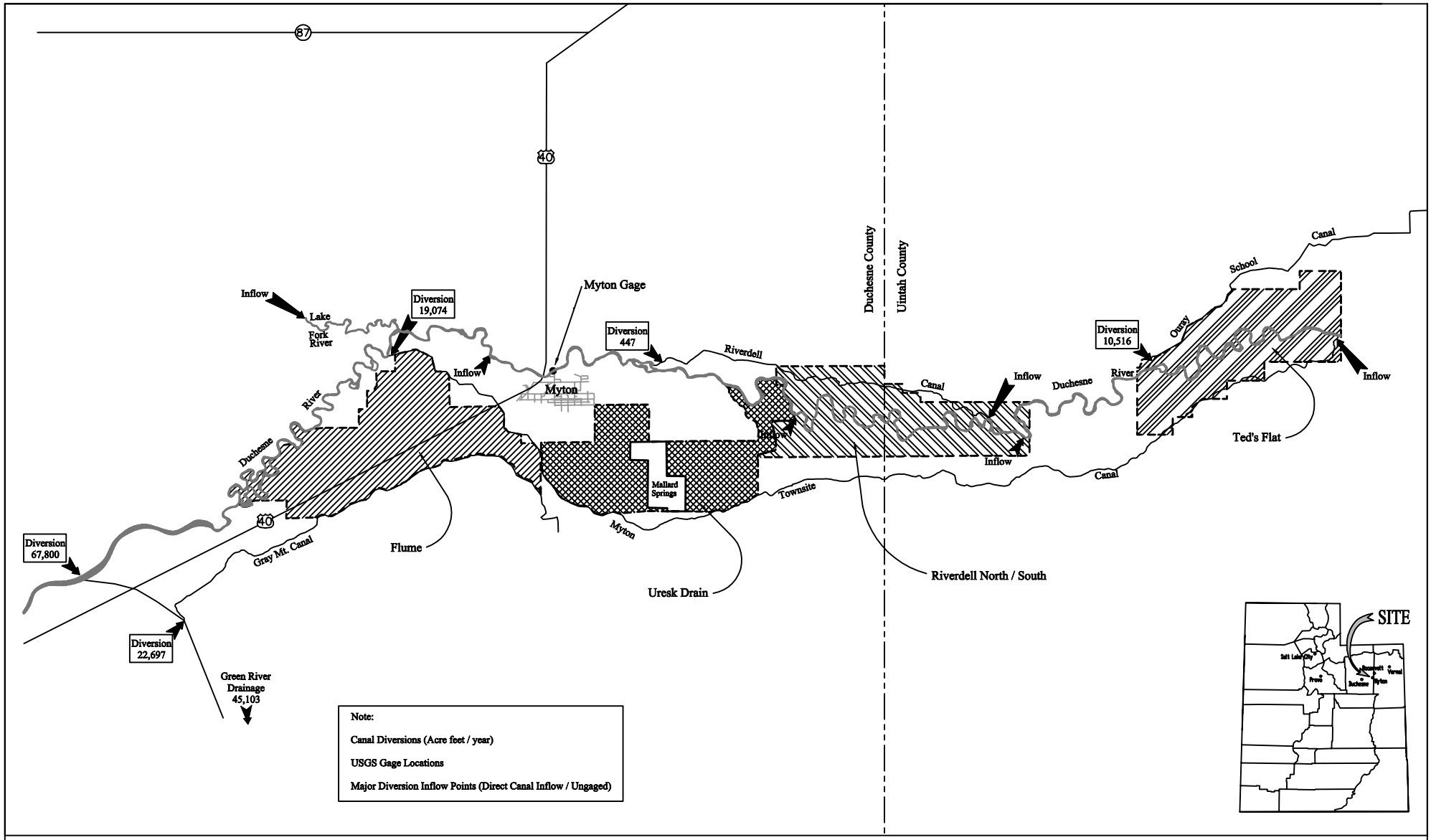


Figure 4-1. Location of Major Diversions and Inflow Points within the LDWP Project Area

LEGEND
- Site Boundary
- Major Roads
- Rivers
- Streams and Canals
- County Boundary

GRAPHIC SCALE
10000 0 5000 10000
1 INCH = 10000 FEET

N 16°

Table 4-27. Average Year (1996) Changes in Streamflow within the Project Area Due to Canal Diversions for the Period April 1 - October 31.

Canal/Site	Inflow/Diversion Amount (acre-feet)	Annual discharge[1] (acre-feet)	Change in discharge (%)	Cumulative Change in Discharge (%)
Duchesne River upstream of Grey Mt Canal	N/A	207,154	N/A	N/A
Grey Mountain Canal	-71,832	135,322	-34.7%	-34.7%
Myton Townsite Canal	-20,132	115,190	-14.9%	-44.4%
Duchesne River at Myton	N/A	115,190	N/A	N/A
Riverdell Canal	0	115,190	0%	-44.4%
Ouray School Canal	-11,104	104,086	-9.6%	-49.8%
Uinta River	+66,324	170,410[2]	63.7%	-17.7%

[1] Discharge upstream/downstream of Myton is calculated by successively adding/subtracting the amount of canal diversions. Discharge is the cumulative total for the period April 1 through October 31. Inflow of the Uinta River is calculated by taking the difference in streamflow at the Ouray School Canal inlet and the recorded flow at the Randlett gage.

[2] Flow at the Randlett gage.

Table 4-28. Wet Year (1995) Changes in Streamflow within the Project Area Due to Canal Diversions for the Period April 1 - October 31.

Canal/Site	Inflow/Diversion Amount (acre-feet)	Annual discharge[1] (acre-feet)	Change in discharge (%)	Cumulative Change in Discharge (%)
Duchesne River upstream of Grey Mt Canal		376,659		
Grey Mountain Canal	(-) 68,215	308,354	-18.1%	-18.1%
Myton Townsite Canal	(-) 21,046	287,308	-6.8%	-23.7%
Duchesne River at Myton		287,308		
Riverdell Canal	0	287,308	0%	-23.7%
Ouray School Canal	(-) 11,143	276,165	-3.9%	-26.7%
Uinta River	(+) 194,045	470,210[2]	(+) 70.3%	24.9%

[1] Discharge upstream/downstream of Myton is calculated by successively adding/subtracting the amount of canal diversions. Discharge is the cumulative total for the period April 1 through October 31. Inflow of the Uinta River is calculated by taking the difference in streamflow at the Ouray School Canal inlet and the recorded flow at the Randlett gage.

[2] Flow at the Randlett gage.

Table 4-29. Dry Year (1990) Changes in Streamflow within the Project Area Due to Canal Diversions for the Period April 1 - October 31.

Canal/Site	Inflow/Diversion Amount (acre-feet)	Annual discharge[1] (acre-feet)	Change in discharge (%)	Cumulative Change in Discharge (%)
Duchesne River upstream of Grey Mt Canal		110,915		
Grey Mountain Canal	(-) 68615	42,300	-61.9%	-61.9%
Myton Townsite Canal	(-) 18,342	23,958	-43.4%	-78.4%
Duchesne River at Myton		23,958		
Riverdell Canal	(-) 2,028	21,930	-8.5%	-80.2%
Ouray School Canal	(-) 11,266	10,664	-51.4%	-90.4%
Uinta River	(+) 26,643	37,307[2]	(+) 249.8%	-66.4%

[1] Discharge upstream/downstream of Myton is calculated by successively adding/subtracting the amount of canal diversions. Discharge is the cumulative total for the period April 1 through October 31. Inflow of the Uinta River is calculated by taking the difference in streamflow at the Ouray School Canal inlet and the recorded flow at the Randlett gage.

[2] Flow at the Randlett gage.

For the period 1989-2002, water diversions from canals within the project area have averaged 52,287 acre-feet per year and have ranged from 45,353 to 60,317 acre-feet per year (Table 4-26). For the same period discharge measured at the Duchesne River at Myton gage has averaged 168,142 acre-feet per year and ranged from 36,173 acre-feet in 2002 to 507,191 acre-feet in 1998 (Tables 4-27 through 4-29). Water diversions have typically varied between -12 percent and +20 percent of average while streamflows at the Myton and Randlett gages have ranged from -83 percent to +202 percent of average. Because diversions amounts are relatively constant when compared to the year-to-year variation in streamflow, diversions take a proportionally larger percentage of streamflow in dry years than they do in wet years.

4.5.5.3 Water Availability

There are between 17,802 and 20,635 acre-feet of water rights associated with land in the project area, depending on the alternative. Table 4-30 provides a summary of the water rights associated with the land according to the BIA (2002). Although lands in the project area are of mixed ownership, all of the water rights in the project area (except those for the Riverdell North property) are senior Indian water rights with an 1861 priority date. Indian water rights are the most senior water rights on the Duchesne River. The water rights associated with the Riverdell North property are junior water rights with a 1916 certification date.

Table 4-30. Water Available with Land (acre-feet) for Each Site under the Proposed Action and Alternatives. [1]					
Water Available with Land	**Site**				**Total**
	Flume	**Uresk Drain**	**Riverdell North/South**	**Ted's Flat**	
Proposed Action	5,885	5,820	5,370	3,560	20,635
Pahcease Alternative	8,421	5,820	5,370	0	19,611
Topanotes Alternative	8,421	5,820	0	3,560	17,802

[1] These numbers represent a diversion of 4 acre-feet per irrigable acre

Water from the Duchesne River is delivered on a priority basis to senior water right holders over junior water right holders. As part of the ongoing basin-wide adjudication of water rights, water users on the Duchesne River, including the BIA on behalf of the Tribe, have agreed on an annual basis to divert their water in accordance with a duty schedule. That schedule is adopted each year by the court pursuant to an interim Order of Distribution, also referred to as the interim duty schedule.

Under the interim duty schedule, the quantity of water diverted into a given canal is based upon the total irrigable acres within the canal service area. Each irrigable acre is entitled to a total of 4.0 acre-feet of water per irrigable acre for the April 1 to October 31 irrigation season.

Under the agreed upon delivery schedule, delivery rates change approximately every two weeks from a low rate at the beginning and end of the irrigation season to a high in June. The interim duty schedule provides for the distribution of water when the flow in the Duchesne River drops to the point that regulation is necessary. In wet years, the duty schedule may not be invoked until late in the irrigation season, if at all.

On average, 52,287 acre-feet of water are diverted from canals within the LDWP project area operated by the Uintah and Ouray Irrigation Project, with an additional 2,267 acre-feet of water rights associated with the Riverdell North property. Total water diversions have not varied greatly between average, dry and wet years. For example, in 1995, a relatively wet year, 53,246 acre-feet of water was delivered to lands within and adjacent to the project area. In 1990, the fourth driest year of the period, water diversions totaled 53,440 acre-feet. In 2002, the driest year in the period, diversions within the project area still totaled 47,950 acre-feet. Overall, water diversions have varied by about +/- 10 percent of the average of 52,287 acre-feet per year, while streamflow during the same period has ranged from about -80 to +200 percent of average.

Under baseline conditions, not all parcels within the project area irrigate according to their full water right every year, with some lands remaining fallow in any given year.

4.5.6 Impact Analysis

4.5.6.1 Significance Criteria

Impacts to water resources would be considered significant if:

- The LDWP resulted in a substantial change in water supply or water use for existing water right holders.

Because the Duchesne River flows have been substantially depleted over time, any measurable changes in streamflows are also disclosed in this section. The significance of streamflow changes for other resources dependent on Duchesne River flows, such as threatened and endangered fish and wildlife and water quality, are discussed in their respective sections.

4.5.6.2 Proposed Action

4.5.6.2.1 Water Requirements

The methods, assumptions and calculations used to arrive at the proposed water budgets are described in Basin Hydrology (1997), WWS (1998a) and WWS (2000), and are summarized in Appendix D. Proposed water budgets represent maximum evapotranspiration demand and maximum soil seepage rates, which would require verification during final design.

The proposed water budget includes support for created and restored wetlands, support for existing irrigation-induced wetlands and irrigation water to maintain grasslands. The degree to which existing wetlands represent natural instead of irrigation-induced wetlands was identified at a feasibility level of analysis, with from 40-70 percent of the wetlands estimated as being irrigation-induced. The water source for these wetlands was assumed to be from irrigation of adjacent grasslands. More detailed analyses conducted during final design may identify that lesser acres of wetlands are irrigation-induced. For this reason, a range of numbers is presented for the water budget. The higher number represents the case where all wetlands and adjacent uplands would be irrigated by the LDWP. The lower number represents the case where the existing irrigation-induced wetlands would be maintained solely by continued irrigation of adjacent uplands.

Cropland is not included in the proposed water budgets as it would generally be acquired under conservation easements with the water rights remaining with the landowner. There is, however, a single exception for the Riverdell North property, in which new cropland may be established and managed solely for wildlife.

The water quality control factor is water added to the total water budget to prevent the accumulation of salts (Christensen and Low 1970). The water required for water quality control is non-consumptive and amounts to a minimum of 27 percent and up to 50 percent of the basic water requirement, depending on site characteristics, as described in sections 2.1.1.8 and 4.6.6.2.1.

Temporary irrigation water for planted riparian species, particularly cottonwood, would be needed for three to five years per planting block and for up to 10 years on sites with large planted riparian areas such as Riverdell North and Ted's Flat. Temporary irrigation is included in the proposed water budget. The long-term water budget for the LDWP would decrease by 260 acre-feet after

construction as the temporary irrigation ceases.

The estimated total annual water requirement for the Proposed Action ranges from 12,258 to 14,653 acre-feet depending on the amount of irrigation-induced wetlands maintained by the project and whether or not new cropland is established on the Riverdell North property. The maximum water requirement of 14,653 acre-feet per year also includes an annual maximum of 260 acre-feet for temporary irrigation of cottonwoods as cottonwoods would be planted on a site-by-site basis in up to 120-acre blocks per year. A maximum of 360 acres of cottonwoods would be irrigated at any one time. Once cottonwoods are established the maximum water requirement would be reduced by 260 acre-feet to 14,393 acre-feet per year. Available water rights total 20,635 acre-feet. Table 4-31 provides a breakdown of this amount by site and by water budget component. The largest individual site water requirements would be for those sites in which both the greatest wetland development and maintenance of adjacent irrigated grasslands is proposed, such as the Flume and the Uresk Drain. The smallest annual water requirements would be for those sites in which riparian restoration is the primary target, as at Ted's Flat North.

Table 4-31. Water Requirements and Water Availability (acre-feet) for Each Site under the Proposed Action.[1]

Water Budget Component	Site				Total
	Flume	Uresk Drain	Riverdell North/South	Ted's Flat	
Wetland support-enhancement	458	1,327	265	345	2,395
Wetland support-created/restored	1,587	1,916	1,531	1,333	6,367
Upland support	1,356	690	426	594	3,066
Water quality control	303	530	267	249	1,349
Cropland	0	0	1,216	0	1,216
Temporary irrigation	130	64	260	133	260[3]
Total Requirement [2]	**3,374-3,832**	**3,199-4,526**	**3,699-3,964**	**2,309-2,654**	**12,258-14,653**
Water Available [4]	**5,885**	**5,820**	**5,370**	**3,560**	**20,635**
Difference [2]	**+2,511 to +2,053**	**+2,621 to +1,294**	**+1,671 to +1,406**	**+1,251 to +906**	**+8,377 to +5,982**

1 Differences between Water Requirements and Water Availability are identified as positive (+) if water availability exceeds site water requirements and negative (-) if water availability is less than water requirements.
2 The range of values reflect differences in the amount of irrigation-induced wetlands to be supported by the Proposed Action.
3 The maximum temporary irrigation in any year is 260 acre-feet.
4 Water availability does not account for any seepage loss from canals.

4.5.6.2.2 Water Availability

Water for the LDWP would come from existing water rights associated with land within the project area under both the low and maximum demand scenarios. A comparison of water requirements and available water rights for the Proposed Action is displayed in Table 4-31. As shown in the table, sufficient water rights exist with lands within the project area to operate the project. If it becomes necessary to move or transfer Uintah and Ouray Irrigation Project water within the project area, the BIA would administratively arrange transfers among parcels within the allocated water rights.

Flows from the Duchesne River would enter the secondary channel of the Flume site when stream flows exceed about 30 to 50 cfs. Flows reach an estimated 300 cfs when flows in the Duchesne River reach their 2-year flood level of 1,146 cfs. Maximum flows occur during spring discharge, but some flows occur in the secondary channel through most of the year in average and wetter years. Flows in the secondary channel return to the Duchesne River near the intake for the Myton Townsite

Canal. Reconnecting the Flume to the secondary channel would redistribute Duchesne River water into a historic channel and would not represent a new diversion. Water availability to downstream diversions would not be affected because total flow in the Duchesne River would still exceed downstream diversion capacity. Water would enter the Ted's Flat north oxbow system in a similar manner. The frequency and magnitude at which water enters the Ted's Flat north oxbow system would need to be verified during final design.

At the Uresk Drain, the Drain would be filled to raise the local groundwater table. Inflow to the Drain is supplied by groundwater. The flow rate in the Uresk Drain is estimated to be 3 to 7 cfs. Once water levels in the Uresk Drain wetlands are at operational level, the site would be operated as a flow-through system with additional water supplied by the Myton Townsite Canal. Annual outflow from the Uresk Drain to the Duchesne River is expected to remain near its current level when water for water quality control is included in the site water budget.

Under the Proposed Action, the LDWP area canal diversions would be within the range of baseline conditions which vary from year to year. The water budget for the wetlands would remain similar among years. As a result, in dry years less natural flow water would be available to junior water right holders, including those of the Riverdell North property, than under baseline conditions. This could result in some junior water right holders calling for additional CUP project water at a higher frequency and for greater amounts. In severely dry years, there may not be sufficient water for the Riverdell North property as it has a low priority right. Under the Proposed Action this would not cause a substantial problem as most of the water requirements for the property would be used for temporary irrigation and potentially for crops that could be left fallow in any given year.

Water lost to infiltration and water used for water quality control within the project area would serve to either recharge the local alluvial aquifer or provide direct return flows to the Duchesne River. This non-consumptive use is estimated at 51.7 percent of the total water budget for the Proposed Action. This is compared to estimated return flows of 51.1 percent for irrigated pastures within the Duchesne River corridor. Because of the proximity of the proposed sites to the Duchesne River, water lost to the wetlands through infiltration would be a net gain to the local alluvial aquifer and, at least locally, to the Duchesne River flow.

4.5.6.2.3 Net Change in Duchesne River Streamflow

Waters allocated to lands served by the Myton Townsite, Grey Mountain and Ouray School Canals are currently diverted from the Duchesne River at an average annual amount of 52,287 acre-feet. With implementation of the project, the same amount of water would continue to be diverted. Water supplied to the project wetlands would not result in a measurable change in return flows downstream of the Myton Townsite Canal. Project water applied for water quality control, representing 27-50 percent of the total water budget, would return directly to the Duchesne River as streamflow. Seepage losses from wetlands within the project area would locally recharge the alluvial aquifer of the Duchesne River. Overall, nonconsumptive use of water would average 51.7 percent of the wetland water budget.

Operation of the Proposed Action could increase return flows locally by about 82 acre-feet per year (0.05 percent of the annual streamflow measured at the Myton gage).

Over the course of the irrigation season, the difference in return flow would result in up to a 0.4 cfs increase in streamflow in the Duchesne River, a difference that would not be measurable. Differences in return flows will be distributed along the length of the project corridor and may vary between sites. Increases in return flows from upstream sites will be available for diversion by the next downstream canal (see figure 4-1). Part of the return flows from the Flume would enter the Duchesne River directly. The remainder would be bypassed under the Myton Townsite Canal and returned to the river. These flows would be available to the next downstream diversion, either the Riverdell Canal or the Ouray School Canal. Return flows from the Myton Townsite Canal would in turn be available for diversion by the Ouray School Canal. Only the return flows from Ted's Flat would enter the Duchesne River downstream of the project area. These return flows would average less than 22 acre-feet per year, or 0.02 cfs, which is not a measurable amount.

4.5.6.3 Pahcease Alternative

4.5.6.3.1 Water Requirements

The estimated total annual water requirement for the Pahcease Alternative is from 12,676-14,786 acre-feet depending on the amount of irrigation-induced wetlands maintained by the project and whether or not new cropland is established on the Riverdell North property. Table 4-32 provides a breakdown of estimated water requirements by site and by water budget component. As for the Proposed Action, the largest individual site water requirements are for sites in which both the greatest wetland development and maintenance of adjacent irrigated grasslands is proposed, such as the Flume and the Uresk Drain.

Table 4-32. Water Requirements and Water Availability (acre-feet) for Each Site under the Pahcease Alternative.[1]

Water Budget Component	Site				Total
	Flume	Uresk Drain	Riverdell North/South	Ted's Flat	
Wetland support-enhancement	517	1,327	265	N/A	2,109
Wetland support-created/restored	2,895	1,916	1,531	N/A	6,342
Upland support	2,439	690	426	N/A	3,555
Water quality control	506	530	267	N/A	1,303
Cropland	0	0	1,216	N/A	1,216
Temporary irrigation	173	64	260	N/A	260[3]
Total Requirement [2]	**6,013-6,530**	**3,200-4,527**	**3,965-3,700**	**N/A**	**12,676-14,785**
Water Available [4]	**8,421**	**5,820**	**5,370**	**N/A**	**19,611**
Difference [2]	**+2,408 to +1,891**	**+2,620 to +1,293**	**+1,670 to +1,405**	**N/A**	**+4,826 to +6,935**

1 Differences between Water Requirements and Water Availability are identified as positive (+) if water availability exceeds site water requirements and negative (-) if water availability is less than water requirements.
2 The range of values reflect differences in the amount of irrigation-induced wetlands to be supported by the Pahcease Alternative.
3 The maximum temporary irrigation in any year is 260 acre-feet.
4 Water availability does not account for any seepage loss from canals.

4.5.6.3.2 Water Availability

The Pahcease Alternative differs from the Proposed Action in that it does not include the Ted's Flat site and it would result in a larger number of wetland acres in the Flume site. The Ouray School Canal would not be used to supply water for the Pahcease Alternative; otherwise, water sources and water management would be similar to that described for the Proposed Action. As for the Proposed Action, the required project water rights are available with the land within the project area.

As for the Proposed Action, the LDWP area canal diversions would be within the range of baseline conditions which vary from year to year. The water budget for the wetlands would remain similar among years. As a result, in dry years less natural flow water would be available to junior water right holders, including those of the Riverdell North property, than under baseline conditions. This could result in some junior water right holders calling for additional CUP project water at a higher frequency and for greater amounts. In severely dry years, there may not be sufficient water for the Riverdell

North property as it has a low priority right. Under the Pahcease Alternative, this would not cause a substantial problem as most of the water requirements for the property would be used for temporary irrigation and potentially for crops that could be left fallow in any given year.

4.5.6.3.3 Net Change in Duchesne River Streamflow

Waters allocated to lands served by the Myton Townsite and Grey Mountain Canals are currently diverted from the Duchesne River at an average annual amount of 43,761 acre-feet. With implementation of the project, the same amount of water would continue to be diverted. Water supplied to the project wetlands would slightly increase the amount of estimated return flows downstream of the Myton Townsite Canal. Project water applied for water quality control, representing 27-50 percent of the total water budget, would return directly to the Duchesne River as streamflow. Seepage losses from wetlands within the project area would locally recharge the alluvial aquifer of the Duchesne River. Overall, nonconsumptive use of water would average 51.1 percent of the wetland water budget.

Operation of the Pahcease Alternative could decrease return flows locally by up to 2 acre-feet per year, which represents a difference in Duchesne River flows of 0.01 cfs, a difference that is not measurable. Temporary irrigation of cottonwoods will require 260 acre-feet of water per year for up to 10 years. Once cottonwoods are established, the long-term water requirement will be reduced by 260 acre-feet to 14,525 acre-feet per year. Return flows would be higher than under existing conditions by 131 acre-feet per year, or 0.71 cfs. Differences in return flows will be distributed along the length of the project corridor and may vary between sites. Increases in return flows from upstream sites will be available for diversion by the next downstream canal (see figure 4-1). Part of the return flows from the Flume would enter the Duchesne River directly. The remainder would be bypassed under the Myton Townsite Canal and returned to the river. These flows would be available to the next downstream diversion, either the Riverdell Canal or the Ouray School Canal. Return flows from the Myton Townsite Canal would in turn be available for diversion by the Ouray School Canal.

4.5.6.4 Topanotes Alternative

4.5.6.4.1 Water Requirements

The estimated total annual water requirement for the Topanotes Alternative is from 11,325 to 13,514 acre-feet depending on the amount of irrigation-induced wetlands maintained by the project. Table 4-33 provides a breakdown of this amount by site and by water budget component. As for the Proposed Action, the largest individual site water requirements are for those sites in which both the greatest wetland development and maintenance of adjacent irrigated grasslands is proposed, such as the Flume and the Uresk Drain. The smallest annual water requirements would be for those sites in which riparian restoration is the primary target, such as Ted's Flat.

Table 4-33. Water Requirements and Water Availability (acre-feet) for Each Site under the Topanotes Alternative.[1]

Water Budget Component	Site				Total
	Flume	Uresk Drain	Riverdell North/South	Ted's Flat	
Wetland support-enhancement	517	1,327	N/A	345	2,189
Wetland support-created/restored	2,895	1,916	N/A	1,333	6,144
Upland support	2,439	690	N/A	594	3,723
Water quality control	506	530	N/A	249	1,285
Cropland	0	0	N/A	0	0
Temporary irrigation	173	64	N/A	133	173[3]
Total Requirement [2]	**6,013-6,530**	**3,199-4,526**	**N/A**	**2,309-2,654**	**11,325-13,514**
Water Available [4]	**8,421**	**5,820**	**N/A**	**3,560**	**17,802**
Difference [2]	**+2,408 to +1,891**	**+2,621 to +1,294**	**N/A**	**+1,251 to +906**	**+6,476 to +4,281**

1 Differences between Water Requirements and Water Availability are identified as positive (+) if water availability exceeds site water requirements and negative (-) if water availability is less than water requirements.
2 The range of values reflect differences in the amount of irrigation-induced wetlands to be supported by the Topanotes Alternative.
3 The maximum temporary irrigation in any year will be 173 acre-feet.
4 Water availability does not account for any seepage loss from canals.

4.5.6.4.2 Water Availability

The Topanotes Alternative does not include the Riverdell North and South oxbows and would not use the federally-owned water rights associated with the Riverdell North property or the Riverdell Canal. Otherwise, water sources and water management would be similar to that described for the Proposed Action. As with the Proposed Action, the required project water rights are available with the land within the project area.

As for the Proposed Action, the LDWP area canal diversions would be within the range of baseline conditions which vary from year to year. The water budget for the wetlands would remain similar among years. As a result, in dry years less natural flow water would be available to junior water right holders, including those of the Riverdell North property, than under baseline conditions. This could result in some junior water right holders calling for additional CUP project water at a higher frequency and for greater amounts. In severely dry years, there may not be sufficient water for the Riverdell

North property as it has a low priority right. Depending on the mitigation plan developed for the property, this could impact the DRACR mitigation.

4.5.6.4.3 Net Change in Duchesne River Streamflow

Waters allocated to lands served by the Myton Townsite, Grey Mountain and Ouray School Canals are currently diverted from the Duchesne River at an average annual amount of 52,287 acre-feet. With implementation of the project, the same amount of water would continue to be diverted. Water supplied to the project wetlands would slightly increase the amount of estimated return flows downstream of the Myton Townsite Canal. Project water applied for water quality control, representing 27-50 percent of the total water budget, would return directly to the Duchesne River as streamflow. Seepage losses from wetlands within the project area would locally recharge the alluvial aquifer of the Duchesne River. Overall, nonconsumptive use of water would average 51.5 percent of the wetland water budget.

Operation of the Topanotes Alternative could increase return flows locally by up to 54 acre-feet per year, which represents an unmeasurable change of 0.3 cfs. Temporary irrigation of cottonwoods will require 173 acre-feet per year. Once cottonwoods are established, the maximum water requirement will be reduced by 173 acre-feet to 13,341 acre-feet per year. Return flows would be higher than existing conditions by 143 acre-feet per year, or 0.78 cfs. All increases in return flow will be available for diversion by the next downstream canal. Return flows from the Myton Townsite Canal would in turn be available for diversion by the Ouray School Canal. Only the return flows from Ted's Flat would enter the Duchesne River downstream of the project area. These return flows would average less than 22 acre-feet per year, or 0.02 cfs, which is not a measurable amount.

4.5.6.5 No Action Alternative

Under the No Action Alternative, existing water diversions would continue via the Grey Mountain, Myton Townsite and Ouray School Canals up to the water rights allowable by law. The Duchesne River would remain mostly dry downstream of the Myton Townsite Canal until return flows enter the river east of Myton. Most of the water diverted from the Duchesne River in the Grey Mountain and Duchesne Feeder Canals would continue to be exported out of the Duchesne River corridor. Junior water right holders would continue to be subject to the diversion rights of senior water right holders.

4.6 WATER QUALITY

4.6.1 Introduction

The water quality analysis addresses potential impacts on water quality from the construction and operation of the Proposed Action and alternatives. This section focuses on the primary types of impacts that would occur from changes in surface water quality caused by the LDWP. The data presented in this section is based on the following water quality studies and data summaries: Mundorff (1977), ReMillard et al. (1995), CUWCD (1996b), USGS (1998) and WWS (2000). The following water quality topics are addressed in the impact analysis:

- Increased levels of contaminants in the Duchesne River or the mitigation wetlands, and
- Changes in the salt load to the Duchesne River (and ultimately the Colorado River) from the mitigation wetlands.

4.6.2 Issues Eliminated from Further Analysis

The following issue was eliminated from detailed analysis for the reasons described below:

- Effects of current agricultural practices and associated fecal contamination and pesticide use on Tribal resources.

This issue relates to general agricultural practices within the Uinta Basin that may contribute non-point source pollution to wetlands and streams. The LDWP would eliminate cattle grazing within the project area and reduce fecal contamination within the LDWP project area, but it would not affect overall grazing and agricultural practices outside of the project area. Changes in general agricultural practices are not part of the LDWP project.

4.6.3 Issues Addressed in the Impact Analysis

The following issues raised during public scoping and agency consultation were considered in this analysis:

- Would the project increase contaminants or salts in the mitigation wetlands that could adversely affect wildlife?
- Would the project increase contaminants in the Duchesne River to a level that could adversely affect fish or wildlife?
- Would the project affect salinity inputs to the Duchesne River in terms of the total amount of salts?

4.6.4 Area of Influence

The project area of influence for water quality includes the areas depicted on Figure 1-2 in portions of Duchesne and Uintah Counties in northeast Utah, and the Duchesne River between Bridgeland and the confluence with the Green River at Ouray.

4.6.5 Affected Environment

4.6.5.1 Water Quality Overview - Fish and Wildlife Concerns

Temperature and other water quality criteria are established by the State of Utah based on specific beneficial uses. The Duchesne River and its tributaries upstream of the Myton sewage treatment plant are designated as Class 3A with respect to aquatic wildlife. The Class 3A designation indicates that the river is protected for cold water fish and other aquatic life. The Flume site is within the area designated as Class 3A. Downstream of Myton, the Duchesne River is designated as Class 3B, which indicates that the river is protected for warm water aquatic life. The remainder of the LDWP project area outside of the Flume site is within the portion of the

Duchesne River designated as Class 3B. According to the State of Utah, waters not specifically classified according to beneficial use are presumed to be used for secondary contact recreation and by waterfowl and water-oriented wildlife. For the purpose of this analysis, open water ponds and oxbow lakes within the Duchesne River corridor are assumed to provide habitat for waterfowl and water-oriented wildlife and are subject to the corresponding water quality criteria.

Previous studies have identified the main water quality parameters of concern in the Duchesne River affecting fish and wildlife as high concentrations of boron and TDS. Within the project area, the main parameters of concern affecting either wildlife or their plant or invertebrate food base are low and fluctuating concentrations of dissolved oxygen (DO), high summer water temperatures and high concentrations of boron and TDS. Water quality standards for each of these parameters may be exceeded locally, as described in the following sections, but not at levels that would cause the Duchesne River to be listed as an impaired water body for the aquatic use designations. However, the Duchesne River is listed as impaired for agricultural use (Class 4) as a result of TDS exceedances (DEQ 2002). Herbicides, pesticides, other organic compounds or heavy metals have not been detected in the project area at levels that would be of concern for aquatic species.

In the Duchesne River, TDS increases in a downstream direction from a summer high of 600-800 parts per million (ppm) west of Myton, 1,500-2,000 ppm near Myton, and 3,000-4,000 ppm near Randlett (Mundorff 1977). Specific conductance is a measure of the ability of water to conduct an electric current and is directly related to both TDS and salinity. Within the project area, specific conductance also increases from values of 1,640 microsiemens per centimeter (uS/cm) at Myton to a high of 2,290 at Randlett (ReMillard et al. 1995). The downstream increase in Duchesne River salinity is attributed to the diversion of large amounts of water with low TDS concentrations diverted from the upstream reaches of the river for irrigation and smaller amounts of water with higher TDS concentrations being returned to the river.

Boron concentrations in the Duchesne River also increase in a downstream direction from an average summer high of 701 parts per billion (ppb) at Myton to an average summer high of 848 ppb at Randlett. Within the project area, the Flume oxbow system contains the highest TDS and boron concentrations measured within any of the project sites (see Table 4-34). High boron concentrations have also been measured in some of the Riverdell oxbows. Ted's Flat contains the lowest boron and TDS values of any of the sites.

Water quality within the Myton Townsite Canal, which borders the Uresk Drain and portions of the Riverdell North/South and Ted's Flat sites, meets water quality standards throughout its length for TDS, specific conductance and boron. Table 4-34 shows the water quality of the Myton Townsite Canal at its outlet to the Duchesne River. Water quality of the Myton Townsite Canal is fairly similar to that of the adjacent Ted's Flat site with the exception that DO levels in the Myton Townsite Canal are much higher than in the Ted's Flat oxbows. Specific water quality parameters are discussed below for each of the proposed sites.

4.6.5.1.1 Salinity

Salinity (as estimated by TDS [expressed as ppm] or specific conductance [expressed as uS/cm]) can affect wildlife and aquatic species either directly or indirectly through effects on food sources, as many submerged aquatic plants cannot tolerate high salinity. Mature waterfowl (a wildlife group for which there is the most data) can tolerate relatively high salinities but ducklings can be affected by TDS levels greater than 3,200 ppm as young birds can not excrete excess salts through nasal glands as can adult waterfowl. Important waterfowl food plants can be adversely affected by salinity. Christiansen and Low (1970) suggest that conductances of less than 1,000 uS/cm are excellent for waterfowl plant production in Utah, but that conductances of more than 8,000 uS/cm are restrictive. Native riparian plants are also generally salt sensitive with adverse effects occurring at soil salinity levels of 2,000 ppm. A general rule of thumb is that these soil levels may be reached if the TDS level in the water supply is consistently greater than 1,500 ppm (Briggs 1996).

The specific conductances measured on the Duchesne River and within portions of the project area fall within acceptable limits for waterfowl production (up to 2,290 uS/cm in the Duchesne River and up to 2,280 uS/cm in the Uresk Drain), but are slightly higher than the range of specific conductances considered "excellent" for waterfowl. Duchesne River TDS levels exceed the water quality standard of 1,200 ppm from east of Myton to the Green River during the summer, but remain below the level at which young waterbirds could be adversely affected.

TDS levels within the Flume and Riverdell South oxbow systems exceed the water quality standards of 1,200 ppm during the summer, reaching values from 1,610-2,680 ppm by the end of the growing season, but remain below the level at which waterfowl could be affected. If sustained for a substantial portion of the growing season, these levels could affect the success of native riparian plants such as cottonwoods. The high TDS values at these two sites likely reflect the influence of return flows on water quality as TDS values in the canals serving the Riverdell South oxbows are much lower at their source. For example, late summer TDS levels in the Myton Townsite Canal, which is used to irrigate land adjacent to the Riverdell South oxbow system, have been measured at 695 ppm, much lower than the 1,610 ppm measured in the oxbow itself.

TDS levels in the Uresk Drain and Ted's Flat sites remain relatively constant throughout the growing season (1,087 ppm for the Uresk Drain and 704-764 ppm for Ted's Flat) and are within water quality standards.

4.6.5.1.2 Boron

Boron is a naturally occurring element required in small amounts by plants and animals for growth, but it can be toxic in higher concentrations. Elevated boron levels in irrigation water can be toxic to certain agricultural crops. Boron tends to accumulate in aquatic systems due to the relatively high solubility of most of its compounds (EPA 1975). In the western U.S., the most common source of elevated boron is agricultural drains (Smith and Anders 1989). Concentrations of boron in water greater than 200 ppb have been shown to impair survival of some fish species, and concentrations of 100 ppb affect reproduction in rainbow trout (Eisler 1990). Representative species of aquatic plants, freshwater invertebrates, fish and amphibians

can usually tolerate prolonged exposure to boron at concentrations of 10,000 ppb without adverse effects.

There is no established wildlife protection standard for concentrations of boron in water, though standards have been recommended at the following levels: 5,000 ppb for fish , 4,000 ppb for aquatic plants and 13,000 ppb for sensitive aquatic species (Eisler 1990). States that have established a wildlife protection standard for boron have placed the level at 1,000 ppb (CUWCD 1996b). All these recommended levels are much higher than the adopted Utah standard of 750 ug/L (750 ppb) for boron in irrigation water.

Water samples from the Duchesne River within the project area have had average boron concentrations of less than 800 ppb, but single sample boron concentrations exceeding the recommended wildlife protection standards have been measured in the Duchesne River at Randlett (1,300 ppb).

In the project area, boron levels exceeding the recommended wildlife protection standard have been measured in the Flume, Riverdell North/South oxbows and at the head of the Uresk Drain. Boron concentrations increase during the summer growing season at all sites except the Uresk Drain. Late summer boron concentrations range from a low of 640 ppb at Ted's Flat to levels greater than 3,000 ppb in the Riverdell North/South oxbows and the Flume oxbows. The higher boron levels in the Flume and Riverdell North/South oxbows parallel the higher TDS concentrations and likely reflect return flow inputs.

No project sites contain lethal concentrations of boron; however, boron is stable in natural systems and boron not taken up by plants or animals tends to accumulate over time (Eisler 1990). Soil samples from the project area were analyzed by the FWS in 1995 (USGS 1998). This study did not indicate that boron was accumulating in the project area soils at levels greater than background soil concentrations. Studies by the DOI at the nearby Pariette Wetlands (as cited in USGS 1998) also showed little biomagnification of boron in animal tissue. The Pariette Wetlands are flushed annually during spring run-off, which may prevent boron accumulation. Boron could accumulate in closed basins receiving boron-rich inflow.

4.6.5.1.3 Physical Parameters (DO, Temperature and pH)

Surface waters must contain at least minimum levels of DO in order to maintain aquatic life. Requirements vary between cold-water and warm-water species. The minimum water quality standard for DO in cold water aquatic systems is to maintain levels above 4 mg/L (1-day average) and 5.0 mg/L (7-day average). The minimum acceptable long-term DO level for warm-water aquatic species is 6.5 mg/L (DEQ 2003). The minimum water quality standard for DO in warm water aquatic systems is to maintain levels above 3 mg/L (1-day average) and 4 mg/L (7-day average). The minimum acceptable long-term DO level for warm-water aquatic species is 5.5 mg/L (DEQ 2003). DO levels will generally decrease with an increase in temperature. Aquatic plants and some invertebrate species can be adversely affected by DO levels of less than 2-3 mg/L. Aquatic plants and invertebrates are important because they provide an important food source for many wetland-dependent species, waterfowl and other waterbirds.

Summer DO concentrations in the project area fall below the acute standards in the Riverdell

South oxbows and are slightly less than the chronic standards in the Ted's Flat oxbows. DO concentrations are higher in drains emptying into the Flume oxbows where surface water discharges of up to 4 cfs have been measured. Increases in water velocity and depth contribute to increased DO concentrations in flowing water (Kadlec and Knight 1995).

The established temperature standards for the protection of aquatic life are 20 degrees centigrade (68 degrees Fahrenheit) for cold-water fish and 27 degrees centigrade (80 degrees Fahrenheit) for warm-water and non-game fish. No temperature standard has been established for protection of waterfowl or water-oriented wildlife. Summer water temperatures approximate the cold water fish standard at the outlet of the Flume with the Duchesne River and exceed it at the upper end. At the remaining LDWP sites, summer water temperatures are less than the warm water fish standards at all sites, although the summer water temperatures in the Swamp wetland at Ted's Flat approach the standard and may exceed it in some years.

The acceptable pH range for both cold- and warm-water species is between 6.5 and 9. All of the proposed sites have pHs within this range.

4.6.5.2 Baseline Water Quality Summary - Fish and Wildlife Concerns

Boron and TDS concentrations in the project area are generally above the wildlife standards but are well below the toxic effects levels. The FWS identified that none of the levels of the constituents would be limiting to adult waterfowl, and that adverse effects of boron on waterbird growth and reproduction would not be expected with development of any of the project sites as a waterbird management area (USGS 1998).

The sampling sites in which the highest concentrations of boron and TDS were measured are also the sites with the lowest flows. The high TDS and boron concentrations in the Riverdell North/South oxbows were measured at discharges of 0.01 cfs or less. In the Flume, boron concentrations decreased in a downstream direction corresponding to an increase in discharge from 1 to 4 cfs. Similar results were observed in the Uresk Drain as boron concentrations decreased from the head of the Drain (0.01 or less cfs) to the Drain outlet (5-7 cfs). As observed in the Flume, the Uresk Drain TDS levels did not increase in a downstream direction.

Ted's Flat was within water quality standards for all parameters except DO which was measured at a level insufficient to support warm-water species and some aquatic plants. The Myton Townsite Canal, which would be used to supply water to most of the project area, has good quality water throughout its length, with boron and TDS concentrations similar to that of Ted's Flat but with much higher DO levels.

Data in Table 4-34 displays existing water quality within the project area as summarized from Mundorff (1977), FWS (1990), ReMillard et al. (1995), USGS (1998) and WWS (2000).

4.6.5.2.1 Salinity Loading

Total salt loading is another measure of how a project can affect a downstream waterbody. Total loading is measured by taking the concentration of a substance in water times

the volume of water flowing past a point. The results can be tabulated as daily (e.g., pounds per day) or annually (e.g., tons per year). Thus it is possible to estimate the annual loads of salts carried to the Duchesne River by the project or delivered from the Duchesne River to the Colorado River.

The Colorado River Salinity Control Act (PL 93-32, 98-569 and 104-20) authorized the DOI and the NRCS to enhance and protect water quality within the Colorado River Basin. Salts in the Colorado River are important as the river water is used to supply water to 18 million people and irrigation water to approximately three million acres. Salt load reductions in Colorado River tributaries, such as the Duchesne River, are necessary to reduce total salts in the Colorado River. Reclamation measures the effects of increases in salts in either the mainstem Colorado River or its tributaries at Imperial Dam on the Colorado River near the Mexican border.

The estimated long-term average annual salt load contributed to the Colorado River by the Duchesne River is 330,000 tons (BOR 1986 as cited in Swanson 2003) which represents 4 percent of the total annual Colorado River salt load of 8.2 million tons at Imperial Dam.

Under baseline conditions, the wetlands and irrigated pastures in the LDWP project area contribute an estimated 11,809 to 13,516 tons of salt annually to the Duchesne River, 4 percent of the total Duchesne River salt load (Swanson 2003). Baseline salt load contributions by site are listed in Table 4-35.

Table 4-34. Summary of Key Water Quality Parameters for Individual Sites within the LDWP Project Area. Cells where values exceed water quality standards are shaded. Warm water standards apply to all sites except the Flume.

Standards	Minimum Summer DO (mg/L)	Maximum Summer Temp (degrees C)	TDS [1] (ppm)	pH	Boron [1] (ppb)	Selenium (ppb)
Water Quality Standard	3-4 Warm water 4-6.5 Cold water	27 20	1,200 (3,200 affects ducklings)	6.5-9	1,000 (lethal at 1,000,000)	>2
Plant Effect Levels	Aquatic plants, invertebrates at < 2-3	N/A	Cottonwood at >1,500 ppm (sustained)	>9	>3,000	Unknown
SITE						
Flume [2] (Cold water standards apply)						
Upper drain	7.2	25	1,650-2,100	8.0	3,500-10,000	1-2
Lower end	8.3	20	599-2,680	8.0	4,000-230	ND
Riverdell [2, 3]						
North oxbow	0.4	22	641-1,670	7.5	920-8,200	ND
South oxbow	2.7	13	1,510-1,610	7.4	1,700-3,700	ND
Uresk Drain [4]	Not collected					
Head of drain		Not collected	1,070	7.6	1,400	ND
Mid-drain		23.5	1,160	8.2	1,000	ND
Drain outlet		22	1,030	8.1	1,000	ND
Ted's Flat [2,4,5]						
Swamp	Not collected	25.7	704	8.8	640	ND
South oxbow	3.9	18.5	764	Not collected	410-760	ND
Myton Townsite Canal [6]	6.5	20.5	270-695	6.5	190-670	ND

[1] Range of values reflect spring and summer concentrations, respectively
[2] USGS 1998
[3] FWS 1990
[4] WWS 2000
[5] Mundorff 1977
[6] ReMillard et al. 1995
ND=non-detect

Table 4-35. Estimated Salt Loads (Tons per Year) Delivered to the Duchesne River under Baseline Conditions for Sites Considered in the Proposed Action and Alternatives.			
Site	**Salt Load (tons/yr)**		
	Proposed Action	**Pahcease Alternative**	**Topanotes Alternative**
Flume	4,907	5,664	5,664
Uresk Drain	3,982	3,982	3,982
Riverdell North/South	2,464	2,464	N/A
Ted's Flat	2,163	N/A	2,163
Total	**13,516**	**12,110**	**11,809**

4.6.6 Impact Analysis

4.6.6.1 Significance Criteria

Impacts to water quality would be considered significant if any of the following occurred:

- The project would result in an exceedance of established wildlife guidelines for environmental contaminants or salts within the project boundaries,
- The project would result in an exceedance of federal or state water quality standards or established guidelines for environmental contaminants in downstream surface waters, or
- The project would increase the total salinity load in the Colorado River by a significant amount. Changes in Colorado River salt loads are measured at Imperial Dam, where the Colorado River Salinity Simulation Model is used to estimate change in total salts. This model measures changes as small as 1 ppm; changes less than that amount are not measurable. Approximately 10,000 tons of salts are required to change the salinity at Imperial Dam by 1 ppm. Impacts to the salinity load of the Colorado River would be considered significant if the project resulted in a measurable change at Imperial Dam, by increasing total salt by more than 10,000 tons over baseline conditions.

4.6.6.2 Proposed Action

4.6.6.2.1 Salinity, Boron and TDS

Boron and TDS occur in irrigation return flows entering each site. Under the Proposed Action, return flows would continue to enter the sites. To maintain water within tolerable salinity levels for wetland-dependent wildlife, considerable outflow from the wetland is required (Christiansen and Low 1970). Under the Proposed Action, wetlands on all sites would be operated as flow-through systems. A water quality control factor is an increase in the water requirement of a site that would be applied to each site's wetland water budget in order to meet the flow-through requirements and prevent accumulation of salts. Because of incomplete mixing of waters within emergent

marshes, the actual amount of water required to maintain a salt balance at an acceptable limit can only be approximated based upon the salinity of the inflowing water. A water quality control factor of 1.27 (meaning a 27 percent increase in the water requirement of the site) was estimated as necessary for those sites receiving inflow with TDS levels less than 800-1,000 ppm. Sites with TDS concentrations greater than 1,200-1,500 ppm in the inflow water require a water quality control factor of 1.5.

The supplemental water required to operate the majority of the non-riparian wetlands as flow-through systems would be primarily provided either directly from canals with low TDS and boron levels, such as the Myton Townsite Canal, or the Duchesne River west of Myton (Table 4-37). These sites are the Flume, the Uresk Drain, Riverdell South oxbows and Ted's Flat South oxbows. The water quality control factor for these wetlands is estimated at 1.27 of the wetland water budget. Supplemental water to operate the sites as flow-through systems would be returned to the Duchesne River as a non-consumptive use of water.

No change in TDS or boron concentrations is anticipated for the Uresk Drain. Most of the site currently contains a high groundwater table or is irrigated. Once the Drain is filled and the water retained longer on-site, supplemental water would be supplied to the Uresk Drain primarily for water quality control and to maintain water flow through the site.

Concentrations of boron and TDS should be reduced in the Riverdell South oxbows as higher quality water from the Myton Townsite Canal is supplied to the system as a water source.

No change in boron or TDS levels is anticipated for the Ted's Flat south oxbow system as the current levels approximate those of the adjacent Myton Townsite Canal, which would be used to supply the site. In addition, the increased water supplied directly from the Myton Townsite Canal should increase the DO concentration.

The Flume would be connected to the Duchesne River west of Myton so as to receive increased flows during spring run-off. The increased spring flow in the Flume would assist in reducing accumulations of boron and other salts, flushing the compounds to the Duchesne River during a high flow period in which concentrations of these substances are well below water quality standards. Supplemental water for the Flume during the summer would be obtained from the Grey Mountain Canal. There is no water quality data for this canal but it likely approximates the water quality of the Duchesne River west of Myton, which meets all water quality standards. Under the Proposed Action, the late summer flows for the Flume would equal or exceed the spring flows in which boron and TDS concentrations are much lower, approaching wildlife protection standards at some sampling sites.

Water for two sites north of the Duchesne River (the Riverdell North oxbow and Ted's Flat north oxbows) would be supplied by the Duchesne River east of Myton. The LDWP would connect the Riverdell North oxbow to the Duchesne River; during operation, it would receive some water from the Duchesne River during spring when concentrations of contaminants are lowest. The remaining water supply would be from the Duchesne River and return flows from the Riverdell Canal. Although these water sources exceed some water quality standards (see Table 4-

37), only 26 non-riparian wetland acres are proposed on this site, and the operation of the system as a flow-through system with a 1.50 water quality control factor should prevent the accumulation of salts. The primary habitat proposed for this site is riparian and the levels of salts and boron in the water supply are below the levels at which adverse effects could occur to the proposed species to be planted.

The Ted's Flat north oxbow would be supplied by water from the Ouray School Canal, which exceeds TDS standards. As for the portions of the Riverdell site north of the Duchesne River, the primary habitat proposed for the site is riparian, which would not be adversely affected.

4.6.6.2.2 Physical Parameters (DO, Temperature and pH)

Increased DO levels would be expected in the Ted's Flat area as flow levels are increased throughout the growing season and surface water is supplied directly from the Myton Townsite Canal instead of through apparent groundwater seepage from the canal. Increased DO levels are also expected in the Riverdell oxbows as flows are increased.

Temperatures in the Flume oxbows equal the standard for cold water fish and may exceed the standard in some years. Current temperatures in the other sites are within the range adequate for warm-water species. The project would not likely increase the water temperatures by increasing flow through the systems. The project also would not change the project area downstream of Myton to a cold-water fishery as the water sources used to provide the flow-through systems are similar to those existing in the project area. Temperatures may be lowered in portions of the oxbows in which water depths increase to three to five feet; however, this depth would be insufficient to buffer cold-water species from high summer air temperatures; however, the project would continue to support warm-water aquatic species.

PH and alkalinity are not expected to change under the Proposed Action. The current levels of these parameters are high, but are within the range considered acceptable for warm-water aquatic life and important wildlife food plants such as bulrush and sago pondweed.

4.6.6.2.3 Duchesne River Salinity and Boron

Boron and TDS levels exceeding water quality standards have been measured in the Duchesne River east of Myton during late summer. By increasing discharge through wetlands in the project area, the project would reduce the concentrations of boron and TDS entering the Duchesne River.

4.6.6.2.4 Salinity Loading

Under the Proposed Action, total salt loading from wetlands and irrigated pastures in the project area would increase by an estimated 1,125 tons annually. This equates to an increase of 0.3 percent of the salt load of the Duchesne River. While representing an adverse impact it is not a significant impact as it represents an amount too small to be measured at Imperial Dam (Swanson 2003).

Table 4-36. Estimated Salt Loads (tons per year) Delivered to the Duchesne River under the Proposed Action.

Site	Salt Load (tons per year)		
	Baseline Conditions	**Proposed Action**	**Change in Salt Load**
Flume	4,907	5,203	+296
Uresk Drain	3,982	4,811	+829
Riverdell North/South	2,464	2,464	0
Ted's Flat	2,163	2,163	0
Total	**13,516**	**14,641**	**+1,125**

Table 4-37. Summary of Water Quality of Supplemental Water Used for Water Quality Control.

Site	Exceeds Water Quality Standards at some points			Supplemental Water Source [1,2]			Additional Water Quality Measures	
	TDS	Boron	DO	Name	TDS (ppm)	B (ppb)	Spring Flushing	Increased Flow
Flume				Duchesne River west of Myton Grey Mountain Canal [3]	600-800 (600-800)	190-670 (690-670)		
Uresk Drain Head Rest				None Myton Townsite Canal	NA 170-695	NA 270-695		
Riverdell N/S North River South Oxbows				Duchesne River east of Myton Myton Townsite Canal	1,500-2,000 170-695	390-701 (880) 270-695		
Ted's Flat North River South Oxbows				Ouray School Canal [4] Myton Townsite Canal	1,500-2,000 170-695	390-701 (880) 270-695		

[1] All sites receive return flows to some degree. Supplemental water refers to the water required to restore, create and/or expand an existing wetland beyond any current return flow input. The named supplemental water source is the source for all water used for water quality control.
[2] Range of numbers represents and late summer concentrations, respectively
[3] Not measured but assumed to equal or exceed the water quality for the MTC which is diverted downstream of the Grey Mountain Canal
[4] Not measured but assumed to reflect Duchesne River water quality between Myton and Randlett

4.6.6.3 Pahcease Alternative

Under the Pahcease Alternative, the water sources, water quality control factors and wetland operation would be the same as for the Proposed Action. The changes in water quality would also be the same as described for the Proposed Action.

Table 4-38. Estimated Salt Loads (tons per year) Delivered to the Duchesne River under the Pahcease Alternative.

Site	Salt Load (tons per year)		
	Baseline Conditions	**Pahcease Alternative**	**Change in Salt Load**
Flume	5,664	5,960	+296
Uresk Drain	3,982	4,811	+829
Riverdell North/South	2,464	2,464	0
Ted's Flat	N/A	N/A	N/A
Total	**12,110**	**13,235**	**+1,125**

Under the Pahcease Alternative, total salt loading from wetlands and irrigated pastures in the project area would increase by an estimated 1,125 tons annually. This equates to an increase of 0.3 percent of the salt load of the Duchesne River. While representing an impact it is not a significant impact as it represents an amount too small to be measured at Imperial Dam.

4.6.6.4 Topanotes Alternative

Under the Topanotes Alternative, the water sources, water quality control factors and wetland operation would be the same as for the Proposed Action. The changes in water quality would also be the same as described for the Proposed Action.

Table 4-39. Estimated Salt Loads (tons per year) Delivered to the Duchesne River under the Topanotes Alternative.			
Site	**Salt Load (tons per year)**		
	Baseline Conditions	**Topanotes Alternative**	**Change in Salt Load**
Flume	5,664	5,960	+296
Uresk Drain	3,982	4,811	+829
Riverdell North/South	N/A	N/A	N/A
Ted's Flat	2,163	2,163	0
Total	**11,809**	**12,934**	**+1,125**

Under the Topanotes Alternative, total salt loading from wetlands and irrigated pastures in the project area would increase by an estimated 1,125 tons. The increase in salts equates to an increase of 0.3 percent of the salt load of the Duchesne River. While representing a negative impact (i.e., an increase in salt loading) it is not a significant impact as it represents an amount too small to be measured at Imperial Dam.

4.6.6.5 No Action Alternative

Under the No Action Alternative, there would be no change in the water quality within the project area. The Flume and Riverdell North/South oxbows would continue to be supported primarily by return flows, and boron and TDS concentrations would continue to exceed wildlife protection levels during late summer. The Uresk Drain would continue to exceed aquatic species protection criteria at its head or uppermost 1,000 feet but remain at or below other water quality parameters throughout the remainder of its length. Ted's Flat would continue to meet all water quality standards except those for DO. The lands within the LDWP project area would continue to supply from 11,809 to 13,516 tons of salt per year to the Duchesne River.

4.7 SOIL RESOURCES

4.7.1 Introduction

The soil resources analysis addresses potential impacts on soil resources from the construction and maintenance of the Proposed Action and alternatives. Construction procedures and revegetation and erosion control measures (sections 2.1.1 and 2.1.2) were reviewed to assess possible effects to the soil resources. Potential changes in soil erosion and stability were assessed by considering construction plans and erosion control procedures. Soil productivity was assessed by reviewing the physical and chemical characteristics of the soil resources within the project area from existing soil surveys (SCS 1955). Potential changes of the soil resources as a result of construction activities were assessed by considering soil texture, soil moisture, soil profiles and topsoil characteristics.

4.7.2 Issues Eliminated from Further Analysis

No issues were eliminated from analysis as no soil resources issues were raised during public scoping.

4.7.3 Issues Addressed in the Impact Analysis

No issues were raised by the public during scoping. The following soil resources impact topics identified during agency meetings are addressed in the impact analysis:

- Soil erosion and stability and
- Soil productivity.

4.7.4 Area of Influence

The area of influence consists of lands in and immediately adjacent to the Duchesne River corridor that would be impacted by the LDWP. Figures 1-3, 1-4 and 1-5 show the overall area of influence for each alternative.

4.7.5 Affected Environment

The available soil data pertaining to the project area varies in age, scale and level of detail. Tribal Trust lands within the project area have not been mapped since the 1950s. The most comprehensive soils information for the project area is found in a 1959 soil survey conducted by the Soil Conservation Service (SCS 1959). Although soil taxonomy and drainage definitions are not equivalent to those used today, the soil survey is accurate when compared to more recent, but less comprehensive, field surveys. The river channel has shifted since this soil survey and thus soil profiles and descriptions may be slightly altered.

Soils in the vicinity of the Duchesne River are a mix of deep and shallow soils over recent alluvium. Green River, Myton and Billings are the only soil types that would be affected within the project area. The productivity of Green River and Billings soils are restricted by poor drainage, inadequate soil moisture, a tendency to erode and insufficient depth. The Myton soils within the project area are restricted by poor drainage and inadequate depth.

The SCS assigned capability classes to the soils in the area according to the suitability of the soils for crops, grazing, forestry and wildlife. Soil productivity adjacent to the river is generally restricted by poor drainage or by shallow, stony soils with limited fertility, or both. Soil productivity in the upper positions of the floodplain is generally restricted by the need to irrigate in order to keep concentrations of injurious salts away from the rooting zone of crops.

4.7.6 Impact Analysis

4.7.6.1 Significance Criteria

Potential impacts to soils would be considered significant if the project created degraded soil conditions. As defined by the NRCS, this would occur when "site productivity, use, and potential for restoring the original plant community are seriously threatened" as a result of project construction or operation (BIA 2000a).

4.7.6.2 Proposed Action

4.7.6.2.1 Soil Erosion and Stability

Adverse soil erosion and stability impacts would be avoided and minimized by using appropriate construction procedures and SOPs as described in section 2.1.2. Construction is planned to occur in the driest time of the year when soil is least susceptible to harmful compaction. Cofferdams would be used to temporarily dewater wetland areas during berm and dike construction. Flows would be introduced gradually into each completed section following construction, with water levels carefully controlled for three to five years to facilitate the establishment of desired wetland and riparian vegetation. Approximately 58 acres of vegetation would be temporarily disturbed during construction of the Proposed Action. This temporary reduction in vegetated cover may increase soil erosion in the short-term; however, improvements associated with the Proposed Action would result in a long-term increase in vegetation density, height and diversity.

4.7.6.2.2 Soil Productivity

Under the Proposed Action, the water table would be raised in and adjacent to the proposed wetland areas. Some areas that are currently not wetland would become permanently flooded. Most of the soils to be flooded have limited productivity because of an existing shallow groundwater table that interferes with cultivation. Soils along the oxbows are typically Green River soils, which are alluvial soils that historically supported wetlands. Soils in the Uresk Drain and in isolated wetlands are underlain by somewhat poorly drained variants of the Myton and Billings series, which also supported more wetlands than under present conditions. The Proposed Action would return these soils to their original state. More well-drained variants of the Green River, Myton and Billings soils underlie uplands within the project area. The productivity of these soils is limited by a shallow soil profile, a high clay content, high alkalinity and lack of natural precipitation. These soils have received irrigation to produce desired vegetation. These areas would continue to be managed as irrigated grasslands or desert shrub habitat for wildlife use. Soil productivity in these areas is expected to be the same as under baseline conditions. Soils that lie between the irrigated grasslands and the inundated areas are expected to gain productivity. The combination of the rising water table and the removal of invasive plant species would allow for establishment, growth and propagation of the desired vegetation. Ultimately, soils would become more productive as water availability is increased.

There would be no change in the productivity of soils that currently support crops. Overall, a slight net gain in soil productivity is expected as a result of the Proposed Action.

4.7.6.2.3 Impact Summary

Construction activities may cause a slight temporary increase in soil erosion during and immediately after construction; however, the Proposed Action would result in a long-term reduction in soil erosion. Raising the water table in the project area would inundate some soils directly adjacent to the proposed wetland areas. These soils, however, are described as having restricted productivity due to a seasonally high water table resulting in excess water. Soils that are located in the uplands in the project area would either retain the same productivity or gain productivity where water would be more available.

4.7.6.3 Pahcease Alternative

4.7.6.3.1 Soil Erosion and Stability

Impacts on soil erosion and stability are expected to be the same as those described for the Proposed Action.

4.7.6.3.2 Soil Productivity

Adverse impacts on soil productivity are not expected for the same reasons defined in section 4.7.6.2.2. Soils that would be inundated from a raised water table are mapped as being limited for cultivation by excess water, and soils in the upland areas would remain unchanged or slightly more productive from more water availability and fewer invasive species. There would be no net loss of soil productivity.

4.7.6.3.3 Impact Summary

Total soil impacts would be the same as described for the Proposed Action.

4.7.6.4 Topanotes Alternative

4.7.6.4.1 Soil Erosion and Stability

Impacts on soil erosion and stability are expected to be the same as those described for the Proposed Action.

4.7.6.4.2 Soil Productivity

Adverse impacts on soil productivity are not expected for the same reasons defined in section 4.7.6.2.2. Soils that would be inundated from a raised water table are mapped as being limited for cultivation by excess water, and soils in the upland areas would remain unchanged or slightly more productive from more water availability and fewer invasive species. There would be no net loss of soil productivity.

4.7.6.4.3 Impact Summary

Total soil impacts would be the same as described for the Proposed Action.

4.7.6.5 No Action Alternative

No changes to soil erosion, stability or productivity would occur under the No Action Alternative. Soil resources would retain baseline conditions as described in section 4.7.5.

4.8 AGRICULTURE AND LAND USE

4.8.1 Introduction

This section addresses the potential impacts on agricultural resources and land uses within the project area resulting from the construction, operation and maintenance of the Proposed Action and alternatives. Issues concerning the compatibility of the project with local policy objectives and land use plans are also addressed.

The section defines and addresses changes in agricultural output as a result of the project and compares the changes to county-wide agricultural production. The significance of changes in agricultural production is primarily socioeconomic; therefore, no significance criteria are listed in this chapter for changes in agricultural output. The significance of changes in agricultural production is evaluated in terms of the local economies, which are analyzed in section 4.9, Socioeconomics.

4.8.2 Issues Eliminated from Further Analysis

All agriculture and land use issues raised during public scoping are addressed in this analysis. No issues were eliminated. Management of the project area to prevent weeds from spreading onto adjacent farmlands is addressed in section 2.1.4.3, Operating Agreements, section 4.2.6, Wetland and Riparian Habitats, and Appendix B, Weed Control Plan.

4.8.3 Issues Addressed in the Impact Analysis

The following issues raised during the public scoping and agency consultation process are addressed in the analysis:

- Will eliminating livestock grazing within the project area have any impact on the livestock industry on a county-wide basis?
- How will conservation easements in the project area impact county-wide agricultural production?
- Will the project affect local agricultural practices or methods of production?
- How do the project-induced changes in land ownership and management conflict with or adhere to county land use objectives?
- Will the land use changes contemplated by the Proposed Action and alternatives be in harmony with land uses in the immediate vicinity of the project as well as county-wide?

4.8.4 Area of Influence

The area of influence for this analysis is defined as Uintah and Duchesne Counties. Agricultural impacts would be felt primarily within the Uinta Basin economy of the two counties. It is not anticipated that any impacts would be felt statewide or otherwise outside the Uinta Basin. Additionally, conflicts with county land use plans would be meaningful only within the two counties.

4.8.5 Affected Environment

4.8.5.1 Agriculture and Land Use in Duchesne and Uintah Counties

There are 4,945,562 acres (7,727 square miles) in Duchesne and Uintah Counties. Of this total, 2,911,000 acres are regarded to be within the Uinta Basin, the principal drainage basin of both counties and the location of the major population centers as well as most of the economic activity. Table 4-40 summarizes land ownership patterns in both counties based on the Ute Tribe GIS database located in Fort Duchesne, Utah.

Approximately 200,000 acres of land in the Uinta Basin portion of Duchesne and Uintah Counties are devoted to irrigated agriculture, with roughly equal amounts of cropland and irrigated pasture (DWRi 1999). Table 4-41 provides a summary of the acres of irrigated agricultural land in both counties.

The farm economy in the two counties is dominated by activities directed toward the production of livestock, including dairy products and sheep, but with a primary focus on beef production. Ninety percent of the farms in Duchesne and Uintah Counties are dependent in some manner upon beef production (including cattle grazing and production of cattle feed) for their farm income. Small grains and corn are grown on 10 percent of the acres devoted to crop production, with the remainder of crops consisting of livestock feed products such as alfalfa hay, grass hay and corn silage. Tables 4-42 and 4-43 summarize the agricultural production in the two-county area based on data presented in Utah Agricultural Statistics (2001).

Table 4-40. Land Ownership in Duchesne and Uintah Counties.

Land Owner	Duchesne County		Uintah County	
	Acres	Percent of County	Acres	Percent of County
Tribal				
Uintah and Ouray Indian Reservation	381,667	18.5	426,840	14.8
Federal				
Bureau of Land Management	201,200	9.7	1,343,298	46.7
Forest Service	776,175	37.5	270,430	9.4
National Park Service	0	0	50,062	1.7
U.S. Fish & Wildlife Service	0	0	11,606	0.4
Bureau of Reclamation	16,890	0.8	8,829	0.4
Other				
State, Private	692,386	33.5	766,179	26.6
Total	2,068,318	100	2,877,244	100

Table 4-41. Summary of Irrigated Farm Characteristics in Duchesne and Uintah Counties.

Land Uses	Duchesne County	Uintah County	Total
Number of farms	811	795	1,606
Average size of farm (acres)	170	130	N/A
Cropland (acres)	56,971	44,954	101,925
Irrigated Pasture (acres)	57,819	38,985	96,804
Total Cropland and Irrigated Pasture (acres)	**114,790**	**83,939**	**198,729**

Table 4-42. Summary of Crop Production in Duchesne and Uintah Counties.

Crops	Duchesne County				Uintah County			
	Acres	Units/ Acre	Yield/ Acre	Total Production	Acres	Units/ Acre	Yield/ Acre	Total Production
Wheat	0	Bushels	0	0	400	Bushels	53	21,000 Bu
Barley	1,800	Bushels	75	128,000 Bu	1400	Bushels	73	77,000 Bu
Corn - grain	1,300	Bushels	12	163,000 Bu	1,100	Bushels	140	154,000 Bu
Corn - silage	1,300	Bushels	19	25,000 Bu [1]	2,800	Bushels	17	47,000 Bu
Oats	400	Bushels	75	30,000 Bu	500	Bushels	69	34,500 Bu
Grass hay	48,800	Tons	3.5	169,300 tons[1]	7800	Tons	3.7	29,200 tons
Alfalfa hay	35,400	Tons	3.9	139,300 tons [1]	31,000	Tons	3.7	115,200 tons
Total Crop Farm Cash Receipts				**$ 7,700,000**	**Total Crop Farm Cash Receipts**			**$ 6,200,00**

[1] Cash value included in Table 4-43 under livestock products.

Table 4-43. Summary of Livestock Production in Duchesne and Uintah Counties.		
Livestock Production (number of animals)	**Duchesne County**	**Uintah County**
All cattle and calves	65,000	46,000
Beef cows	32,000	23,000
Milk cows	3,200	2,000
Breeding sheep and lambs	8,000	12,000
Total Livestock Farm Receipts (including crops produced for livestock consumption)	**$32,900,000**	**$22,900,000**
Total Farm Cash Receipts	**$40,200,000**	**$29,100,000**

4.8.5.2 Agriculture and Land Use within the Project Area

The project area is located within the Uintah and Ouray Indian Reservation. The Reservation itself, and therefore the project area, contains a checkerboard pattern of Indian and non-Indian ownership due to homesteading in the early 1900s. Land ownership in the project area is summarized for each alternative in Table 2-3 in section 2.1.3.1. The majority of the land within each alternative is in Tribal Trust. Tribal Trust and existing federally-owned land together comprise from 62-67 percent of the project area. The remainder of the land is fee land.

Land uses and agricultural practices in the project area are not particularly diverse when compared to the two counties overall. Of the total 7,790 acres of land within the Proposed Action project area, 491 acres of land are devoted to alfalfa hay, with minor amounts of other rotation crop production. Total production of alfalfa hay in the project area is estimated at 1,318 tons annually as compared to 254,500 tons of alfalfa hay and 198,500 tons of grass hay in the two-county area. The project area produces approximately 0.5 percent of the alfalfa hay produced in the two-county area. The small percentage of area affected is a result of the design of the project area to avoid active croplands unless they abutted an oxbow system.

The remaining 93.7 percent of the Proposed Action project area consists of irrigated, sub-irrigated and dry pastures devoted to grazing. Of this percentage, 3,885 acres, or 50 percent of the total project area, is dry pasture that is grazed at very low intensity (less than 1 AUM). Irrigated pastures comprise 30 percent of the Proposed Action project area. These lands are flood irrigated. Grazing practices vary, including year-round grazing and spring-only grazing, but the dominant practice is to graze cow-calf pairs from April through September. Production on irrigated pastures averages 2.5 to 3 AUMs per acre. Grazing intensity on irrigated lands is moderate to high, with no restrictions on forage amount. The project area contains 1,087 acres of federal land that are idle and not currently in agricultural production.

Table 4-44. Estimated Agricultural Production on Lands in the Proposed Action Area under Baseline Conditions.					
Land use	**Acres[1]**	**Average Production/Acre[2]**	**Total Production**	**Average Value/Unit[2]**	**Total Value**
Cropland - Tribal	169	3.5 tons	560.0 tons	$100/ton	$56,000
Cropland - Fee	331	3.5 tons	1,158.5 tons	$100/ton	$115,850
Cropland Totals	**500**	**N/A**	**1,718.5 tons**	**N/A**	**$171,850**
Irrigated Pasture (Tribal)	1,186	2.5 AUMs[3]	2,965 AUMs	$15/AUM	$44,475
Irrigated Pasture (Fee)	1,141	3.0 AUMs	3,423 AUMs	$15/AUM	$51,345
Irrigated Pasture Totals	**2,327**	**N/A**	**6,388 AUMs**	**N/A**	**$95,820**
Other - Tribal	2,727	0.68 AUMs	1,854.4 AUMs	$15/AUM	$27,815
Other - Fee	1,158	0.87 AUMs	1,007.5 AUMs	$15/AUM	$15,112
Other - Totals	**3,885[4]**	**N/A**	**2,861.9 AUMs**	**N/A**	**$42,927**
Total Estimated Value					**$310, 597**

[1] Acres based on 1997 aerial photograph analysis.
[2] Figures based on BIA estimates.
[3] AUM = Animal unit month which represents the amount of forage consumed by a cow and calf in one month.
[4] There are an additional 1,087 acres in the Riverdell North property which are not under agricultural production.

Although the exact proportions of land devoted to cropland, irrigated pasture and dry pasture vary among alternatives (see Table 2-6 in section 2.2.3 and Table 2-7 in section 2.3.3), agricultural patterns for the other two alternatives are similar to those described for the Proposed Action.

4.8.5.3 Land Use Plans

Duchesne and Uintah Counties both have general plans containing policies and objectives for the land uses and management in the two counties (Duchesne County 1997, Uintah County 1996). The plans are similar in content and both support an objective of "no net increase" in public lands in their respective counties. These similar objectives conflict with LDWP project plans to acquire fee land and place them in federal ownership. Other provisions in the counties' general plans appear to be in harmony with the Proposed Action and alternatives. Some of the provisions in the plans include the following:

- Supporting acquisition of private property on a willing seller basis (Duchesne County),
- Supporting community and county sponsored beautification and cleanup efforts (Duchesne County),
- Developing an outdoor field institute or nature center (Duchesne County),

- Protecting the County's rural character (Uintah County),
- Improving and protecting water quality (Uintah and Duchesne Counties), and
- Promoting responsible public land recreation and tourism (Uintah and Duchesne Counties).

Though the Ute Tribe has no formal land use plan, they have a general policy of trying to consolidate Tribal Trust lands whenever former Reservation, or "homesteaded lands," become available for purchase.

4.8.6 Impact Analysis

4.8.6.1 Significance Criteria

The impact analysis for the Proposed Action and alternatives measures changes in agricultural production as a result of the LDWP. The significance of such changes is one of the socioeconomic questions addressed in section 4.9.

Changes in land use resulting from the project would be considered significant if such changes conflict with the objectives of the counties' land use plans, or if changes are incompatible with land uses in the area such that the local lifestyle is adversely affected.

4.8.6.2 Proposed Action

4.8.6.2.1 Agricultural Production and Practices

Of the 7,790 acres in the Proposed Action project area, 491 are being cultivated for rotation crops (primarily alfalfa hay). Although this production would continue under the Proposed Action, a conservation easement would be placed on these lands requiring that at least 20 percent of the crop be left for wildlife and not harvested for sale. The conservation easement would not reduce total crop production, but would reduce the marketable crop yield by 264 tons per year, which has a value of $26,400 at the current market value of $100 per ton. Utah Agricultural Statistics (2001) indicates that there were 254,500 tons of alfalfa hay produced in Duchesne and Uintah Counties in 2000 (see Table 4-42). The Proposed Action would reduce the marketable crop yield in the two- county area by approximately 0.1 percent.

There are 6,212 acres of pasture land in the project area that are currently being grazed or are open for grazing. Based on figures provided by the BIA (2000a), the total potential pasture yield is 9,250 AUMs per year, or $138,747 at the current market value of $15 per AUM. The Proposed Action would eliminate grazing on these lands to provide suitable habitat for wildlife. The total number of AUMs and their estimated value was developed by the BIA (BIA 2000a). Cropland and pasture land have mixed ownership (Table 4-44), and not all agricultural land will be acquired in fee title. However, under easements negotiated with the Tribe, agricultural production would be changed as described for the fee lands.

The State of Utah does not compile statistics on the number of AUMs across the state, so it is not possible to directly compare the local reduction of AUMs to county-wide production. However, since the dominant form of grazing on the LDWP project lands is cow-calf pairs for six months of the year, the loss of these AUMs would be roughly equivalent to the loss of 1,542 cow-calf pairs

(9,250 AUMs divided by six months), assuming that no alternative grazing lands were available. Table 4-43 indicates that there are 111,000 cattle and calves in Uintah and Duchesne Counties, which equates to 55,500 cow-calf pairs. The loss of 1,542 cow-calf pairs in the project area would represent a loss of 2.8 percent of the cow-calf pairs in the two counties.

Total marketable agricultural production within the project area (including both crop and livestock production) would be reduced by 56 percent. This reduction would result in only a slight change in total county-wide production. The production change is not anticipated to impact individual income as land owners would be compensated for revenue loss either by land purchase or conservation easements. Allottees would be compensated for the fair market value of their agricultural land. Lessees of Tribal Trust land are subject to Tribal lease provisions that allow a change in lease conditions at any time. Changes in lessee use of Tribal Trust land are consistent with existing Tribal policy.

Pasture land would be acquired in fee title. This action may impact individual landowners, but impacts would be minimized by avoiding all residences unless they are adjacent to oxbows, and by developing standard land acquisition procedures according to the Uniform Relocation Assistance and Real Properties Acquisition Policies Act of 1970. These procedures are described in more detail in section 2.1.3.2.

The Proposed Action would impact agricultural practices and operations in the project area and the surrounding vicinity in small ways. Grazing would be eliminated from pastures in the project area unless necessary to achieve wildlife management goals. Cropping practices and pesticide application on cropped farms in the project area would be altered. Such changes would have no effect on agricultural practices on adjacent farms.

Table 4-45. Estimated Marketable Agricultural Production under the Proposed Action.[1]					
Land Use	**Acres**	**Average Production/ Acre [1]**	**Total Production**	**Average Value/Unit [1]**	**Total Value**
Cropland -Tribal	160	2.8 tons	448 tons	$100/ton	$44,800
Cropland - Fee	331	2.8 tons	927 tons	$100/ton	$92,700
Cropland totals:	**491**	**N/A**	**1,375 tons**	**N/A**	**$ 137,500**
Irrigated Pasture (Tribal)	1,186	0 AUMs [2]	0 AUMs	$15/AUM	$0
Irrigated Pasture (Fee)	1,141	0 AUMs	0 AUMs	$15/AUM	$0
Irrigated Pasture Totals:	**2,327**	**N/A**	**0 AUMs**	**N/A**	**$0**
Other - Tribal	2,727	0 AUMs	0 AUMs	$15/AUM	$0
Other - Fee	1,158	0 AUMs	0 AUMs	$15/AUM	$0
Other - Totals:	3,885		0 AUMs		$0
Total Estimated Value					**$137,500**

[1] Figures based on BIA estimates (production includes a 20% reduction for conservation easement)
[2] An Animal Unit Month (AUM) represents the amount of forage consumed by a cow and calf in one month

4.8.6.2.2 Land Use Plans

The Proposed Action would initiate changes in land use and ownership in the project area. Some of these changes conflict with Duchesne and Uintah Counties' land use plans. Other changes are consistent with the counties' goals of preserving open space and planning for nature-oriented recreation.

Under the Proposed Action, up to 2,154 acres of private land would be acquired and converted to federal ownership. This conflicts with the land use plans of both counties, both of which call for "no net increase" in public land. Additionally, since the power of eminent domain remains available as a last resort to acquire these properties, it is possible that county officials could view this aspect of the Proposed Action as a conflict with land use plan objectives calling for protection of private property (the Duchesne County General Plan calls for "protecting private property rights during CUP Completion Act implementation").

These plans and policies were adopted in 1996 and 1997, many years after the requirements for completion of the CUP were established in federal law. The LDWP is part of the federally-mandated mitigation requirements for the CUP originally committed to in 1964. The joint lead agencies must comply with the federal requirements to complete the CUP. Although the Duchesne and Uintah County land use plans are not binding on the federal government, the joint lead agencies would adopt several strategies

to reduce the conflict between the counties' no-net-loss policies, private property concerns and project implementation. These strategies are listed below.

- The project has been designed to avoid residences wherever possible and still meet wildlife habitat goals.
- Where land acquisition is necessary to meet the project goals, every effort will be made to acquire properties on a willing-seller basis.
- Eminent domain authority would be used only if necessary.
- Active croplands bordering oxbows may be placed under conservation easements and not acquired in fee title.

Ultimately the conflict would remain unresolved as there would be a net loss of private land in the two counties.

The project would initiate land-use changes that are in harmony with other features of the counties' land use plans and land use patterns on adjacent lands. For instance, both counties have land use objectives that call for "protecting the county's rural character." The Proposed Action and alternatives support this county goal by creating and preserving an open space corridor. Moreover, the Proposed Action should improve water quality and provide some limited potential for wildlife-related recreation, an objective of both Uintah and Duchesne Counties.

Although the Proposed Action would eliminate grazing in the project area and initiate other land use changes, the land within the project area would remain rural and undeveloped in appearance. The marketable yield of crops and livestock products would be reduced by 0.1 to 0.4 percent, respectively, in the two counties. Such changes should not affect the viability of an agricultural lifestyle within Duchesne and Uintah Counties nor interfere with land uses and lifestyles in the surrounding area.

4.8.6.3 Pahcease Alternative

4.8.6.3.1 Agricultural Production and Practices

Table 4-46 provides a summary of current and post-project agricultural uses, acreage, yield and crop values on lands within the Pahcease Alternative project area. Of the total 6,765 acres in the Pahcease Alternative, 349 acres are presently cropped for alfalfa hay. Conservation easements would not reduce the total crop production, but would reduce the marketable crop yield by 20 percent. This translates to a reduction in the marketable yield of 244 tons per year, with a value of $24,430 at the current market value of $100/ton. The Pahcease Alternative would reduce the marketable crop yield in the two-county area by 0.1 percent.

There are 5,329 acres of pasture land in the Pahcease Alternative that are grazed or available for grazing, with a potential yield of 8,580 AUMs. The current market value of these AUMs is $128,693. Eliminating grazing would reduce cow/calf pairs in the two-county area by 1,430, a reduction of 2.6 percent on a county-wide basis, if alternative grazing sites were not available.

Total marketable agricultural production within the project area (including both crop and livestock production) would be reduced by 61 percent. This reduction would result in only a slight change in total county-wide production. The production change is not

anticipated to impact individual income as land owners would be compensated for the revenue loss either by land purchase or conservation easements. Allottees would be compensated for the fair market value of the agricultural land. Lessees of Tribal Trust land are subject to Tribal lease provisions that allow a change in lease conditions at any time. Changes in lessee use of Tribal Trust land are consistent with existing Tribal policy.

Pasture land would be acquired in fee title or by easement on Tribal Trust lands. This action may impact individual landowners but impacts to individual homeowners would be minimized by avoiding all residences unless they are adjacent to oxbows and by developing standard land acquisition procedures according to the Uniform Relocation Assistance and Real Properties Acquisition Policies Act of 1970. These procedures are described in more detail in section 2.1.3.2.

As for the Proposed Action, the Pahcease Alternative would impact agricultural practices and operations in the project area and the surrounding vicinity in small ways. Grazing would be eliminated from pastures in the project area, unless necessary to meet wildlife management goals. Cropping practices and pesticide application on cropped farms in the project area would be altered. Such changes would have no effect on agricultural practices on adjacent farms.

Table 4-46. Estimated Marketable Agricultural Production under the Pahcease Alternative. Both pre-project (baseline conditions) and post-project conditions are listed.

Land Use	Acres	Pre-project Production				Post-project Production		
		Average Production/ Acre [1]	Total Production	Average Value/Unit [1]	Total Value	Average Production/Acre	Total Production	Total Value
Cropland -Tribal	124	0 tons	434 ts	$100/ton	$43,400	2.8 tons	347.2 tons	$34,7200
Cropland - Fee	225	3.5 tons	787.5 tons	$100/ton	$78,750	2.8 tons	630 tons	$63,000
Cropland totals	**349**	**N/A**	**1,221.5 tons**	**N/A**	**$122,150**	**N/A**	**977.2 tons**	**$97,720**
Irrigated Pasture (Tribal)	1,144	2.5 AUMs	2,860 AUMs	$15/AUM	$42,900	0 AUMs	0 AUMs	$0
Irrigated Pasture (Fee)	1,173	3.0	3,519	$15/AUM	$52,785	0 AUMs	0 AUMs	$0
Irrigated Pasture Totals	**2,317**	**N/A**	**6,379 AUMs**	**N/A**	**$95,685**	**N/A**	**0 AUMs**	**$0**
Other - Tribal	2,210	0.68 AUMs	1,503 AUMs	$15/AUM	$22,542	0 AUMs	0 AUMs	$0
Other - Fee	802	0.87 AUMs	698	$15/AUM	$10,466	0 AUMs	0 AUMs	$0
Other - Totals	**3,012**	**N/A**	**2,201 AUMs**	**N/A**	**$33,008**	**N/A**	**0 AUMs**	**$0**
Total Value					**$250,843**			**$97,720**

[1] Figures based on BIA estimates

4.8.6.3.2 Land Use Plans

The Pahcease Alternative would acquire up to 1,787 acres of private land, eliminate grazing on project lands and reduce marketable crop yield by 20 percent on 349 acres of land. The impacts of these actions on county land use and surrounding properties is the same as for the Proposed Action.

4.8.6.4 Topanotes Alternative

4.8.6.4.1 Agricultural Production and Practices

Table 4-47 provides a summary of current and post-project agricultural uses, acreage, yield and crop values on lands within the Topanotes Alternative project area. Of the total 6,648 acres in the Topanotes Alternative, 541 acres are cropped for alfalfa hay and other rotation crops. Conservation easements would not reduce the total crop production, but would reduce the marketable crop yield by 20 percent. This translates to a reduction in the marketable yield of 378 tons per year, with a value of $37,850 at the current market value of $100/ton. The Topanotes Alternative would reduce the marketable crop yield in the two county area by 0.5 percent.

There are 6,107 acres of irrigated and non-irrigated pasture land in the Topanotes Alternative that are grazed or available for grazing, with a potential yield of 7,949 AUMs. The current market value of these AUMs is $119,235. Eliminating grazing would reduce cow/calf pairs in the two-county area by 1,324, a reduction of 2.4 percent, if alternative grazing was not available.

Total marketable agricultural production within the project area (including both crop and livestock production) would be reduced by 51 percent. This reduction would result in only a slight change in total county-wide production. The production change is not anticipated to impact individual income as land owners would be compensated for revenue loss either by land purchase or conservation easements. Allottees would be compensated for the fair market value of their agricultural land. Lessees of Tribal Trust land are subject to Tribal lease provisions that allow a change in lease conditions at any time. Changes in lessee use of Tribal Trust land are consistent with existing Tribal policy.

Pasture land would be acquired in fee title or by easements on Tribal Trust lands. This action may impact individual landowners but impacts to individual homeowners would be minimized by avoiding all residences unless they are adjacent to oxbows and by developing standard land acquisition procedures according to the Uniform Relocation Assistance and Real Properties Acquisition Policies Act of 1970. These procedures are described in greater detail in section 2.1.3.2.

As for the Proposed Action, the Topanotes Alternative would impact agricultural practices and operations in the project area and the surrounding vicinity in small ways. Grazing would be eliminated from pastures in the project area, unless necessary to meet wildlife management goals. Cropping practices and pesticide application on cropped farms in the project area would be altered. Such changes would have no effect on agricultural practices on adjacent farms.

4.8.6.4.2 Land Use Plans

The Topanotes Alternative would acquire up to 2,171 acres of private land, eliminate grazing on project lands and reduce

marketable crop yield by 20 percent on 541 acres of land. The impacts of these actions on county land use and surrounding properties is the same as for the Proposed Action.

Table 4-47. Estimated Marketable Agricultural Production under the Topanotes Alternative. Both pre-project (baseline conditions) and post-project conditions are listed.

Land use	Acres	Pre-project Production				Post-project Production		
		Average Production/acre	Total Production	Average Value/Unit	Total Value	Average Production/acre	Total Production	Total Value
Cropland -Tribal	160	3.5 tons	560 tons	$100/ton	$56,000	2.8 tons	448 tons	$44,800
Cropland - Fee	381	3.5 tons	1,333.5 tons	$100/ton	$133,350	2.8 tons	1,067 tons	$106,700
Cropland totals	**541**	**N/A**	**1,893.5 tons**	**N/A**	**$189,350**	**N/A**	**1,515 tons**	**$151,500**
Irrigated Pasture (Tribal)	1,127	2.5 AUMs[2]	2,118 AUMs	$15/AUM	$31,770	0 AUMs[2]	0 AUMs	$0
Irrigated Pasture (Fee)	954	3.0	2,862 AUMs	$15/AUM	$42,930	0 AUM[1,2]	0 AUMs	$0
Irrigated Pasture Totals	**2,081**	**N/A**	**4,980 AUMs**	**N/A**	**$74,700**	**N/A**	**0 AUMs**	**$0**
Other[3] - Tribal	2,810	0.68 AUMs	1,911 AUMs	$15/AUM	$28,665	0 AUMs	0 AUMs	$0
Other - Fee	1,216	0.87 AUMs	1,058 AUMs	$15/AUM	$15,870	0 AUMs	0 AUMs	$0
Other - Totals	**4,026**	**N/A**	**2,969 AUMs**	**N/A**	**$44,535**	**N/A**	**0 AUMs**	**$0**
Total Value	**6,648**				**$308,585**			**$151,500**

[1] Figures based on BIA estimates.
[2] AUM = Animal unit month which represents the amount of forage consumed by a cow and calf in one month.
[3] Category includes 1861 water-righted Tribal Trust lands which are currently idle but available to be put into production at any time.

4.8.6.5 No Action Alternative

Under the No Action Alternative, agricultural production in the project area would continue to be focused on cattle grazing and feed production. Such production would continue to represent 0.4 percent of the livestock production in the two-county area. More than one-half of the acres devoted to grazing would continue to consist of dry pasture with an estimated AUM of less than 1.0 per acre. Agricultural practices would continue as described for the baseline conditions. No actions would be taken to maintain open space or wildlife-related recreation on project lands. Land would remain open for conversion of agricultural land to other uses.

4.9 SOCIOECONOMICS

4.9.1 Introduction

This section addresses potential direct and indirect socioeconomic impacts resulting from the construction, operation and maintenance of the Proposed Action and alternatives of the LDWP. These impacts may result from project construction or the project's longer term effects on agriculture, recreation and other economic resources in the impact area.

4.9.2 Issues Eliminated from Further Analysis

The following issues raised during the public scoping and agency consultation process were eliminated from further analysis for the reasons listed below.

- Changes in population and demographics.

The Proposed Action and alternatives would each generate 30 full-time, temporary jobs during the most active phase of the project. These jobs are expected to be filled primarily by Tribal members or from other people living in the Uinta Basin. The project should not generate any migration of labor into the Uinta Basin or otherwise create any noticeable changes in population or demographics in the project area.

4.9.3 Issues Addressed in the Impact Analysis

- Will employment levels change as a result of the LDWP construction and operation, and will this affect the local economy?
- Will there be a long-term economic impact from changes in agricultural practices within the project area?
- Is the community infrastructure in the local impact area and on the Uintah and Ouray Indian Reservation adequate to meet project-associated demand for housing, police and other community services during project construction and operation?
- Will there be a change in the county tax base associated with the purchase of fee land?
- Will the project produce any economic benefits to Tribal members?

4.9.4 Area of Influence

For the purposes of the socioeconomic analysis, two impact areas of influence are defined: (1) a local impact area, comprised of Duchesne and Uintah Counties and (2) the

Uintah and Ouray Indian Reservation. The Reservation is analyzed as a separate entity as the Tribe has social and economic needs different from the counties as a whole. Accordingly, impacts that might be regarded as insignificant when viewed from a county-wide perspective, such as employment, could be considered significant from a Tribal perspective.

4.9.5 Affected Environment

4.9.5.1 Local Impact Area - Duchesne and Uintah Counties

4.9.5.1.1 Population

From 1990 to 2001, the estimated population of Duchesne County grew from 12,600 to 14,646, an annual increase of 1.5 percent. During the same period, the population of Uintah County grew at a nearly identical rate of 1.6 percent, from 22,230 to 26,049. Both counties experienced population growth rates below the statewide average of 2.9 percent during the 1990s (GOPB 2002).

According to models prepared by the Utah Governor's Office of Planning and Budget, the population growth rates for both counties will decline in the coming decades. Annual growth rates in the Uinta Basin are expected to average 1.1 percent per annum through the year 2020, less than the statewide average of 2.2 percent. This would result in a Uinta Basin population of 49,030 in the year 2020 (GOPB 2002).

4.9.5.1.2 Employment

Table 4-48 shows that the 2000 unemployment rates for Duchesne and Uintah Counties were 6.0 percent and 4.8 percent, respectively. These rates are higher than the statewide unemployment rate of 3.2 percent for the year 2000; however, both counties experienced a substantial decline in unemployment from 1999, when unemployment rates were 9.4 percent and 7.2 percent, respectively. The decline in unemployment can be attributed primarily to non-farm job growth of 3.5 to 5.7 percent during the period. This non-farm job growth exceeded the statewide average of 2.5 percent.

Table 4-48. Employment Figures for Duchesne and Uintah Counties, 1999-2000.

County	Civilian Labor Force		Total Employed		Total Unemployed		Unemployment Rate	
	1999	2000	1999	2000	1999	2000	1999	2000
Duchesne	5,881	5,641	5,326	5,304	555	337	9.4%	6.0%
Uintah	10,662	11,029	9,892	10,505	770	524	7.2%	4.8%

The Utah State Water Plan (DWRi1999) contains future employment projections for the two counties generated by the Utah Process Economic and Demographic (UPED) model. Through the year 2020, the number of jobs in Duchesne County is expected to increase by 38 percent, or 1.9 percent per year. In Uintah County, the growth during the

same period is expected to be 46 percent, or 2.3 percent per year. This growth is expected to occur across a wide range of economic sectors, including construction, transportation, service, recreation and government employment. The exception to this trend is in the agricultural sector where the two counties are each expected to lose up to 100 agricultural jobs over the next 20 years.

4.9.5.1.3 Income/Output

In contrast to the economic situation decades ago, both Uintah and Duchesne Counties have diverse, growing economies in which agriculture plays an increasingly minor role. Total personal income in the year 2000 was $256,700,000 in Duchesne County and $444,000,000 in Uintah County. In Duchesne County, this represents an increase of 6.2 percent over the year 1999, while in Uintah County the increase was 10.7 percent. Per capita income in both counties remains below the state average (77 percent of the state average in Duchesne County and 75 percent of the state average in Uintah County).

In Duchesne County, the largest single contributor to county payroll wages is government (30 percent), followed by mining (19.7 percent) and transportation and public utilities (16 percent). In Uintah County, the largest contributor to payroll wages was mining (26.7 percent), followed by government services (22.8 percent), other services (17.3 percent) and trade (16.1 percent).

4.9.5.1.4 Agricultural Economics

Duchesne and Uintah Counties are generally regarded as rural areas, where a high proportion of private land is devoted to agricultural production. The Division of Water Resources (DWRi 1999) indicates there are 201,120 acres of privately-owned irrigated crop and pasture lands in the Uinta Basin, with over one million acres of private rangeland in the two counties. The average irrigated farm in Uintah County is 130 acres, while in Duchesne County the average size is 170 acres. More than 90 percent of the farms are devoted to beef production, either through cattle grazing or associated feed production.

Despite the visibility of agriculture in the Uinta Basin, the contribution of agriculture to the economies of the two counties is relatively small, generally only 1 percent or less. The majority of farms in the Uinta Basin exist only as part-time operations with farmers working full-time at other occupations (DWRi 1999). Table 4-49 provides recent comparisons between total personal income in the two counties with personal income derived from agriculture. These figures reveal several trends in Uinta Basin economics that are confirmed by viewing statistics over longer time frames:

- Total personal income in both counties is rising steadily,
- Personal income from farming is highly variable, and has fallen dramatically since its high point in 1990 when it reached $12,900,000 in Uintah County and $14,445,000 in Duchesne County,
- Personal income from farming has been falling as a proportion of total income in both counties over the past decade, a trend which is predicted to continue, and
- The long-term decline of agriculture in the two counties is also underscored by the prediction that the number of agricultural jobs in both counties will decline in the next 20 years.

Table 4-49. Personal and Agricultural Income in Duchesne and Uintah Counties, 1997-99.						
Measure	Uintah County			Duchesne County		
	1997	1998	1999	1997	1998	1999
Total Personal Income ($millions)	364.2	384.4	401.2	237.3	241.6	256.7
Personal Income from Farming ($millions)	2.229	1.399	4.366	2.930	2.609	1.456
Agriculture as percent of Personal Income	0.6%	0.4%	1.1%	1.2%	1.1%	0.6%

4.9.5.1.5 Community Infrastructure

Education. Public education in the Uinta Basin is in stable financial condition, although a number of schools are beginning to reach capacity. The Duchesne County School District has a bonding debt of $5,790,000, which is 24.9 percent of its legal bonding capacity and slightly above the state average of 23 percent. The District has an undistributed reserve fund of $500,000 and an unappropriated reserve of $551,859. The Uintah County School District is one of only two districts in the state with no outstanding bonds. It has an undistributed reserve fund of $1,054,270 and an unappropriated reserve of $2,577,948. Both districts appear to have the fiscal capability of expanding school capacity should it become necessary.

In the fall of 2001, the Uintah County School Board declared that all of the elementary and middle schools in the Vernal area had reached capacity (a condition which precludes transfers from other areas), although some of the outlying schools such as LaPoint and Todd were still below full capacity.

In contrast to the situation in Uintah County, the Duchesne County school population has been shrinking over the past five years due to a downturn in the oil economy. Overall, the schools are now operating at about 70 percent of capacity, with 500 fewer students than five years ago. This trend is expected to continue in the near future, as the class sizes in the lower grades are smaller than the class sizes in higher grades. Union High School in Roosevelt appears on paper to be near capacity; however, many of the enrolled students are actually attending courses at either Uinta Basin Applied Technical College or the Utah State University Extension campus, both of which are located in Roosevelt (Miles 2002).

The Tribe operates Uinta High School and Todd Elementary School on the Reservation.

Law Enforcement and Fire Protection. Duchesne County reports that the sheriff's office is currently understaffed due to personnel turnover, but that there are adequate personnel to handle law enforcement needs in the County. The single exception is in addressing drug abuse, a growing problem in the County (Hendricks 2002). Four cities in the county have their own fire departments, including the town of Myton. Additionally, there are three county fire stations. These facilities are adequately staffed by volunteers, although County officials feel they could use more volunteer help if it were available (Adams 2002).

The highway patrol office in Vernal covers the entire Uinta Basin. Although in the past the office has been understaffed, recent funding from the state has allowed them to hire a full complement of troopers and officers. They are experiencing no difficulties in handling law enforcement duties at this time (Bench 2002).

Medical Services. The only hospital in Duchesne County is the Uinta Basin Medical Center, located in Roosevelt. In addition to this facility, the Medical Center operates four satellite clinics. Bed occupancy rates at the hospital range from 40 to 50 percent. Technically, the hospital is quite advanced for a rural facility, with services including an MRI, CT, ultrasound and nuclear medicine. Specialties available at the hospital include surgery, orthopedics, pediatrics, ENT, opthamology, psychiatry, oncology and dermatology. There is one ambulance available in each of the towns of Altamont, Duchesne, Roosevelt and Tabiona, as well as a transport ambulance operating out of Roosevelt (Jensen 2002).

In Uintah County, the only hospital is the Ashley Valley Medical Center in Vernal, presently operating at a bed capacity of around 30 percent. The medical facilities are in good condition and technologically up-to-date. There are no satellite clinics affiliated with this hospital. Ambulance service in the county is provided by a private company. There are seven ambulances active in the county with the capacity to assign an additional five from Salt Lake City if needed (Batty 2002).

Public Utilities. The only company currently supplying natural gas in the Uinta Basin is Questar, which is meeting current demand and anticipates no future problems with supply or distribution. Moon Lake Electric, which supplies electricity to most of the Uinta Basin, is well-positioned to handle power needs in the area for many years to come. In addition, Qwest (formerly U. S. West) and Uinta Basin Telephone report they have adequate telecommunications infrastructure in place to easily accommodate current and anticipated future demand.

Solid waste in Altamont, Duchesne and Roosevelt is collected by K&K Sanitation and deposited at the county landfill, which is many years from filling to capacity. Roosevelt's sewage treatment system, which was built to accommodate 20,000 citizens, is still a number of years away from capacity. Culinary water in Roosevelt is presently supplied by wells. New wells have come on line recently, and there are no present problems with supplying customer needs. Additionally, Roosevelt is participating in the CUPCA 203 expansion of Sand Hollow Reservoir, which should handle growth demands for water in the foreseeable future.

Mosquito control is conducted by two Mosquito Abatement Districts (MADs) that are not under the direct control of the Counties. Residents within the MADs pay from $5-7 per year for mosquito control services. Further discussion of the LDWP effects on mosquitoes and MADs can be found in section 4.10, Public Health and Safety.

Housing. In the year 2001, 370 homes were sold in the Uinta Basin at an average price of $97,825, a 14 percent increase in price from the prior year. This increase in price, coupled with a decrease in the number of days each house stayed on the market, is indicative of the fact that an upswing in oil and gas production in the Uinta Basin has caused the

housing market to become tighter. This shift has had its greatest impacts on rental housing and housing available to low-income families. There are now waiting lists at 50 percent of the rental units throughout the Uinta Basin. Additionally, rents and rental deposits have increased, making it increasingly difficult for low-income families to find suitable housing. The situation is particularly acute for families earning only 30 percent of the area's median income. Housing for this income group is already insufficient, a situation which is expected to worsen in the next five years (UBAG 2002).

4.9.5.2. Uintah and Ouray Indian Reservation

4.9.5.2.1 Population

Only 15.4 percent of the total population within the Uintah and Ouray Indian Reservation consists of Tribal members. This is because the five most populous cities in the Uinta Basin, which are occupied primarily by non-Tribal members, are located within the Reservation boundaries.

There are 3,205 members of the Tribe, most of whom live on the Uintah and Ouray Indian Reservation (BIA 2000a). The Tribal population has remained relatively constant over the past decade. There are no projections available for the future population growth rate on the Reservation.

4.9.5.2.2 Employment

In 1995, 767 Tribal members were employed on the Uintah and Ouray Indian Reservation. The unemployment rate of 48 percent (250 people seeking work) was considerably higher than that of the Uinta Basin as a whole (CUWCD 2001). The primary employer of Tribal members on the Reservation is the Ute Tribe. No other data are available on Tribal employment by industry type.

4.9.5.2.3 Income/Output

Income of Tribal members remains well below the income levels of Uinta Basin residents in general. The most recent data indicates that in 1989, the average Indian household in the Uinta Basin earned $14,600, or 61.1 percent of the Uinta Basin average.

4.9.5.2.4 Agricultural Economics

The Tribe is traditionally not an agrarian society. Most of the Tribal land used for agricultural purposes within the project area is leased to non-Tribal members for either gazing or crop production. Either the Tribe or individual allottees receive lease payments for the land but do not receive a royalty on the production. The agricultural production and value on the leased lands is included in Tables 4-44, 4-46 and 4-47.

Part of the Ute Tribe Water Settlement funds may be used to increase Tribal crop production outside of the project area through on-farm and irrigation system improvements. The BIA (2000a) estimated through use of an input/output (I/O) model that if farm improvements were made, the value of Tribal crop production could increase by up to $1.8 million. Details of how and when these improvements would occur is unknown.

4.9.5.2.5 Community Infrastructure

There are presently no schools on the Reservation that serve Tribal members in grades K-12. Tribal members are educated at public schools. Medical services are provided by the Indian Health Service facility located at

Fort Duchesne. The Tribal police station is located in Fort Duchesne, and is currently staffed with 14 full-time officers and three jailers.

4.9.6 Impact Analysis

4.9.6.1 Significance Criteria

The significance criteria employed in this analysis vary depending on the socioeconomic variable being analyzed. The following list identifies different categories of impacts to be evaluated and the significance criteria applied to each category.

- ***Social Services.*** Impacts to social services would be considered significant if changes in social conditions brought about by the project exceed the capacity of social service providers to deliver the level of service identified under the baseline conditions.
- ***Economic Impacts.*** Impacts to the Uinta Basin economy would be considered significant if there were a predicted change in employment or other economic sectors of 2.5 percent or greater. This number is based on an I/O model developed for the Uinta Basin by the Governor's Office of Planning and Budget (GOPB). This model estimates multiplied economic effects that result directly or secondarily from an initial stimulus to other economic sectors within the Uinta Basin economy. Changes of 2.5 percent represent the limit at which the model can accurately predict economic changes. Therefore, any economic change which the model can accurately detect would be considered significant.
- ***Tribal Impacts.*** Given the historic high levels of unemployment on the Reservation, any new jobs created or other improvements in socioeconomic conditions would be considered significant even though such changes may not be statistically significant within the Uinta Basin itself when analyzed through the I/O model.

4.9.6.2 Proposed Action

4.9.6.2.1 Project Construction

The Uinta Basin I/O model was used to evaluate economic impacts from the construction and operation of the Proposed Action and alternatives. This model utilizes 141 different categories of inputs covering a range of economic activities in the Uinta Basin in any given year. For this analysis, the most active year during the construction phase of the Proposed Action was used to estimate the maximum potential annual economic impact. All project-related activities expected to occur during that year were classified according to categories available in the I/O model. Estimated dollar values were assigned to each construction activity and related activities such as real estate fees, gas and supplies, lodging and consulting services. Annual losses from the elimination of grazing were also entered into the model. Other project expenses such as legal and engineering fees were not entered into the model since they are expected to be contracted outside the Uinta Basin and would have no effects within the defined impact area.

The I/O model provides three basic measures of economic change - number of new jobs created, increases in personal income and increases in total economic output in the Uinta

Basin. The I/O model predicts that during the most active construction year for the Proposed Action the following economic changes would occur:

- There would be $645,365 of new inputs into the Uinta Basin economy,
- There would be losses of $140,640 from the elimination of grazing,
- Twenty-three new jobs would be created,
- Personal earnings would increase by $436,339, and
- Total economic output would increase by $890,701.

To evaluate the significance of these changes, they are compared to overall figures for Uintah and Duchesne Counties to confirm whether these changes represent a 2.5 percent change in baseline conditions. The Economic Report to the Governor 2002 (GOPB 2002) indicates that in the year 2000 there were 14,025 people employed in the two counties, their combined personal income was $700,700,000, and the combined industrial output was around $1.5 billion. Using these numbers, the Proposed Action would increase jobs in the two counties by 0.2 percent, personal income by 0.1 percent and total output by 0.1 percent. Although the Proposed Action would have impacts that may be significant to individuals within the Uinta Basin, such impacts are not significant within the overall Uinta Basin economy.

4.9.6.2.2 Operation and Maintenance

The Uinta Basin I/O model was also used to evaluate impacts after construction is complete. Inputs to the economy are smaller as construction jobs are no longer funded. Positive inputs to the model include funding of the Tribal wetland office and small increases in local revenues from hunters and wildlife watchers. Revenue losses from the elimination of grazing would continue and there would be a 20 percent reduction in marketable hay production. The I/O model indicates that there would be an increase of 2.3 permanent jobs, $100,434 in personal income and $112,883 in total economic output. These increases would not be considered significant in terms of the total Uinta Basin economy.

4.9.6.2.3 Social Services

As described in the baseline conditions, social services in the Uinta Basin are presently meeting local needs with the exception of a growing drug problem and some capacity problems in Uintah County schools. In-migration of labor to fill jobs created by the project could cause degradation of these services. Whenever possible, all jobs created by the project are to be filled by members of the Ute Tribe from the pool of unemployed workers. Any jobs which cannot be filled by Tribal members are expected to be filled by other people from within the two-county area. There should be no significant impact on housing, schools, police or other social services as the projected labor force for the project is already using these same services at the present time.

The two MADs would be able to control mosquitoes within the project area according to the details summarized in section 4.10, Public Health and Safety. The MADs currently collect fees for mosquito control of approximately $5-7 per year. Mosquito control fees could possibly increase by a small amount as a result of the Proposed Action, but

the increase would likely be less than $0.25 per year (Waite 2002).

4.9.6.2.4 Tax Revenues

The Proposed Action would generate a small increase in tax revenue in the impact area through sales taxes on purchases such as personal spending, gasoline and transient room taxes. These small increases in tax revenues would be proportional to the increases in personal income and economic output. As the larger increases in personal income and economic output were not significant within the wider Uinta Basin economy, the smaller increases in tax revenues would not be significant either.

County property taxes represent a separate category of taxes. The Proposed Action and alternatives would initiate permanent impacts to the county tax base with conversion of fee lands to federal ownership. Payments In Lieu of Taxes (PILT) is a federal program that provides funds to counties to offset the costs of having non-taxable federal lands within their jurisdiction, up to a specified maximum PILT payment. The maximum PILT payment has been reached in both Duchesne and Uintah Counties and therefore, the Proposed Action would not result in an increase in PILT payments. As a result, the two counties would lose property tax revenues on the acquired private land. The tax losses would vary considerably depending on the category of grazing land involved. Land categories and projected tax losses are identified in Table 4-50. Under the Proposed Action, there would be an annual projected tax loss of $699 for Duchesne County and $909 for Uintah County. These impacts would occur whether acquired fee lands are owned by the federal government or placed in trust for the Tribe.

Table 4-50. Estimated Changes in County Taxes under the Proposed Action and Alternatives.			
Land Use Type/ Valuation	**Acres**	**Greenbelt Valuation**	**Decrease in Tax Revenues [$0.013142 x valuation]**
DUCHESNE COUNTY			
Proposed Action			
Irrigated Pasture/$150 acre	225	$33,750	-$444
Dry Pasture/$35 acre	554	$19,390	-$255
Pahcease Alternative			
Irrigated Pasture/$150 acre	243	$36,450	-$479
Dry Pasture/$35 acre	748	$26,180	-$344
Topanotes Alternative			
Irrigated Pasture/$150 acre	183	$27,450	-$361
Dry Pasture/$35 acre	609	$21,315	-$280
UINTAH COUNTY			
Proposed Action			
Irrigated Pasture/$150 acre	281	$ 42,150	-$554
Dry Pasture/$35 acre	771	$26,985	-$355
Pahcease Alternative			
Irrigated Pasture/$150 acre	37	$5,550	-$73
Dry Pasture/$35 acre	230	$8,050	-$106
Topanotes Alternative			
Irrigated Pasture/$150 acre	244	$36,600	-$481
Dry Pasture/$35 acre	541	$18,935	-$249

4.9.6.2.5 Uintah and Ouray Indian Reservation

Given the high rates of unemployment and low income on the Reservation, any new job opportunities or other improvements in social services for the Tribe would be significant. Under the Proposed Action, the construction phase would provide 15 jobs for nine months over a four year span, with an additional 15 temporary jobs for a planting crew, which would last for four months a year for 10 years. Preference would be given to Tribal members in filling these jobs. Additionally, the project would fund a Tribal wetland office with three permanent positions during both the

construction and O & M phases of the project, as well as maintenance jobs that would be available to the Tribe. Accordingly, both phases of the project would create significant socioeconomic benefits to the Tribe. As these jobs would be filled with Tribal members presently living in the area, there should be no positive or negative impacts to social services from project construction or operation.

4.9.6.3 Pahcease Alternative

4.9.6.3.1 Project Construction

The peak construction year under the Pahcease Alternative would have the same economic inputs as the Proposed Action, with the exception that realtor fees would be $15,840 higher. The I/O model indicates that these inputs to the Uinta Basin economy would create 23 new jobs, $441,636 in increased personal income and $915,320 in increased output in the Uinta Basin economy. There would be a loss of $129,990 of grazing income. As for the Proposed Action, these economic changes would not be significant.

4.9.6.3.2 Operation and Maintenance

Economic impacts during the O & M period would be the same as for the Proposed Action.

4.9.6.3.3 Social Services

As for the Proposed Action, the Pahcease Alternative would not create any social service impacts.

4.9.6.3.4 Tax Revenues

Impacts on sales taxes and transient room taxes are the same as for the Proposed Action. Under the Pahcease Alternative, there would be a projected annual loss of $823 in property taxes to Duchesne County as fee land is converted to federal ownership. The equivalent loss to Uintah County would be $179 (Table 4-50). These impacts would occur whether acquired fee lands are owned by the federal government or placed in trust for the Tribe.

4.9.6.3.5 Uintah and Ouray Indian Reservation

As for the Proposed Action, there would be an increase in jobs available for Tribal members during both the construction and O & M periods. This would result in a significant beneficial impact to the Tribe.

4.9.6.4 Topanotes Alternative

4.9.6.4.1 Project Construction

The peak construction year under the Topanotes Alternative would provide $568,500 of new inputs to the Uinta Basin economy. The I/O model indicates that these inputs to the Uinta Basin economy would create 16 new jobs, $322,346 in increased personal income and $683,513 in increased output in the Uinta Basin economy. The Topanotes Alternative would also result in $121,200 in losses from the elimination of grazing. As for the Proposed Action, these economic changes would not be significant.

4.9.6.4.2 Operation and Maintenance

The O & M period for the Topanotes Alternative would add 1.4 new jobs to the Uinta Basin economy, and increase personal income by $87,986 and economic output by $76,888. The significance of these changes is the same as for the Proposed Action.

4.9.6.4.3 Social Services

As for the Proposed Action, the Topanotes Alternative would not create any social services impacts.

4.9.6.4.4 Tax Revenues

Impacts on sales taxes and transient room taxes are the same as for the Proposed Action. Under the Topanotes Alternative, there would be a projected annual loss of $641 in property tax revenues to Duchesne County as fee land is converted to federal ownership. The equivalent loss to Uintah County would be $730 (Table 4-50). These impacts would occur whether acquired fee lands are owned by the federal government or placed in trust for the Tribe.

4.9.6.4.5 Uintah and Ouray Indian Reservation

As for the Proposed Action, there would be an increase in jobs available for Tribal members during both the construction and O & M periods. This would result in a significant beneficial impact to the Tribe.

4.9.6.5 No Action Alternative

Under the No Action Alternative, agricultural employment would continue to decline while employment in other sectors such as construction, services, recreation and government increases. Personal income would likely continue its increased trend. Agriculture would continue to be conducted on a large portion of the lands within the two-county area, but farms would continue to be operated part-time and agricultural income would continue to represent a small proportion of total personal income. The existing infrastructure would continue to meet current and projected future county needs. Tax revenues would continue to be collected on fee land within the project area.

There would be no project-associated jobs for Tribal members under the No Action Alternative. This would result in a loss of three full-time jobs in the Tribal Wetlands Office. Up to 30 temporary construction positions would not be available for Tribal members.

4.10 PUBLIC HEALTH AND SAFETY

4.10.1 Introduction

The LDWP public health and safety analysis addresses potential impacts from the construction and operation of the project. The analysis focuses on ways the implementation of the project may increase the threat to human health and safety from hazards associated with the increase in wetlands and open water.

4.10.2 Issues Eliminated from Further Analysis

The following public health and safety issues raised during public scoping and agency consultation were eliminated from detailed analysis in this section. Potential safety impacts associated with increased traffic are addressed in section 4.12.

- Increased risk of accidents to workers during project construction.

Hazards associated with construction activity were eliminated from detailed analysis as the

SOPs listed in Appendix A would minimize the risks of construction hazards.

- Increased exposure to hazardous materials associated with proximity of the project area to the abandoned Myton City dump.

The upper boundary of the Uresk Drain is located approximately one half mile from the abandoned Myton City dump. There is no visible evidence in the Uresk Drain or on the abandoned dump site of potential hazardous substances (i.e., barrels, surface debris, odors, surface water discoloration or plant damage), nor is the city dump being used. However, to ensure that any potential groundwater contamination was identified, a full spectrum of water quality tests was conducted at the Uresk Drain sampling point closest to the dump. No hazardous substances were found in the Uresk Drain either at the point closest to the abandoned Myton City dump or downgradient from that point.

4.10.3 Issues Addressed in the Impact Analysis

The following public health and safety impact topics are addressed in the impact analysis:

- Will the project increase mosquitoes in local residential areas such as Myton?
- Will the project increase the incidence of mosquito-borne diseases in the Uinta Basin?

4.10.4 Area of Influence

The project area of influence includes population centers within two miles of the project area depicted on Figure 1-2 for nuisance mosquitoes, and the Uinta Basin as a whole for disease-carrying mosquitoes.

4.10.5 Affected Environment

There are two main ecological groups of mosquitoes in Utah: those inhabiting temporary pools and those requiring permanent water (Andersen 1966). The temporary pool mosquitoes include the species *Aedes dorsalis* and other species of the genus *Aedes,* which are nuisance but primarily non-disease carrying mosquitoes. These species lay their eggs on moist soils, typically occurring in areas in which the water level fluctuates between flooded and drawn-down conditions, such as flood-irrigated pastures, seasonally-flooded wetlands and golf courses. In particular, irregularly flooded saltgrass meadow subject to a repetitive moist-dry water regime provides high quality *Aedes* mosquito producing habitat. Permanently-flooded conditions prevent mosquito egg deposition. The average flight range of the adult mosquito *Aedes* is up to two miles from the hatch site, but individuals have been trapped at distances of up to 10-20 miles from the hatch site (AMCA 2002). Myton is one of the residential areas located within the average flight range distance of the *Aedes* mosquitoes from sites within the LDWP project area. Portions of the Uresk Drain and Flume sites are within two miles of Myton.

Permanent water mosquito species include *Culex tarsalis*, which is both a nuisance mosquito and the primary vector of the western equine encephalitis (WEE) and St.

Louis encephalitis (SLE) viruses in Utah (Moore et al. 1993, CDC 2002). The WEE virus can infect both humans and livestock. Although the temporary pool species *Aedes dorsalis* can carry the WEE virus, "for practical purposes, WEE surveillance in mosquitoes can be limited to the collecting and testing of *Culex tarsalis*" (Moore et al. 1993).

The range of the SLE virus has expanded in the western U.S., with the range expansion attributed to the presence of irrigated farmlands (Moore et al. 1993). *Culex tarsalis* larval habitats are closely associated with irrigated farms and ranches, with irrigated water (particularly tailwater and irrigation ditches) providing the most common habitat (CDC 2002). Mosquito development from larvae to adult can be completed within 9 to 10 days following irrigation. The WEE virus requires an intermediate host to complete its life cycle; important intermediate hosts are wild birds, particularly species associated with irrigated farmlands (e.g., pheasants, house sparrows and mourning doves) (CDC 2002). The West Nile virus can cause a form of encephalitis (West Nile Encephalitis [WNE]) similar to WEE and SLE. The West Nile virus has recently been detected in Utah. It is carried by mosquitoes in the *Culex* genus which are the same primary vectors carrying other forms of encephalitis (CDC 2002).

Permanent water species lay their eggs directly on the water surface. Water depths preferred by these species range between 4-12 inches with larval densities decreasing dramatically with depths greater than one foot. Other conditions favoring these species include stagnant water and low dissolved oxygen (DO) conditions. In addition to irrigated farms and ditches, habitats preferred by the permanent water mosquitoes include shallow marsh and golf course ponds. The increased water turbulence associated with flowing water typically discourages egg deposition in larger irrigation canals. *Culex* mosquitoes are generally weak fliers but have been known to fly up to two miles from their hatch site (AMCA 2002).

Although wetlands can contain habitat for both groups of mosquitoes, not all parts of a wetland produce mosquitoes. For example, open water greater than one foot deep, submerged vegetation and flowing water do not provide mosquito habitat. Under current conditions in the LDWP project area, the following habitats have the potential to produce mosquitoes: wet meadow, shallow water edges of the emergent marsh, irrigated pastures and irrigation ditches. All of these habitats are characterized by an irregularly flooded or stagnant water regime. The habitat with the largest acreage of potential mosquito-producing area is irrigated pasture (1,609 acres). Other habitats in the project vicinity with the potential to provide additional mosquito habitat include adjacent irrigated pastures and the wetlands recently developed on the state-owned Mallard Springs Wildlife Management Area (hereafter referred to Mallard Springs) by the Duchesne County Water Conservancy District.

Irrigated pastures also provide the greatest extent of potential mosquito habitat in the vicinity of the Myton residential area, with 1,126 acres out of a total 1,693 acres of potential mosquito-producing habitat in irrigated pasture.

Under baseline conditions, the Mosquito Abatement Districts (MADs) found in Duchesne and Uintah County control mosquitoes on both private and Tribal Trust land. All potential mosquito-producing

habitats including wetlands and irrigated pastures are treated. Approximately 76,000 acres of land are currently treated for mosquitoes in the two counties. The primary form of treatment is to target mosquito larvae before they emerge as flying adults by applying BTI (a biological control agent) or goldenbear oil, a light mineral oil that dissipates within two to three hours. Malathion, a stronger chemical used to treat flying adult mosquitoes, is not typically used.

Encephalitis outbreaks tend to occur in 10-11 year cycles. That means that although *Culex tarsalis* can be present in an area, it may not transmit the WEE, SLE or WNE virus to humans or livestock every year. The State of Utah maintains flocks of sentinel chickens (birds repeatedly tested for the presence of encephalitis viruses) and mosquito trapping pools throughout the state in areas of high risk for encephalitis. The sentinel flocks are monitored regularly to provide early information about potential encephamyelitis (the disease caused by various strain of encephalitis viruses) epidemics. This monitoring helps impede any risk of disease transmission to humans, as it can identify target areas for strong control measures. In 2001 and 2002, the monitoring showed that there was no encephalitis virus in Utah (Utah Mosquito Abatement Association 2001, 2002), though encephalitis virus was detected in 2003 (Utah Department of Health 2003).

Table 4-51. Summary of Existing Habitats in the LDWP Area with the Potential to Produce Mosquitoes.

Habitat Type	Size (Acres)			Hydrologic Regime
	Proposed Action	Pahcease Alternative	Topanotes Alternative	
Emergent marsh	503	409	483	Irregularly and repeatedly flooded
Wet meadow/shallow marsh	446	388	408	
Non-wetland irrigated pasture[1]	1,609	1,642	1,683	
Irrigation ditches			Not quantified	Stagnant, slow moving water
Total (acres)	**2,558**	**2,439**	**2,574**	

[1] This total differs from the acreage of irrigated pasture listed in section 4.8 as portions of the total acres of irrigated pasture contains wetlands which are separated out in this table.

4.10.6 Impact Analysis

4.10.6.1 Significance Criteria

Impacts on public health and safety would be considered significant if:

- There were a substantial increase in habitats potentially supporting nuisance mosquitoes within two miles of the Myton residential area, or
- The project resulted in an increase in habitats in the Uinta Basin that could produce disease-bearing mosquitoes that could not reasonably be controlled.

The significance criteria are based on mosquito ecology research supported by Utah Mosquito Abatement Districts and a general recognition that increases in mosquitoes would create conflict with neighboring communities over both nuisance and disease-bearing mosquitoes. Quantification of potential mosquito-producing habitats is based on data presented in section 4.2 and the habitat maps on file at the Tribe wetlands office.

4.10.6.2 Proposed Action

Under the Proposed Action, there would be a total increase of 1,027 acres of wet meadow and emergent marsh wetlands, with 857 acres of existing wetlands maintained or enhanced by improvements in water quality (particularly increased DO) and provision of a more stable water supply. The remaining increase in wetland acres consists of mesic shrubs, which are not considered to provide mosquito habitat.

Concurrent with the increase in wetlands is a decrease in irregularly flooded pastures, which provide the greatest extent of mosquito-producing habitat in the project area. Considering both the increase in wetlands and the decrease in irrigated pasture, there would be a net increase in potential mosquito-producing habitats of 746 acres. This represents less than 1 percent of the acres currently treated by the MADs in Duchesne and Uintah Counties.

The potential for the increased acreage of mosquito-producing habitat to actually produce mosquitoes would be reduced by three factors:

- The hydrologic regime would be changed from reliance on irregularly supplied irrigation return flows to a more stable and permanent water supply, which would reduce the potential for *Aedes* mosquitoes to complete their life cycle,
- The proposed flow-through hydrologic regime would increase DO content in wetlands currently suffering from stagnant water and extremely low DO concentrations, and
- Water depths in portions of the emergent marsh would be increased to at least 18 inches, which would reduce the area providing habitat for *Culex tarsalis*.

Accounting for changes in the water supply and water depths, there would likely be only a slight increase in total mosquito-producing habitat.

Similarly, although wetland acreage within the vicinity of the Myton residential area would increase by 527 acres, there would be a decrease of 91 acres of irrigated pasture. Overall there would be a net increase of

potential mosquito-producing habitat of 436 acres within the portion of the project area located near Myton which represents approximately 1 percent of the total acres currently treated for mosquitoes in Duchesne County.

The net increase of less than 1 percent in acres of potential mosquito-producing habitats in the two-county area is not substantial given the abundance of irrigated pastures in the project vicinity and the likelihood that changes in wetland water supply and depths would reduce the mosquito-producing potential of the new habitats. However, any increase in potential habitat that could produce the disease vector *Culex tarsalis* would be significant if the disease vectors could not reasonably be controlled.

Under the Proposed Action, a special use permit would be negotiated with the MADs located within Duchesne and Uintah Counties to provide mosquito control. The Tribe and associated agencies would cooperate with the MADs' efforts to suppress mosquitoes as long as the efforts did not conflict with the wildlife purposes of the project. Cooperation would consist of the following items:

- Access would be allowed for regular monitoring and use of approved mosquito controls,
- Low impact chemicals, such as BTI and goldenbear oil, would be allowed under the special use permit conditions, with stronger chemicals, such as Malathion, used only as a last resort when disease vectors are present, and
- Tribal personnel would assist with regular mosquito monitoring.

The Proposed Action would not change the existing state encephalitis monitoring program used to identify the potential for encephamyelitis outbreaks before they occur. The special use permit would likely allow the use of strong chemicals such as Malathion in specified areas where a substantial health risk of encephalitis is identified through monitoring. Outbreaks of encephamyelitis tend to be cyclic. The best deterrent against disease is regular monitoring, with treatment only as necessary. With regular monitoring and treatment as necessary to prevent disease, the risk of encephalitis and other human health concerns can be controlled on project lands in the same manner as other lands within the two-county area.

Table 4-52. Summary of Habitats in the LDWP Area with the Potential to Produce Mosquitoes under the Proposed Action. Both the total size and the increase in acres are listed.

Habitat Type	Size (Acres)	Hydrologic Regime
Emergent marsh	954 (+458)	Permanently flooded, flow-through regime
Wet meadow/shallow marsh	920 (+569)	Seasonally flooded
Non-wetland irrigated pasture	1,328[1] (-281)	Irregularly flooded
Irrigation ditches	No change	Stagnant, slow moving water
Total	**3,202 (+746)**	**N/A**

[1] This total differs from the acreage of irrigated pasture listed in section 4.8 as portions of the total acres of irrigated pasture contains wetlands which are separated out in this table.

4.10.6.3 Pahcease Alternative

Under the Pahcease Alternative, there would be a total increase of 1,023 acres of wet meadow and emergent marsh wetlands, with 734 acres of existing wetlands maintained or enhanced by improvements in water quality (particularly DO) and provision of a more stable water supply. Concurrent with the increase in wetlands would be a decrease in irregularly flooded pastures, which provide the greatest extent of mosquito-producing habitat in the project area. Considering both the increase in wetlands and the decrease in irrigated pasture, there would be a net increase in potential mosquito-producing habitats of 912 acres. This represents approximately 1 percent of the acres currently treated by the MADs in Duchesne and Uintah Counties. Within the vicinity of the Myton residential area, there would be a net increase of 698 acres of potential mosquito-producing habitat within the portion of the project area located near Myton, which represents approximately 2 percent of the total acres currently treated for mosquitoes in Duchesne County.

The slight increase of potential mosquito-producing habitats could provide a local increase in nuisance mosquitoes. However, mosquito control would be implemented as described for the Proposed Action and the risk of increased encephalitis outbreak would be controlled.

Table 4-53. Summary of Habitats in the LDWP Area with the Potential to Produce Mosquitoes under the Pahcease Alternative. Both the total size and the increase in acres are listed.

Habitat Type	Size (Acres)	Hydrologic Regime
Emergent marsh	850 (+441)	Permanently flooded, flow-through regime
Wet meadow/shallow marsh	907 (+582)	Seasonally flooded
Non-wetland irrigated pasture	1,531[1] (-111)	Irregularly flooded
Irrigation ditches	No change	Stagnant, slow moving water
Total	**3,288 (+912)**	**N/A**

[1] This total differs from the acreage of irrigated pasture listed in section 4.8 as portions of the total acres of irrigated pasture contains wetlands which are separated out in this table.

4.10.6.4 Topanotes Alternative

Under the Topanotes Alternative, there would be a total increase of 991 acres of wet meadow and emergent marsh wetlands, with 812 acres of existing wetlands maintained or enhanced by improvements in water quality (particularly DO) and provision of a more stable water supply. Concurrent with the increase in wetlands would be a decrease in irregularly flooded pastures, which provide the greatest extent of mosquito-producing habitat in the project area. Considering both the increase in wetlands and the decrease in irrigated pasture, there would be a net increase in potential mosquito-producing habitats of 855 acres, or approximately 1 percent of the total acres currently treated for mosquitoes in Duchesne and Uintah Counties. Within the vicinity of the Myton residential area, there would be a net increase of 698 acres within the portion of the project area located near Myton, which represents approximately 2 percent of the total acres currently treated for mosquitoes in Duchesne County.

The increase of potential mosquito-producing habitats could provide a local increase in nuisance mosquitoes. However, mosquito control would be implemented as described for the Proposed Action and the risk of increased encephalitis outbreak would be controlled.

Table 4-54. Summary of Habitats in the LDWP Area with the Potential to Produce Mosquitoes under the Topanotes Alternative. Both the total size and the increase in acres are listed.		
Habitat Type	**Size (Acres)**	**Hydrologic Regime**
Emergent marsh	925 (+442)	Permanently flooded, flow-through regime
Wet meadow/shallow marsh	878 (+549)	Seasonally flooded
Non-wetland irrigated pasture	1,547[1] (-136)	Irregularly flooded
Irrigation ditches	No change	Stagnant, slow moving water
Total	**3,350 (+855)**	**N/A**

[1] This total differs from the acreage of irrigated pasture listed in section 4.8 as portions of the total acres of irrigated pasture contains wetlands which are separated out in this table.

4.10.6.5 No Action Alternative

Under the No Action Alternative, mosquitoes would continue to be produced on 2,439-2,574 acres within the project area, which represents up to 38 percent of the land proposed for inclusion in the LDWP project area (see Table 4-50). The major mosquito-producing habitat would continue to be irrigated pasture, with wetlands providing lesser potential habitat acres. The MADs in Duchesne and Uintah Counties would continue to treat all potential mosquito-producing habitat regardless of land ownership.

4.11 RECREATION RESOURCES

4.11.1 Introduction

The recreation analysis addresses potential impacts on recreation from the construction and operation of the Proposed Action and alternatives. The focus of the analysis is on all forms of wildlife-oriented recreation such as bird watching, nature education, fishing and hunting.

The following recreation impact topics are addressed in the impact analysis:

- Changes in the amount of recreational use within the LDWP project area.

4.11.2 Issues Eliminated from Further Analysis

No issues were eliminated from analysis. All recreation issues raised during public scoping and agency consultation were analyzed.

4.11.3 Issues Addressed in the Impact Analysis

The following recreation issues are addressed in the impact analysis:

- Would the project change existing recreational use or access within the Duchesne River corridor?

4.11.4 Area of Influence

The recreation impact area of influence consists of a 14 mile corridor along the Duchesne River from Bridgeland to Randlett.

4.11.5 Affected Environment

The project area lies within the Uinta Basin, an area of about 4,548 square miles. This area is highly regarded for its varied outdoor recreation resources including campgrounds, trails, streams and remote areas for hunting. These recreation resources are located on lands administered by the federal government, the state and the Tribe. Much of the current recreation use occurs in the Uinta Mountains and along tributaries to the Duchesne River above Starvation Reservoir and the SACS system. The primary recreation area administered by the Ute Tribe in the Uinta Mountains is the Big Springs area.

The main public wildlife-related recreation areas within the project vicinity include Bottle Hollow (a trout fishery), Pelican Lake (bluegill and bass fishery), Midview Reservoir (bluegill and bass fishery) and ONWR (waterfowl hunting, wildlife viewing). None of these recreation areas are within the project area.

Recreation use of the Duchesne River corridor is generally low, due to lack of general access, lack of fishing opportunities and the general discouragement of non-consumptive recreation. Current access to private lands within the project area require individual private landowner permission in addition to a state license for hunting or fishing. Access to the Uintah and Ouray Indian Reservation is allowed, but restricted, and non-Indians are required to purchase Tribal permits for access. In general, the Tribe does not encourage general non-consumptive recreation from non-Indians. Public access is allowed on the state-owned Mallard Springs area and the federally-owned Riverdell North property. Non-consumptive recreation does not require a permit but hunting does. Primary use of the two sites by recreationists is for small game and pheasant hunting, although recent wetland habitat improvements at Mallard Springs have caused an as-yet quantified increase in the waterfowl hunters using the area.

Fishing within the project area is low to non-existent. The most abundant species in the Duchesne River are carp and catfish which do not provide as much appeal to anglers as the trout streams located in the Uinta Mountains or the bass fisheries in nearby reservoirs.

Entry to the Duchesne River or other remote recreation sites within the project area can be accessed through a limited number of parking areas along county roads. Limited parking areas exist at the west end of the Flume site, the Goose Ponds overlook and Riverdell North overlook. A few more vehicles could be parked along the sides of county roads at wide shoulder points. As a result of these factors, very widely dispersed recreation presently occurs within the project site.

4.11.6 Impact Analysis

4.11.6.1 Significance Criteria

The project area is presently sparsely populated and visited. As a result, quantified data regarding specifics of big and small game "takes" or other recreation statistics do not exist at this time. Therefore, significance criteria for recreation is not quantified. Recreation impacts would be considered significant if the LDWP resulted in a measurable change in recreation use in the project area. Impacts would be considered beneficial if they resulted in an increase in recreational use of the area and negative if they reduced current recreational use.

4.11.6.2 Proposed Action

Under the Proposed Action, the improved wetland, riparian, aquatic and upland habitats would attract and support additional wildlife species (see section 4.3), which traditionally attract additional recreationists, including wildlife watchers, hunters and fishers. The ability to enter the area would be increased as restricted fee land would become part of a larger wildlife management area administered by the Tribe. Use of the area would require a Tribal permit for access, except on the Riverdell North property where no permit would be required for general access and either a state or Tribal permit would be all that would be required for fishing or hunting.

Although increasing accessibility to the Duchesne River, the project would not likely increase fishing opportunities as there would be no change in the fishery as a result of the project. Hunting (particularly waterfowl hunting) and non-consumptive recreation would likely increase. The increase in use would be limited, however, by the general lack of parking. The few parking areas within the project area would only be minimally improved, and would generally only provide parking for one to five vehicles. A larger area that could provide parking for up to 20 vehicles or a bus may be created overlooking the Goose Ponds area of the Uresk Drain. Improvement of this area would allow the Uresk Drain site to become available to school groups for nature education programs.

The LDWP would not change the current use of the adjacent Mallard Springs area, but could improve its value as a wildlife area by creating a large wetland complex immediately adjacent to it. The LDWP would also not reduce the current use of the Riverdell North property as access would continue according to the existing permit system; no special use or other Tribal permit would be required for access.

Overall, there would be a small and likely unmeasurable increase in recreational use of the project area. Current levels of public recreation use or access would not be reduced.

4.11.6.3 Pahcease Alternative

Impacts of the Pahcease Alternative would be similar to those described for the Proposed Action.

4.11.6.4 Topanotes Alternative

Impacts of the Topanotes Alternative would be similar to those described for the Proposed Action.

4.11.6.5 No Action Alternative

Recreation resources of the Duchesne River corridor would not differ significantly from existing conditions. Recreational use in the Uinta Basin would continue to be concentrated in the Uinta Mountains and at local reservoirs. Access would continue to be limited on both fee and Tribal Trust land, but open to the public on the Riverdell North property.

4.12 TRANSPORTATION

4.12.1 Introduction

This section addresses direct physical impacts and operational impacts on the road system of the Uinta Basin resulting from the construction, operation and maintenance of the Proposed Action and alternatives. Most of these impacts would occur during the 10-year construction phase of the project. However, there may also be long-term increases in traffic from people visiting the project area for a number of purposes, including hunting, wildlife observation and education.

4.12.2 Issues Eliminated from Further Analysis

Only one transportation issue was identified during the public scoping process: increased traffic on town roads in Myton, where children frequently play in the streets. This issue will not be addressed further in the analysis as project operations would require vehicular traffic to bypass the town and use a combination of 7500 East and River Road, the designated truck routes in the Myton area.

4.12.3 Issues Addressed in the Impact Analysis

The following concerns are addressed in the impact analysis:

- Potential for direct physical effects on roads from transportation of heavy equipment and project construction materials, and
- Effects on existing Levels of Service (LOS) that might be impacted by workers traveling to and from the job, deliveries of various materials or visits by recreational users. LOS, which is defined in more detail below in section 4.12.5, is a highway rating system that evaluates traffic flow conditions on various road segments.

4.12.4 Area of Influence

The transportation impact area of influence is comprised of the road network in the Uinta Basin that would be used during construction of the Proposed Action or alternatives, as well as roads used for recreation and project maintenance after construction is complete. Impacts are likely to occur in an area extending from Duchesne to Vernal, with the greatest impacts occurring on the road system around the town of Myton and adjacent to the Duchesne River corridor from Myton to Randlett. These roads are listed and evaluated in section 4.12.5.

4.12.5 Affected Environment

The road network in the project area consists of Highway 40, a two-lane major arterial

route, as well as several paved county roads and numerous county, Tribal and private dirt roads that vary in quality and day-to-day physical conditions. Highway 40 is the primary transportation route through the Uinta Basin and would likely carry much of the increased traffic load from the construction of the project. Table 4-55 lists the roads in the project area and their present LOS status.

Table 4-55. Major Roads in the LDWP Area and Levels of Service.

Road	Lanes	Surface	LOS or status	Cars per Day[1]
U.S. Highway 40 - Duchesne to Roosevelt	2 to 4	Paved	B	5,796
U.S. Highway 40 - Roosevelt to State Road 88	2 to 4	Paved	B, C	5,571
River Road	2	Paved & dirt	B	*
Independence Road	2	Paved	B	*
7500 East, Myton	2	Paved	B	*
1500 East, Roosevelt	2	Paved	B	*
Miscellaneous dirt roads	1	dirt	Good to fair	*

[1] Average of segments from Traffic 2000 Book, Utah Department of Transportation
* volumes not calculated by UDOT or local highway departments

The LOS classification scheme is a methodology used by highway engineers to evaluate how well traffic is moving on a particular road segment (US DOT 1997). LOS A is a condition described as "free-flow," where average speeds approach 60 mile per hour (mph), passing frequency is low and platoons (vehicles moving in groups) are infrequent. LOS B is a regime of traffic flow where speeds of 55 mph or slightly higher are expected on level terrain, where passing must be done frequently to maintain speed, and where platoons are forming more regularly. With LOS B, service flow rates of 750 passenger cars per hour, totaled in both directions, can be achieved under ideal conditions

LOS C is also a situation of stable flow where average speeds can exceed 52 mph. However, unrestricted passing demand exceeds passing capacity, there is a noticeable increase in platoon formation and size and frequency of passing impediments. A service flow rate of up to 1,200 passenger cars per hour can be accommodated under LOS C under ideal conditions. LOS D, E and F do not occur on any roads in the project area and are therefore not described in this analysis.

According to the Utah Department of Transportation (UDOT) statistics and conversations with local highway officials (Kay 2002), all of the roads in the project area operate at LOS B or better, with the exception of a few segments of Highway 40

around the town of Roosevelt, which operate at LOS C.

4.12.6 Impact Analysis

4.12.6.1 Significance Criteria

Impact significance criteria are based on professional judgment, federal and state regulations and standards and contacts with state and county officials. The following impacts on roads and bridges would be considered significant if they occurred as a result of the Proposed Action or other alternatives:

- A change in the LOS provided by an existing road, or
- Physical damage to transportation systems that is not repaired.

4.12.6.2 Proposed Action

Construction of the Proposed Action would occur over a 10-year period, with the vast majority of work being performed by two main seasonal work crews - one for site preparation and berm building and the other for planting. There would also be management personnel onsite throughout the construction season and material deliveries. These categories of activities are described in more detail below. An estimate of the amount of vehicular traffic associated with each activity is also included.

Main construction crew. An estimated crew of 15 workers would be used to perform the main construction tasks described in section 2.1.2. This crew would generate 15 daily round trips during construction season.

Planting, seeding crew. A second crew of 15 workers would be engaged in planting and weed control activities for an estimated 4-month work period. During this work period, the number of daily vehicle round trips generated by this crew would be a maximum of 15 per day.

Management. There would be a number of managers, supervisors, engineers and inspectors who visit the job site on a daily basis. It would be impossible to predict in advance how many vehicle trips might be related to this supervisory activity on any particular day; however, for the sake of this analysis, it is assumed that this facet of the project would generate a maximum of 10 round trips per day.

Deliveries, hauling, miscellaneous. The list of materials to be delivered to the project area is listed in Table 2-5 and summarized below:

- Concrete for control structures - 300 cubic yards in 100 vehicle trips over a 10-year period,
- Rock to strengthen berms around control structures,
- Delivery of seeds, fencing and other miscellaneous materials - one round trip per day, and
- Transport of cottonwood poles and other plants from the nursery area - one load per day.

It is predicted that the vehicular traffic from these activities would not generate more

than 10 round trip per day, including a portion involving large trucks.

In a worst-case scenario, during the height of the construction process there would not be more than 50 vehicle round trips occurring on any particular day: 30 for the construction and planting crews, 10 for management activities and 10 for deliveries and other miscellaneous tasks. This period of maximum vehicular activity would occur only during the 4-month period when the planting crew is in operation. During the remaining six months of construction activity the vehicular traffic associated with the project would not exceed 35 round trips per day.

If all 50 daily project-related trips occur on Highway 40, it is possible, although highly unlikely, that such traffic increases might cause the LOS to change from B to C on certain sections of the road. As indicated by Table 4-55, the average number of cars per day on various segments of Highway 40 between Duchesne and Roosevelt is approximately 5,700, or an average of 237 cars per hour. However, there are specific segments in and around the town of Roosevelt where the number reaches 8,870 cars per day, or 370 cars per hour. Adding 50 vehicles to either of these numbers in any one hour period would clearly not change the LOS on Highway 40 given that roads of that type can handle 750 vehicles per hour and still operate comfortably within LOS B.

Traffic is not evenly distributed throughout a 24-hour period. Local officials have estimated that up to 35 percent of the traffic on the most congested segments may occur between the peak hours of 4:00 to 6:00 p.m. (Kay 2002). At this time, traffic flows could reach 1,500 cars per hour on Highway 40 near Roosevelt, which is in the range of LOS C. Adding any additional traffic to this highway segment could push the LOS clearly into the C range. The potential for this to occur would be minimized by scheduling deliveries and construction inspections to occur outside of the peak traffic hours.

The counties in the project area do not keep statistics on traffic volumes on county roads other than on Highway 40. However, UDOT and the counties have indicated that these other roads in the project area all operate at LOS B or better and have traffic volumes that are only a small fraction of the numbers seen on Highway 40. Some of the traffic generated by the project would use these highways; however, this extra traffic would not be sufficient to move these roads from LOS B to LOS C.

Physical damage to the road system is expected to be minimal; moreover, it is anticipated that any damage to the road system caused by project operations would be repaired as part of the project itself.

Transportation Impacts After Construction. Vehicle trips associated with ongoing maintenance and management of the project are not expected to generate more than several automobile trips per day and would not be sufficient to change the LOS on any road. Public use for hunting or other wildlife-related activities could potentially bring more traffic to the area. Although the project would allow access for wildlife-related purposes, parking would be limited to a few designated small, gravel parking lots. Accordingly, the number of

visitors to the facility should remain small and have no significant impacts on the LOS of roads in the project area.

4.12.6.3 Pahcease Alternative

Transportation impacts from the Pahcease Alternative would be the same as those from the Proposed Action.

4.12.6.4 Topanotes Alternative

Transportation impacts from the Topanotes Alternative would be the same as those from the Proposed Action.

4.12.6.5 No Action Alternative

There would be no change to the LOS or physical damage to any roads in the project area under the No Action Alternative.

4.13 AIR QUALITY

4.13.1 Introduction

This section addresses air quality and potential impacts from emissions generated during construction of the Proposed Action or alternatives. All construction activities and general vehicle travel would generate emissions. The primary pollutants of concern are particulates (associated with earth moving and increased use of unpaved roads) and vehicle emissions (associated with heavy equipment use). None of the construction activities would result in remedial action of any hazardous waste activity.

4.13.2 Issues Eliminated from Further Analysis

No issues were eliminated from analysis as no air quality issues were raised during public scoping.

4.13.3 Issues Addressed in the Impact Analysis

The following issue is addressed in the impact analysis:

- Will the construction and operation of the LDWP result in reduced air quality in the Uinta Basin?

4.13.4 Area of Influence

The area of influence is the Uinta Basin.

4.13.5 Affected Environment

The primary factors that determine air quality are the locations of air pollution sources, amounts and types of pollutants and meteorological conditions over a period of time. Air pollution can be particulate pollution, as a result of dust, smoke or other suspended particulates, or invisible chemical pollutants from vehicle emissions, commercial or industrial sites.

Ambient air quality is regulated by provisions under the Federal Clean Air Act of 1970 as amended. Two air quality standards established by the U.S. Environmental Protection Agency are applicable to the Uinta Basin: the National Ambient Air Quality Standards (NAAQS)

and Prevention of Significant Deterioration (PSD).

NAAQS created standards for the maximum allowable concentrations of specific air pollutants including particulate matter (measured as PM_{10}, or particles less than 10 microns in diameter), sulfur oxides (SOx), ozone (O2), carbon monoxide (CO), nitrogen oxides (NOx) and lead (Pb). There are two categories of NAAQS standards: primary standards concerning human health and secondary standards concerning human welfare.

PSD standards are denoted by the classification of air, Class I, Class II and Class III, and are designed to prevent the deterioration of air quality by any new construction or other modification in attainment areas. In general, Class I attainment areas are generally national parks, monuments, wilderness areas and wild and scenic rivers. Class II attainment areas also have scenic qualities, but greater concentrations of pollutants are allowable.

The entire Uinta Basin, including the lands within the LDWP project area, is designated as Class II, with air quality typically classified as good to excellent. Windblown dust (PM_{10}) from agricultural activities and unpaved roads are the predominant existing pollution sources. Existing vehicle emissions (which consist primarily of PM_{10}, NOx and SOx) in the more populated areas of the Uinta Basin are minimal.

Although no federal Class I designated areas exist in the Uinta Basin, the High Uintas Wilderness, classified as a Class II PSD area, is approximately 30 miles north of the project. The High Uintas Wilderness is the nearest area of concern for air quality, and is considered acid rain sensitive.

The Uinta Basin has an arid to semi-arid, continental climate with widely ranging daily and annual temperatures. The seasons are distinct, with an average annual precipitation of slightly more than eight inches. Winters are typically cold with 6-10 inches of snowfall and an average winter temperature of 20 degrees Fahrenheit. Average minimum winter temperature is 8 degrees Fahrenheit. Summers are mild with occasional hot spells. The average summer temperature is 69 degrees, with an average daily maximum temperature of 87 degrees Fahrenheit. With an average seasonal rainfall of 3.5 inches, less than half of the annual average precipitation falls during the summer months. Although wind direction is variable, the predominant winds are out of the west. From April through July, the highest average wind speed is 10 miles per hour.

4.13.6 Impact Analysis

4.13.6.1 Significance Criteria

As a Class II attainment area, potential impacts on air quality would be considered significant if the NAAQS standards are exceeded during construction. This would occur if several hundred tons of NOx, SOx or particulates were emitted during any 12-month period of construction. Particulates include dust emissions and pollutants emitted from the burning of fuel, especially diesel fuel, used by large trucks and other vehicles. These standards only apply to direct air quality impacts of the projects, which include emissions from construction traffic and operation of construction

equipment. Indirect emissions would include traffic induced by the new wildlife management area.

4.13.6.2 Proposed Action

The Proposed Action would increase vehicle emissions in the Uinta Basin during construction. Table 4-56 provides an estimate of maximum emissions by construction equipment during the estimated 10-year construction period. This estimate is based on a worst-case scenario in which all equipment that would potentially be used on the project would be running continuously eight hours per day for a nine month period. Based on the worst-case analysis, the maximum amounts of pollutants generated during construction would be less than 60 tons per year. None of the three specific air pollutants of concern (NOx, SOx and PM_{10}) would exceed allowable air standards for the area during any single year of construction activities.

The prevailing direction of wind during the construction period is west to east, which is away from the High Uintas Wilderness Area. There should be no impact from the LDWP construction on the air quality of the High Uintas Wilderness.

The Proposed Action may increase some visitation to the area, which would indirectly increase recreation traffic and vehicle emissions. Because parking would be limited to a few designated small, gravel parking lots, the number of visitors to the facility should remain small and have no measurable air quality impacts. The air quality standards would not be violated because they only apply to direct air quality impacts of a project, such as emissions from construction equipment.

Table 4-56. Estimated Emissions from LDWP Construction Equipment under the Worst-Case Scenario. Estimates are in tons per year.

Alternative	Nitrogen Oxides (NOx)	Sulfur Oxides (SOx)	Particulates (PM_{10})	Total Emissions
Proposed Action	50	4.2	3.3	57.5
Pahcease	20	1.7	1.3	23
Topanotes	20	1.7	1.3	23
No Action	0	0	0	0

The worst-case scenario means that all construction equipment is running for a full eight hours per day for the entire length of the construction period.

4.13.6.3 Pahcease Alternative

Under the Pahcease Alternative, air quality emissions would increase over baseline conditions. Total emissions per year would not exceed 23 tons (Table 4-56), which would not result in an exceedance of the NAAQS standards.

Recreational traffic and vehicle emissions would be similar to those described for the Proposed Action.

4.13.6.4 Topanotes Alternative

Air quality emissions for the Topanotes Alternative would be the same as described for the Pahcease Alternative.

4.13.6.5 No Action Alternative

There would be no change in air quality emissions from the No Action Alternative. No project-related construction or increase in recreational traffic would occur. Baseline air conditions would continue as described in section 4.13.5.

4.14 NOISE

4.14.1 Introduction

This section addresses potential impacts from the noise generated from construction activities of the Proposed Action and alternatives for the LDWP. Federal, state and local noise regulations were reviewed to determine applicability to the project and to assess potential impacts. Potential indirect noise impacts were also considered in this analysis.

4.14.2 Issues Eliminated from Further Analysis

No issues were eliminated from analysis as no noise issues were raised during public scoping.

4.14.3 Issues Addressed in the Impact Analysis

The following issue is addressed in the noise impact analysis:

- Will the project, during either construction or operation, increase noise levels within the Duchesne River corridor?

4.14.4 Area of Influence

The impact area of influence includes all areas in which noise generated by the Proposed Action would be heard. Noise would be generated from the roads used by construction and recreation traffic as well as areas directly adjacent to where construction activities would take place. Figure 1-2 shows the overall project area of influence and Maps 1-4 at the back of the document identify the anticipated locations of construction activities.

4.14.5 Affected Environment

The A-weighted decibel scale (dBA) is used to measure noise. Incremental values on this scale represent the loudness of common sounds perceived by humans. Quantified baseline noise was not available for the impact area of influence; however, some

general inferences can be made based on field visits and published noise studies (CEQ 1970, Urban Institute 1976). The Uinta Basin is generally quiet except for the noise generated by traffic on roads, particularly Highway 40. Highway traffic typically generates noise at about 70 dBA, with large trucks generating noise up to 90 dBA. These are decibel ratings generated at 50 feet from the traffic, the standard distance at which noise studies are conducted. Decibel levels are reduced by a factor of four each time the distance is doubled, assuming no other mitigating factors such as trees, walls or other physical barriers are in the sound trajectory.

The only sensitive receptors in the LDWP project area are a few private residences near areas where construction would occur. Sensitive receptors are defined as establishments that are especially susceptible to noise impacts such as schools, nursing homes, hospitals and residences. There are no schools or hospitals adjacent to the construction sites or the main travel route (Highway 40). Myton is the only town adjacent to the project area and trucks are required by the town to use a separate truck route that diverts traffic around the residential area to access River Road.

4.14.6 Impact Analysis

4.14.6.1 Significance Criteria

Noise that would be generated by the Proposed Action and alternatives was considered significant if it would exceed baseline noise levels and acceptable levels defined in EPA's Noise Pollution Level index (EPA 1971). "Normally unacceptable" noise levels are considered to be 74 to 88 dBA in the EPA index. Noise levels are considered significant if activities near sensitive receptors would likely generate noise exceeding "normally unacceptable." Noise at this level is annoying, and if people are exposed to it for long periods, noise barriers need to be constructed to make the indoor environment tolerable. Noise levels above 88 dBA are considered "clearly unacceptable" in the EPA index. Noise at this level is very annoying, can cause hearing damage to people exposed for eight hours or more and the cost to construct noise barriers to make both the indoor and outdoor environments tolerable would be prohibitive.

4.14.6.2 Proposed Action

Noise would be generated by vehicles and heavy equipment during the construction of the features of the Proposed Action. A full list of equipment to be used and associated noise levels at 50 feet are outlined in Table 2-2 of Chapter 2. The loudest equipment (scraper and grader - up to 95dBA, bulldozer and end-loader - up to 96 dBA) would likely be limited to construction sites within the project area away from most sensitive receptors.

A few private residences (sensitive receptors) are located within the construction area, but are located at a distance much greater than 50 feet from construction activities (ranging from 300 to 1,000 feet). The Flume site has two residences that may be affected by increased noise, and two residences within the Uresk Drain site may experience some noise impacts from increased traffic frequency along River Road. One residence that may experience noise above baselines

levels lies within each of the Riverdell and Ted's Flat sites. It is unlikely that noise levels would exceed "clearly unacceptable" (above 88 dBA) for these few residences given the noise attenuation with increased distance from the source of the sound. Some people may experience noise in excess of the significance criteria if they are within 50 feet of the construction sites. Others may experience lower noise levels as the distance from the construction site increases. Potential noise impacts would occur only during the weekdays for at most eight hours each day.

Baseline noise in the project area is generated from trucks traveling along Highway 40. Decibel (A-weighted) levels from these trucks varies from 70 to 90 dBA. This noise level is similar to what would be generated by the trucks that would be used to deliver materials to the construction sites. People would experience a slightly higher frequency of truck noise on Highway 40, but it is not expected to be significant to sensitive receptors for the duration of the construction activities.

Some construction noise would occur on smaller roads in the project area that are not regularly traveled by construction equipment under baseline conditions. These roads are not regularly traveled by pedestrians and there would be little to no impact on pedestrians as trucks pass.

There may be some increased frequency of visitors to the project area after construction, but there would be minimal development of improved parking facilities and increased use of the area would likely consist of local residents and Tribal members. Noise levels created by vehicles would be the same as traffic under baseline conditions, but there could be a small increase in the frequency of a noise impact.

4.14.6.3 Pahcease Alternative

The Pahcease Alternative would cause similar noise impacts as described for the Proposed Action.

4.14.6.4 Topanotes Alternative

The Topanotes Alternative would cause similar noise impacts as described for the Proposed Action.

4.14.6.5 No Action Alternative

The No Action Alternative would have no noise impacts. Baseline conditions would continue as described in section 4.14.5.

4.15 CULTURAL RESOURCES

4.15.1 Introduction

This analysis addresses potential impacts on cultural resources resulting from the construction, operation and maintenance of project features associated with the Proposed Action and alternatives of the LWDP. A Class I Cultural Resource Inventory of the project area was completed in 2002 (Alpine Archeology 2002). An intensive Class III survey of features within the selected alternative would be completed prior to construction according to the terms of a Memorandum of Agreement negotiated among the Tribe, Mitigation Commission and Utah State Historic Preservation Office (SHPO). The Class I survey report is on file at the Tribal office. Appendix F contains a draft Memorandum of

Agreement regarding future cultural resource surveys and a letter from the Tribal Cultural Resources Specialist clearing the project for significant Tribal sites.

4.15.2 Issues Eliminated from Further Analysis

No issues were eliminated from analysis; all cultural issues raised during public scoping and agency consultation were analyzed.

4.15.3 Issues Addressed in the Impact Analysis

The following cultural issues are addressed in the impact analysis:

- What are the extent and type of cultural resources in the project area?
- What is the probability of historic properties occurring within the area of, and potentially being impacted by, proposed project features?
- Are there any potentially impacted prehistoric and historic sites eligible for the National Register of Historic Places (NRHP) to locate and record?
- Are there any ethnographic, traditional and religious use areas eligible to the NRHP, using as guidelines National Historic Register Bulletin 38, American Indian Religious Freedom Act, PL 95-341 and the Native American Graves Protection and Repatriation Act of 1990, PL-101-601?

4.15.4 Area of Influence

The area of influence, as shown on Figure 1-2, includes up to 10,000 acres along the Duchesne River corridor between Bridgeland and Randlett.

4.15.5 Affected Environment

This section presents a broad overview of cultural resources in the Uinta Basin. A detailed overview of cultural resources in the Uinta Basin is presented in the Cultural Resource Inventory of the Lower Duchesne Wetland Project: Duchesne and Uintah Counties, Utah (Alpine Archeology 2002).

The earliest inhabitants of the region may have been representative of the Paleoindian stage, which emphasized the exploitation of megafaunal and floral resources during the period of transition from the Pleistocene to the Holocene dating between 10,000 B.C. and 7,800 B.C. Paleoindian components are very infrequent in the vicinity of the project area; the stage is mostly represented by surface finds of isolated diagnostic projectile points (Spangler 1995).

Warming of the environment to essentially modern conditions resulted in the end of the Pleistocene and extinction of several megafaunal species upon which Paleoindian cultures relied; this stage is known as the Archaic. Archaic stage remains are relatively well-represented in the Uinta Basin. In northeastern Utah, the Formative stage (between A.D. 1 and A.D. 400) is represented by the Fremont culture, and remains of this culture are quite common in low-lying areas where farming was possible.

During the late Protohistoric to early Historic periods (between A.D. 1200 and 1400), the way of life and material culture of the Ute and Shoshone are remarkable for their similarity to earlier hunter and gatherer groups. Initial Euroamerican entry into the region was by the Dominguez-Escalante Expedition in 1776. This expedition stimulated traders in New Mexico to venture northward to trade with the Utes in central Utah. Euroamerican entry into the region increased during the fur trade with numerous trapping parties utilizing the area throughout the 1820s and 1830s.

As a result of the growing conflicts between settlers and the Utes in the Basin, the Uintah Reservation was established by Executive Order of President Abraham Lincoln on October 3, 1861. The project area remained Ute lands until 1905, when it was opened to homesteading. The General Land Office (GLO) patent record search conducted for this project verifies that most of the homesteads in the project area were cash sales between 1908 and 1920 (see Appendix A of Alpine Archeology [2002]).

In 1906, Congress authorized an Act (34 Stat. 375) establishing the Indian Irrigation Project, which specified that proceeds from the sale of lands from the former Uintah Indian Reservation were to be used to construct an irrigation system for Indians. The canals are still in use today.

Most of the known sites within the project area are historic structure or engineering features. Only one prehistoric and eight historic sites have been formally recorded within the LDWP project area. Significant cultural resources in the LDWP project area are limited to four historic canals that have been officially determined eligible to the NRHP; the remaining five sites are either unevaluated or judged insignificant by their field recorders. No sites in the project area have been listed on the NRHP, nor are there any sites of cultural importance or sacred sites to the Ute Tribe within the project area.

4.15.5.1 The Flume

Two block surveys totaling 260 acres have been conducted within or immediately adjacent to the Flume site (totaling roughly 10 percent of the total area). Both surveys were within Sections 22 and 27, T3S, R2W. NRHP-eligible sites recorded include two historic structural sites (H1 and H2), the Myton Townsite Canal and the Grey Mountain Canal. Both canals border the Flume but are not located within the site.

The GLO plat dated May 31, 1923, based on field surveys conducted from 1919 to 1922, shows a road marked "Victory Highway" which was the first transcontinental road in the United States in Sections 26, 27, 33, and 34, T3S, R2W. Segments of the Victory Highway may be present in the project area. Those that retain integrity are likely to be eligible for the NRHP.

4.15.5.2 Uresk Drain

About 965 acres of the 1,929-acre site (50 percent) has been inventoried to a reconnaissance level. The Myton Townsite Canal is the only NRHP-eligible site, but it borders and is not located within the Uresk Drain site.

The Uresk Drain was built between 1936 and 1939 by the Civilian Conservation Corps and has not been formally

documented (SCS 1959, WWS 1998a). It may be eligible for the NRHP.

4.15.5.3 Riverdell North/South

Four surveys have been conducted within the Riverdell North/South site, all of which have been on the Riverdell North property. In all, approximately 223 acres of the 2,190-acre site (10 percent) have been examined. The Riverdell Canal (42DC373) is the only site formally recorded; it has been officially determined to be eligible to the NRHP.

4.15.5.4 Ted's Flat

Previous cultural resource inventory projects within or adjacent to the Ted's Flat site documented the Ouray School Canal and the Myton Townsite Canal (Stalheim 1983). Because no acreage was provided in the canal survey report, it is difficult to determine the total area surveyed within the 2,073-acre Ted's Flat unit. It is estimated that less than 5 percent has been examined for cultural resources. The two historic canals have been officially determined to be eligible to the NRHP. These canals border the site but are not actually located within it.

4.15.6 Impact Analysis

Impacts to cultural resources within the project area would occur within the Duchesne River floodplain as depicted on Figure 1-2. Impacts that would occur as a result of construction and operation of the project include filling and flooding irrigation features and planting desirable vegetation within the floodplain.

4.15.6.1 Significance Criteria

Determination of effects on eligible cultural resources is guided by federal implementing regulation 36 CFR 800, which states that cultural resource assessments of federal "undertakings" on eligible properties should result in one of three determinations: (1) no effect; (2) no adverse effect (i.e., one or more historic properties would be affected but the historic qualities making them significant will not be harmed); or (3) adverse effect (i.e., the undertakings would cause harm to one or more historic properties). These guidelines are used to determine effects and possible effects on eligible cultural resources associated with the Proposed Action and alternatives. Impacts on historic and prehistoric sites not eligible for the NRHP are not considered an effect on cultural resources. Cultural resources are regarded as significant if they meet the eligibility criteria for nomination to the NRHP (36 CFR 60).

Since cultural resources surveys of the impact area of influence have not been comprehensive, the location and extent of potential impacts on these resources is unknown. Under the Memorandum of Agreement (MOA) (a draft copy of which is included as Appendix F), it is understood that more complete cultural and paleontological surveys may need to be done as the project proceeds. Under the MOA, the Tribe, in conjunction with other lead agencies, would outline who would be responsible for the survey and would facilitate the process for the identification, evaluation and treatment of historic properties that may be impacted under the Proposed Action or alternatives.

4.15.6.2 Proposed Action

Table 4-57 lists the known historic sites within the LDWP under the Proposed Action, their location in relation to the LDWP project area and their NRHP status.

Table 4-57. Known Historic Sites within the LDWP Area under the Proposed Action and Alternatives.

Site	NRHP Status	General Location	Potential Impact
Grey Mountain Canal	Eligible	Borders portions of the Flume site	None
Ouray School Canal	Eligible	Borders Ted's Flat site on the north side of the river	None
Myton Townsite Canal	Eligible	Borders portions of the Flume, Uresk Drain and Ted's Flat South sites	One new turn-out may be installed adjacent to the Ted's Flat site
Riverdell Canal	Eligible	Within the Riverdell North Property	None
Uresk Drain	Unknown	Within the Uresk Drain site	Filled and flooded

The project area borders the Grey Mountain, Myton Townsite and Ouray School Canals, but would not affect them other than through potentially installing a new turn-out on the Myton Townsite Canal adjacent to the Ted's Flat site. The Riverdell Canal is being rebuilt under the related RWIP and the effects and appropriate mitigation would be handled by that project. No impacts would occur to standing historic structures as they are located outside of the areas planned for wetlands or planting. The Uresk Drain would be filled and flooded, but more comprehensive cultural work would be completed prior to project implementation.

4.15.6.3 Pahcease Alternative

The NRHP-eligible Grey Mountain, Myton Townsite and Riverdell Canals either border or are within the Pahcease Alternative project area, but would not be affected by the project. The Riverdell Canal is being rebuilt under the related RWIP and the effects and appropriate mitigation would be handled by that project.

4.15.6.4 Topanotes Alternative

The NRHP-eligible Ouray School, Grey Mountain and Myton Townsite Canals are within the Topanotes Alternative, but would not be affected by the project other than through potentially installing a new turn-out on the Myton Townsite Canal adjacent to the Ted's Flat site.

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4.15.6.5 No Action Alternative

The No Action Alternative would have no effect on cultural resources. Baseline conditions would continue as described in section 4.15.5.

4.16 NATIVE AMERICAN RESTRICTED/TRUST RESOURCES

The United States, through treaties and acts of Congress, holds title to lands and natural resources for the use and benefit of Native American Tribes and individual Tribal members. Because of this fiduciary obligation, the United States as Trustee must insure that these trust resources are maximized to the greatest extent possible for the benefit of the Native American owners. These trust resources can be real property, physical assets or intangible property rights. Examples of trust resources are lands, minerals, hunting and fishing rights and water rights. Regardless of the trust resource, all federal agencies have an obligation to carry out the trust responsibility the United States has assumed for Native American Tribes and individual Tribal members.

The Proposed Action would occur on portions of the Uintah and Ouray Indian Reservation and would utilize land and water rights of the Ute Tribe. The Tribe would be compensated for placing an easement on its land and leasing its water to the project. The Tribe would also receive the benefit of increased wetland-wildlife resources and associated hunting, cultural and educational opportunities.

Lands within the Proposed Action and alternatives would be operated as a special use wetland-wildlife area under the Proclamation of the Tribal Wildlife Advisory Boards and the Business Committee. A Comprehensive Conservation and Management Plan would be developed by the Tribe that specifies allowable uses and access conditions. The Management Plan may impose restrictions on access if necessary to meet Tribal wildlife goals. Access restrictions for wildlife management purposes are consistent with existing Tribal wildlife management policies and would only occur with Tribal development and approval of the LDWP Management Plan.

The Tribe is a lead agency on this project for planning purposes. The Tribe has developed the conceptual project plans and would manage the wetland-wildlife area. The BIA, the trustee responsible for protection of Tribal Trust resources, is a cooperating agency on the project and has been included in the planning process. The BIA will prepare a trust resources letter documenting their conclusions regarding the effects of the project on Tribal Trust resources per the Government-to-Government Consultation Policy (BIA 2000b).

4.17 ENVIRONMENTAL JUSTICE

Executive Order 12898 and its accompanying memorandum have the primary purpose of ensuring that "each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionally high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low income populations . . . " By definition, American Indians are considered minorities. Low income is defined by using federal poverty guidelines.

When determining whether effects are adverse and disproportionally high, agencies are to consider whether or not there is or would be an impact on the natural or physical environment that adversely affects a minority or low-income population.

Fifty-eight percent of the land in the project area is under Tribal ownership (including both Tribal Trust and allotted lands). Forty-eight percent of the Ute Tribe is unemployed, with an average annual income of $14,600. Thus, the local population is mostly classified as both a minority and a low-income population.

The CUWCD (2002) identified that there are 250 Tribal members in the Uinta Basin that would be interested in work on a construction project. Under the Proposed Action, construction would occur over a 10-year period generating temporary, seasonal jobs for up to 30 local residents. Construction contractors would be required to give preference to qualified Ute Indians in hiring and income would be generated for some individual Ute Indians during project construction.

The project would be operated by the Tribe under terms of the operating agreements discussed in section 2.1.4.3. Employment would be provided for an estimated regular staff of three personnel with periodic needs for temporary workers to meet O & M needs. The Tribe could decide to select one or more non-Tribal members to manage the project during the initial project operation if such expertise were necessary, but it is anticipated that over the long-term, all project management will be done by Tribal members.

Both project employment opportunities and increased wetland-wildlife resources would provide a positive impact on the Ute Indian Tribe (a minority and low-income population) without adversely affecting the health and safety of local residents or adversely affecting the local economy (see section 4.9 and section 4.10). None of the alternatives would disproportionally affect low-income or minority communities.

4.18 MITIGATION

4.18.1 Introduction

This section describes proposed mitigation for significant impacts caused by the Proposed Action and alternatives. Mitigation measures are proposed where feasible and practicable for resources that would incur significant adverse impacts after the implementation of the SOPs listed in Appendix A.

4.18.2 Cultural Resources

An inventory has been completed for resources of cultural significance to the Tribe; no resources of cultural significance were found (Alpine Archeology 2002; see Appendix F). Before construction, a complete inventory of prehistoric and historic resources would be completed at all sites in the project area where disturbance would occur. The inventory would be completed in accordance with a Programmatic Agreement that would be finalized among the Tribe, DOI, Mitigation Commission, Utah State Historic Preservation Officer and the Advisory Council on Historic Preservation (Appendix

F). The Programmatic Agreement would ensure that all potentially significant impacts on cultural resources are identified, eligibility of historic resources for the National Register of Historic Places is determined and that appropriate mitigation is implemented. Mitigation for impacts to sites eligible for the National Register of Historic Places would consist of Historic American Building Survey/Historic American Engineering Record (HABS/HAER) documentation, excavation or other appropriate measures.

4.19 UNAVOIDABLE ADVERSE IMPACTS

4.19.1 Introduction

This section describes unavoidable adverse impacts that would occur under the Proposed Action and alternatives. These impacts, presented by resource, are adverse impacts that remain after both implementation of the SOPs listed in Appendix A and the mitigation measures described in section 4.18.

There would be no unavoidable adverse impacts under the Proposed Action and alternatives for the following resources as they either did not have any adverse impacts or no adverse impacts remained after mitigation.

- Wetlands
- Threatened, Endangered and Candidate Species
- Water Resources
- Water Quality
- Soils
- Recreation
- Transportation

4.19.2 Wildlife Resources

There would be some temporary loss of upland habitat (for three to five years), which would represent a temporary impact to some upland songbirds and upland-associated raptors.

4.19.3 Agriculture and Land Use

Individual farmers and lessees would have to alter agricultural practices within the project area due to the restrictions on grazing and the reservation of 20 percent of crop yields for wildlife use. There would be a reduction of 0.1 percent in the marketable alfalfa yield for the two-county area and a reduction of 0.4 percent in livestock cash receipts.

There would be a conversion of private land to federal ownership within the project area. This would result in a conflict with Duchesne and Uintah Counties land use plans.

4.19.4 Socioeconomics

The Proposed Action and alternatives would initiate permanent impacts to the county tax base due to conversion of fee lands to federal ownership. In the process, the counties would lose property tax revenues on the private land, and instead receive payments in lieu of taxes (PILT). Under the Proposed Action, there would be a small annual decrease of $699 in tax revenues to

Duchesne County, and a decrease of $909 to Uintah County.

Under the Pahcease Alternative, there would be an annual loss of $823 to Duchesne County as PILT payments fail to fully compensate for the loss in property taxes. This represents a 0.2 percent decrease in 2001 PILT payments for the County. The equivalent loss to Uintah County would be $179, or 0.02 percent of their 2001 payment.

Under the Topanotes Alternative, there would be an annual loss of $641 to Duchesne County (a 0.1 percent decrease in 2001 PILT payments for the County). The annual loss to Uintah County would be $730, or 0.02 percent of their 2001 payment.

4.19.5 Public Health and Safety

There would be a net increase of 661 acres of potential mosquito-producing habitats (wetlands and irrigated pastures) which represents less than 1 percent of the acres currently treated by the MADs located in Duchesne and Uintah Counties. Potential mosquito-producing habitat within 2 miles of Myton would increase by 436 acres.

4.19.6 Air Quality

Nitrogen oxides, sulfur oxides and particulate matter from vehicle emissions would increase during construction. Dust emissions would increase during construction.

4.19.7 Noise

Noise levels would exceed significance criteria for people within about 50 feet of construction sites. There would be some noise impacts to residences during the construction period, but noise levels would remain below unacceptable levels according to EPA guidelines.

4.19.8 Cultural Resources

Complete surveys for cultural resources in the impact area of influence have not been completed, so the location and extent of potential unavoidable adverse impacts on these resources is unknown.

4.20 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

4.20.1 Introduction

This section describes the irreversible and irretrievable commitment of resources that would occur under the Proposed Action and alternatives. There would be no irreversible and irretrievable commitment of resources under the Proposed Action and alternatives for the following resources:

- Wetlands
- Wildlife Resources
- Threatened, Endangered and Candidate Species
- Water Quality
- Soils
- Public Health and Safety
- Recreation
- Transportation
- Noise
- Air Quality
- Cultural Resources

4.20.2 Proposed Action

Materials used during construction of the Proposed Action would be permanently committed to the project. Table 2.5 in section 2.1.5 lists materials to be used during construction.

Construction of the Proposed Action would require 110,400 gallons of gasoline for vehicles and equipment. Additional traffic after construction would use more fuel but the amount is not readily quantifiable.

Up to 6,212 acres of lands currently being grazed or available for grazing would be permanently removed from grazing.

Funds used for the construction and operation of the Proposed Action would be permanently committed to the project and would not be available for other purposes.

4.20.3 Pahcease Alternative

The irreversible and irretrievable commitment of resources under the Pahcease Alternative would be generally similar to that for the Proposed Action.

Construction of the Pahcease Alternative would require 82,800 gallons of gasoline for vehicles and equipment. Additional traffic after construction would use more fuel but the amount is not readily quantifiable.

Up to 5,329 acres of lands currently being grazed or available for grazing would be permanently removed from grazing.

4.20.4 Topanotes Alternative

The irreversible and irretrievable commitment of resources under the Topanotes Alternative would be generally similar to that for the Proposed Action.

Construction of the Topanotes Alternative would require 82,800 gallons of gasoline for vehicles and equipment. Additional traffic

after construction would use more fuel but the amount is not readily quantifiable.

Up to 6,107 acres of lands currently being grazed or available for grazing would be permanently removed from grazing.

4.21 CUMULATIVE IMPACTS

Section 1.7 describes six related or reasonably foreseeable projects for which cumulative impacts need to be addressed. The related projects are listed in Table 4-58 along with a summary of resources to be addressed in the cumulative impact analysis for all alternatives.

Table 3-1 summarizes the impacts of the Proposed Action and alternatives. Cumulative impacts are discussed below for each resource that would be impacted by the LDWP. The determination of cumulative impacts is based on net impacts, or those impacts remaining after mitigation has been applied. Both beneficial and adverse impacts are addressed in the cumulative impact analysis.

According to NEPA guidelines, cumulative impacts must be addressed for all identified impacts, regardless of their significance. Cumulative impacts are not discussed for resources in which the condition under the Proposed Action or the alternatives would not be substantially different from the baseline condition. The resources for which no measurable change would occur under the Proposed Action and the action alternatives and for which no cumulative impact analysis was conducted are:

- Threatened, Endangered and Candidate Species
- Soil Resources
- Water Resources
- Recreation
- Noise
- Cultural Resources

Although the LDWP would slightly increase air emissions, there are no related projects that affect air quality, so this resource is not addressed in the cumulative impact analysis.

Under the No Action Alternative, there would be no measurable change from baseline conditions for most resources except Wetland and Riparian Habitats and Wildlife Resources (Table 4-58). Therefore, cumulative impacts for the No Action Alternative are discussed only for these two resources. In contrast to the Proposed Action and other action alternatives, there would be no measurable changes from baseline conditions for water quality, agriculture/land use, socioeconomics, public health and safety and transportation; cumulative impacts for these resources are not discussed.

The cumulative impact analysis is based on existing and readily available data for the related projects. Cumulative impacts are discussed quantitatively where the appropriate data for related projects exists. Where quantitative data for a project does not exist in a readily available format, the cumulative impacts are discussed qualitatively.

Table 4-58. Summary of Resources Affected by the LDWP Alternatives and Related Projects.

Resource	General LDWP Impacts (Proposed Action and/or alternatives)	Resources Potentially Impacted by Related Projects					
		Colorado River Salinity Control Program	Mallard Springs	DRACR	RWIP	Section 203(a) UBRP	CREF
ACTION ALTERNATIVES							
Wetland/Riparian	Net increase in acres; some temporary loss of habitat	√	√	√	√	√	
Wildlife	Net increase in habitat; some temporary loss of habitat	√	√	√	√	√	
Water Quality	Slight reduction of TDS and boron concentrations; +1,125 tons of salts annually	√				√	
Agriculture/ Land Use	Reduction in livestock and crop production; change in land ownership			√		√	√
Socioeconomics	Decreases in tax revenues and agricultural income; increase in personal income and Tribal employment			√		√	√
Public Health and Safety	Increase in potential mosquito habitat		√	√			
Transportation	Slight increase in vehicle trips					√	
NO ACTION ALTERNATIVE							
Wetland/Riparian	Long-term loss of native species and wetlands; increase in invasive species	√	√	√	√	√	
Wildlife	Long-term loss of riparian habitat	√	√	√	√		

4.21.1 Cumulative Impacts of the Proposed Action

4.21.1.1 Wetland and Riparian Resources

The Proposed Action would restore 2,037 acres of wetland and riparian habitats and enhance an additional 1,925 acres of wetland and riparian habitats. There would be temporary impacts to 15.2 acres of native, non-riparian wetlands and 3.8 acres of cottonwood forest. These habitats would be restored but there would be a loss of habitat functions for a period of approximately three to five years for herbaceous wetlands and up to 30 years for cottonwood forest.

Related projects that would initially result in losses of wetland and riparian habitats include the Colorado River Salinity Control Program (estimated 211 acres of wetlands in Duchesne County), RWIP (yet to be quantified impacts to cottonwood forest and wetlands within the Duchesne River corridor) and Section 203(a) UBRP (approximately five acres of temporary and five acres of permanent wetland impacts along the Lake Fork River upstream of the project area). Each of these three projects would mitigate for their impacts, resulting in no net permanent loss of wetlands, but cumulatively with the LDWP would result in a temporary loss of at least 236 acres of wetlands and 3.8 acres of cottonwood forest.

Mitigation for some of the Colorado River Salinity Control Program impacts has been completed at the state-owned Mallard Springs. At Mallard Springs, 38 acres of wetlands have been created to offset losses elsewhere associated with canal lining. Although this mitigation does not result in a net change in wetland acres, its location within the LDWP project area results in a local increase in wetlands.

The DRACR mitigation is included within the Proposed Action and would not add to cumulative impacts of this alternative. There would be a total of 3,962 acres of wetland and riparian habitats created, restored or enhanced under the combined SACS-DRACR mitigation.

4.21.1.2 Wildlife Resources

The Proposed Action would improve habitat for all nine major wildlife species evaluated. There would be a net loss of 842 acres of upland habitat which would be offset by enhancements on the remaining upland habitat for nesting and feeding. There would be a temporary loss of 15.2 acres of wetland and 3.8 acres of riparian habitat, and a permanent loss of 9.5 acres of wetland. This loss would be more than offset by the creation, restoration and enhancement of 2,068 acres of wetland and 1,128 acres of riparian habitat.

Related projects that would initially impact wildlife resources include the Colorado River Salinity Control Program, RWIP and Section 203(a) UBRP. The Colorado River Salinity Control Program impacts an estimated 211 acres of wetlands in Duchesne County that provide habitat for three of the wildlife groups evaluated (shorebirds, waterfowl and furbearing animals). The development of 38 acres of wetlands at Mallard Springs represents mitigation for some of these impacts. These projects represent an overall increase in

habitat for the three wetland wildlife groups in the project area.

RWIP is expected to impact approximately 4.3 acres of mostly riparian cottonwood habitat that provides habitat for three of the major wildlife groups evaluated (migratory songbird, raptors and big game). Section 203(a) UBRP would temporarily impact 5 acres of habitat and permanently impact 5 acres of habitat for shorebirds, waterfowl and furbearers. Section 203(a) UBRP would permanently impact 351 acres of desert shrub and 20 acres of riparian shrub, and would temporarily impact 27 acres of desert shrub habitat. Given the mitigation in place for these projects, no permanent loss of habitat is expected from implementation of these projects (i.e., no net loss is expected). However, when combined with the LDWP, there would be a temporary loss of 1,120 acres of upland habitat including desert shrub, grassland and annual weed/fallow, and a temporary loss of 236 acres of wetland and 24 acres of riparian habitat

As the DRACR mitigation is included within the Proposed Action, DRACR would not add to cumulative impacts.

4.21.1.3 Water Quality

The Proposed Action and alternatives would produce a slight, but unmeasurable increase in TDS concentrations in irrigation return flows entering the Duchesne River, and increase the salt load to the Duchesne River by 1,125 tons annually. A related project that would affect the Duchesne River TDS concentration is the Section 203(a) UBRP project which would reduce salt loading by 4,700 tons but increase TDS concentrations in the Lake Fork outflow to the Duchesne River by 242 ppm. Cumulatively, the small reduction in TDS caused by the Proposed Action would be insufficient to offset the estimated increases in TDS as a result of the Section 203(a) UBRP and there would be a net increase in TDS concentrations over time.

As of the 2001 water year, the Colorado River Salinity Control project has reduced the salt load to the Duchesne River by 105, 914 tons per year. Cumulatively, the Colorado River Salinity Control Project, the Section 203(a) UBRP and the Proposed Action would result in an annual salt load reduction of 115,017 tons per year.

4.21.1.4 Agriculture/Land Use

Cumulative impacts to land use and agriculture in the project area would result from the operation of Section 203(a) UBRP, the Upper Colorado River Endangered Fish Recovery Program (CREF), and the Proposed Action. The Section 203(a) UBRP would require the fee title acquisition of 340 acres of private land and transfer that land to the Moon Lake Water Users Association (MLWUA). In conjunction with the loss of private lands in the Proposed Action, Duchesne County may view this as a cumulative violation of the County's policy of "no net increase" of public lands, even though the MLWUA is not a state or federal agency.

The Section 203(a) UBRP would have both positive and negative effects on agricultural output in the project area. Additional “project water” from enhanced storage in Big Sand Wash Reservoir could potentially be used for agriculture on eligible lands, which would offset losses on agricultural lands retired in the Proposed Action.

Additionally, the Section 203(a) UBRP would facilitate more reliable delivery of late season irrigation water to certain farms and enhance agricultural output during dry years. In contrast, the retirement of 340 acres of land may reduce agricultural output depending on the current use of those lands.

The Upper Colorado River Endangered Fish Recovery Program (CREF) is in the process of acquiring flood easements on properties along the Green River in Uintah County. Since title to these properties remains with the original private landowners, these easements would not contribute to the cumulate effect of violating the County's "no net increase" of public land policy. However, these easements prohibit the building of dikes to protect agricultural lands and also allow the breaching of existing dikes where necessary. Accordingly, it is possible that agricultural output on these properties could be reduced in years when flooding occurs, although it is not possible to calculate or predict such reductions.

The DRACR mitigation is included within the Proposed Action and would not add to cumulative impacts of this alternative. There would be a total of 2,494 cumulative acres of fee land acquired under the Proposed Action.

4.21.1.5 Socioeconomics

Cumulative effects are expected to result from the construction of the Proposed Action concurrently with the construction of the Section 203(a) UBRP (CUPCA Sec. 203a). No measurable socioeconomic impacts are expected from the operation of the Section 203(a) UBRP, so no cumulative effects can be expected during the operational periods of the two projects.

During the construction phase, the Section 203(a) UBRP is expected to increase employment in the construction sector of Duchesne County and to provide additional employment for Ute Tribal members. This increase in income in the area would also generate a proportional increase in sales tax revenues. Additionally, the project is expected to bring several new families to the Duchesne and Altamont areas. These socioeconomic impacts of the Section 203(a) UBRP were not evaluated quantitatively in the 203(a) Environmental Assessment, so cumulative effects in conjunction with the Proposed Action can only be addressed qualitatively.

Increases in construction income from the Section 203(a) UBRP would augment increases in income from construction of the Proposed Action. The cumulative effects would be a slight reduction in unemployment in the two-county impact area, increased personal income and improvement in other sectors of the local economy through increased personal spending. The Section 203(a) UBRP is also expected to bring new families into the Duchesne area, putting additional stress on the area schools and other social services. This is not expected to generate cumulative effects, however, because the Proposed Action anticipates hiring local workers who are already using these same social services. None of these cumulative effects, however, would be significant in terms of criteria defined for the Proposed Action.

Acquisition of private land for the Section 203(a) UBRP would also have a cumulative impact on Duchesne County property tax

revenues. However, since land uses and tax categories were not specified for the properties to be acquired, it is not possible to compute such impacts. The DRACR mitigation is included within the Proposed Action and would not add to cumulative impacts of this alternative. There would be a cumulative total of $1,608 of tax revenues lost within Duchesne and Uintah Counties under the Proposed Action.

4.21.1.6 Public Health and Safety

The Proposed Action would result in an increase in the amount of potential mosquito-producing habitat (746 acres of wet meadow, emergent marsh and irrigated grassland), which represents less than 1 percent of the acres currently treated by MADs in Duchesne and Uintah Counties.

Related projects that could also affect the amount of mosquito-producing habitat include the Mallard Springs mitigation, which adds an additional 38 acres of wetland in the vicinity of Myton.

These wetlands were created from irrigated pasture which is the primary mosquito-producing habitat in the area. Although the wetland creation represents a change in wildlife habitat type, it does not represent an change in the potential for mosquito production.

The DRACR mitigation is included within the Proposed Action and would not add to cumulative impacts of this alternative.

Under the Proposed Action, there would be no related projects resulting in a cumulative increase in potential mosquito-producing habitat.

4.21.1.7 Transportation

Cumulative impacts on transportation facilities in the project area would occur from the simultaneous construction of the Proposed Action and Section 203(a) UBRP. The Section 203(a) UBRP anticipates a 5-year construction period and would involve the construction of a variety of features in the Uinta Basin, several of which are near the Roosevelt-Myton area. These features include the Big Sand Wash Reservoir enlargement and Big Sand Wash-Roosevelt pipeline. Specific numbers of vehicle trips for workers and construction equipment were not calculated as part of the 203(a) Project Environmental Assessment; however, the assessment did specify that up to 40 workers could be involved in the project at peak periods. Some of these workers, as well as construction equipment and materials, would likely travel the same roads as workers and equipment for the Proposed Action. It is not expected that this cumulative effect would change the LOS on any particular road segment in the project area, except possibly during peak traffic periods between 4:00 to 6:00 p.m. in the town of Roosevelt.

No cumulative impacts on transportation resources are expected to occur during the operational periods of the Proposed Action and Section 203(a) UBRP.

4.21.2 Cumulative Impacts of the Pahcease Alternative

4.21.2.1 Wetland and Riparian Resources

The Pahcease Alternative would restore 2,125 acres of wetland and riparian habitats and enhance an additional 930 acres of wetland and riparian habitats. There would be temporary impacts to 11 acres of native, non-riparian wetlands. These habitats would be restored but there would be a loss of habitat functions for a period of approximately three to five years. As described for the Proposed Action, the related Colorado River Salinity Control Program, RWIP and Section 203(a) UBRP would mitigate for wetland impacts, resulting in no net permanent loss of wetlands, but cumulatively with the LDWP would result in a temporary loss of at least 232 acres of wetlands.

Mitigation for some of the Colorado River Salinity Control Program impacts has been completed at the state-owned Mallard Springs. At Mallard Springs, 38 acres of wetlands have been created to offset losses elsewhere associated with canal lining. Although this mitigation does not result in a net change in wetland acres, its location within the LDWP project area results in a local increase in wetlands.

The DRACR mitigation is not included within the Pahcease Alternative and would be implemented under a separate plan developed by the Mitigation Commission. The DRACR mitigation, as identified in 1982, is to replace 390 wetland-wildlife habitat units through creation of 450 acres of wetlands. Cumulatively, the DRACR mitigation and the LDWP under the Pahcease Alternative would create, restore or enhance a total of 3,505 acres of wetland and riparian habitats. This is 493 acres less than the Proposed Action, which combines the LDWP and the DRACR mitigation into a single project.

4.21.2.2 Wildlife Resources

The Pahcease Alternative would improve habitat for all nine major wildlife species evaluated. There would be a net loss of 774 acres of upland habitat which would be offset by enhancements on the remaining upland habitat for nesting and feeding. There would be a temporary loss of 11.0 acres and a permanent loss of 8.1 acres of waterfowl and shorebird habitat. There would be no temporary or permanent loss of migratory songbird habitat. These losses would be offset by the creation, restoration and enhancement of 1,523 acres of waterfowl and shorebird habitat and 1,132 acres of migratory songbird habitat.

Related projects that would initially impact wildlife resources include the Colorado River Salinity Control Program, RWIP and Section 203(a) UBRP. The Colorado River Salinity Control Program impacts an estimated 211 acres of wetlands in Duchesne County that provide habitat for three of the wildlife groups evaluated (shorebirds, waterfowl and furbearing animals). The development of 38 acres of wetlands at Mallard Springs represents mitigation for some of these impacts. These projects represent an overall increase in habitat for the three wetland wildlife groups in the project area.

The mitigation obligation for DRACR, which identifies the need for the

replacement of 390 wetland-wildlife habitat units with the creation of 450 acres of wetlands, is not included with the Pahcease Alternative. When combined with the Pahcease Alternative, a total of 1,937 acres of waterfowl and shorebird habitat and 1,132 acres of migratory songbird and big game habitat would be created, restored or enhanced.

RWIP is expected to impact approximately 4.3 acres of mostly riparian cottonwood habitat that provides habitat for three of the major wildlife groups evaluated (migratory songbird, raptors and big game). Section 203(a) UBRP would temporarily impact 5 acres of habitat and permanently impact 5 acres of habitat for shorebirds, waterfowl and furbearers. Section 203(a) UBRP would permanently impact 351 acres of desert shrub and 20 acres of riparian shrub and temporarily impact 27 acres of desert shrub habitat. Given the mitigation in place for these projects, no permanent loss of habitat is expected from implementation of these projects (i.e., no net loss is expected). However, when combined with the LDWP, there would be a temporary loss of 1,044 acres of upland habitat including desert shrub, grassland and annual weed/fallow, and a temporary loss of 244 acres of waterfowl and shorebird habitat and 8 acres of migratory songbird and big game habitat.

4.21.2.3 Water Quality

Cumulative water quality impacts under the Pahcease Alternative would be the same as those described for the Proposed Action.

4.21.2.4 Agriculture/Land Use

The cumulative impacts of Section 203(a) UBRP, the Upper Colorado River Endangered Fish Recovery Program (CREF) and the Pahcease Alternative would be the same as the Proposed Action. However, the Pahcease Alternative does not accomplish required wetland mitigation for the DRACR, so it is anticipated that an additional 1,087 acres of land in either Duchesne or Uintah Counties would need to be acquired for this purpose. If these lands are privately owned, such acquisition would add to the cumulative effect of increasing public land in one or both counties in violation of the "no net increase" policies.

Cumulatively, Section 203(a) UBRP, the DRACR mitigation and the LDWP under the Pahcease Alternative would acquire 3,214 acres of fee land. This is 720 acres more than the Proposed Action, which combines the LDWP and the DRACR mitigation into a single project.

Acquiring additional private land to satisfy DRACR mitigation would also very likely further reduce agricultural output in the two-county project area. Current agricultural production on lands in the Pahcease Alternative project area is approximately $38 per acre annually ($250,843 divided by 6,640). If lands eventually acquired to meet DRACR mitigation were of the same relative productivity, additional losses to county agricultural output would be $41,306 annually. According to significance criteria defined earlier, such additional cumulative losses would not be significant in comparison to overall agricultural output in the two counties.

4.21.2.5 Socioeconomics

Cumulative socioeconomic effects for the Pahcease Alternative would be the same as the Proposed Action, with the exception of tax revenues. The additional purchase of 1,087 acres of fee land for the Pahcease Alternative would further reduce county property taxes, depending on the use of the land at the time of purchase. Assuming that land with a moderate valuation such as irrigated pasture is purchased, this would result in the potential loss of $2,143 in property taxes. Tax revenue losses would be lower if dry pasture were purchased and higher if cropland were acquired. There would be an estimated cumulative total of $3,145 of tax revenues lost within Duchesne and Uintah Counties under the Pahcease Alternative. This amount is $2,037 higher than the cumulative loss of tax revenues under the Proposed Action.

4.21.2.6 Public Health and Safety

The Pahcease Alternative would result in an increase in the amount of potential mosquito-producing habitat (912 acres of wet meadow, emergent marsh and irrigated grassland), which represents approximately 1 percent of the acres currently treated by MADs in Duchesne and Uintah Counties for mosquitoes.

Related projects that could also affect the amount of mosquito-producing habitat include the Mallard Springs mitigation, which adds an additional 38 acres of wetland in the vicinity of Myton.

These wetlands were created from irrigated pasture which is the primary mosquito-producing habitat in the area. Although the wetland creation represents a change in wildlife habitat type, it does not represent an change in the potential for mosquito production.

The DRACR mitigation is not included within the Pahcease Alternative and would add 450 acres of wetlands. Cumulatively, the DRACR mitigation and the LDWP under the Pahcease Alternative would result in a net total of 1,362 acres of potential mosquito-producing habitat. This is 616 acres more than the Proposed Action, which combines the LDWP and the DRACR mitigation into a single project.

4.21.2.7 Transportation

Cumulative transportation impacts for the Pahcease Alternative would be the same as described for the Proposed Action.

4.21.3 Cumulative Impacts of the Topanotes Alternative

4.21.3.1 Wetland and Riparian Resources

The Topanotes Alternative would restore 1,461 acres of wetland and riparian habitats and enhance an additional 1,714 acres of wetland and riparian habitats. There would be temporary impacts to 13.8 acres of native, non-riparian wetlands and 3.8 acres of cottonwood forest. These habitats would be restored but there would be a loss of habitat functions for a period of approximately three to five years for herbaceous wetlands and up to 30 years for cottonwood forest. As described for the Proposed Action, the related Colorado River Salinity Control Program, RWIP and Section 203(a) UBRP would mitigate for

wetland impacts, resulting in no net permanent loss of wetlands, but cumulatively with the LDWP would result in a temporary loss of at least 239 acres of wetlands and cottonwood forest.

Mitigation for some of the Colorado River Salinity Control Program impacts has been completed at the state-owned Mallard Springs. At Mallard Springs, 38 acres of wetlands have been created to offset losses elsewhere associated with canal lining. Although this mitigation does not result in a net change in wetland acres, its location within the LDWP project area results in a local increase in wetlands.

The DRACR mitigation is not included within the Topanotes Alternative and would be implemented under a separate plan developed by the Mitigation Commission. The DRACR mitigation, as identified in 1982, is to replace 390 wetland-wildlife habitat units through creation of 450 acres of wetlands. Cumulatively, the DRACR mitigation and the LDWP under the Pahcease Alternative would create, restore or enhance a total of 3,625 acres of wetland and riparian habitats. This is 377 acres less than the Proposed Action, which combines the LDWP and the DRACR mitigation into a single project.

4.21.3.2 Wildlife Resources

The Topanotes Alternative would improve habitat for all nine major wildlife species evaluated. There would be a net loss of 693 acres of upland habitat which would be offset by enhancements on the remaining upland habitat for nesting and feeding. There would also be a temporary loss of 13.8 acres and a permanent loss of 8.7 acres of waterfowl and shorebird habitat and 3.8 acres of migratory songbird and big game habitat. These losses would be offset by the creation, restoration and enhancement of 1,938 acres of waterfowl and shorebird habitat and 1,237 acres of migratory songbird habitat.

Related projects that would initially impact wildlife resources include the Colorado River Salinity Control Program, RWIP and Section 203(a) UBRP. The Colorado River Salinity Control Program impacts an estimated 211 acres of wetlands in Duchesne County that provide habitat for three of the wildlife groups evaluated (shorebirds, waterfowl and furbearing animals). The development of 38 acres of wetlands at Mallard Springs represents mitigation for some of these impacts. These projects represent an overall increase in habitat for the three wetland wildlife groups in the project area.

The mitigation obligation for DRACR, which identifies the need for the replacement of 390 wetland-wildlife habitat units with the creation of 450 acres of wetlands, is not included with the Topanotes Alternative.

RWIP is expected to impact approximately 4.3 acres of mostly riparian cottonwood habitat that provides habitat for three of the major wildlife groups evaluated (migratory songbird, raptors and big game). Section 203(a) UBRP would temporarily impact 5 acres of habitat and permanently impact 5 acres of habitat for shorebirds, waterfowl and furbearers. Section 203(a) UBRP would permanently impact 351 acres of desert shrub and 20 acres of riparian shrub and temporarily impact 27 acres of desert shrub habitat.

Given the mitigation in place for these projects, no permanent loss of habitat is expected from implementation of these projects (i.e., no net loss is expected). However, when combined with the LDWP, there would be a temporary loss of 1,044 acres of upland habitat including desert shrub, grassland and annual weed/fallow, and a temporary loss of acres of waterfowl and shorebird habitat and 28 acres of migratory songbird and big game habitat.

4.21.3.3 Water Quality

Cumulative water quality impacts under the Topanotes Alternative would be the same as those described for the Proposed Action.

4.21.3.4 Agriculture/Land Use

Cumulative impacts under the Topanotes Alternative would be similar to that of the Proposed Action, with the exception that cumulatively 2,511 acres of fee land would be acquired, which is 17 acres more than the cumulative effects of the Proposed Action.

4.21.3.5 Socioeconomics

Cumulative socioeconomic effects for the Topanotes Alternative would be the same as described for the Proposed Action, with the exception that there would be a cumulative total of $1,375 of tax revenues lost within Duchesne and Uintah Counties.

4.21.3.6 Public Health and Safety

The Topanotes Alternative would result in an increase in the amount of potential mosquito-producing habitat (855 acres of wet meadow, emergent marsh and irrigated grassland), which represents approximately 1 percent of the acres currently treated by MADs in Duchesne and Uintah Counties for mosquitoes.

Related projects that could also affect the amount of mosquito-producing habitat include the Mallard Springs mitigation, which adds an additional 38 acres of wetland in the vicinity of Myton.

These wetlands were created from irrigated pasture which is the primary mosquito-producing habitat in the area. Although the wetland creation represents a change in wildlife habitat type, it does not represent a change in the potential for mosquito production.

The DRACR mitigation is not included within the Topanotes Alternative and would add 450 acres of wetlands. Cumulatively, the DRACR mitigation and the LDWP under the Topanotes Alternative would result in a net increase of 1,305 acres of potential mosquito-producing habitat. This is 559 acres more than the Proposed Action, which combines the LDWP and the DRACR mitigation into a single project.

4.21.3.7 Transportation

Cumulative transportation impacts for the Topanotes Alternative would be the same as described for the Proposed Action.

4.21.4 Cumulative Impacts of the No Action Alternative

4.21.4.1 Wetland and Riparian Resources

Under the No Action Alternative, wetland and riparian habitats would be lost over the long-term as cottonwoods die and are replaced by noxious and/or invasive weeds, wetlands are dried up or native species in wetlands are replaced by invasive weeds. There is no data to predict the rate at which this loss would occur, but at least 668 to 801 acres of noxious weeds would persist and likely expand under the No Action Alternative.

Of the five related projects that also affect wetland and riparian habitats, only one project has addressed invasive species control. The RWIP would prevent invasive weeds from expanding on the Riverdell North property and also attempt to reduce existing invasions. There is no information regarding how the other related projects would address invasive species control. Cumulatively, it is likely that the RWIP would control expansion of invasive weeds, but that at least 668 to 801 acres of invasive weeds would persist and expand elsewhere within the project area.

4.21.4.2 Wildlife Resources

Under the No Action Alternative, there would be a long-term loss of riparian habitat due to native riparian species mortality and subsequent replacement by invasive species. This would affect the riparian-associated wildlife species listed in section 4.3. There is no data to predict the rate at which the loss of native riparian species would occur. No other related projects have addressed the long-term loss of native riparian species and associated wildlife habitat along the Duchesne River. Cumulatively, under the No Action Alternative, there would be a net loss of migratory bird, raptor and big game habitat.

Lower Duchesne River
Wetlands Mitigation Project

Draft Environmental Impact Statement

CHAPTER 5

CONSULTATION AND COORDINATION

CHAPTER 5: CONSULTATION AND COORDINATION

5.1 INTRODUCTION

National Environmental Policy Act regulations provided by the Council on Environmental Quality (CEQ) direct project proponents to allow both interested agencies and the general public to review and comment on EISs. This chapter describes the consultation and coordination that occurred with agencies and the public throughout project planning and during scoping and development of the LDWP DEIS.

The Tribe initiated and managed the consultation and coordination for the LDWP DEIS. Because the majority of the project would occur on Tribal Trust lands and mitigation for Tribal resource losses was a key project need, Tribal members and leaders provided input on all stages of the project. The Tribe also involved other agencies that had related responsibilities in the early stages of the project. The Tribe provided updates and information about the proposed project to local interested parties. The following describes the process of agency and public involvement for the LDWP.

5.2 PROJECT PLANNING

Project planning began in 1995 with preparation of a series of project feasibility reports (produced in 1997, 1998 and 2000). During the feasibility analysis, public input was sought by the Tribe through a combination of several methods. Landowners within the proposed project area were approached individually by Tribal representatives to describe the project, identify any landowner concerns and also assess the likelihood of individual landowners to be willing sellers of their land and associated water rights to the project.

Concurrently, the Tribe prepared a survey and distributed it to Tribal members requesting input on the project. Twenty-six Tribal members completed the survey. The majority of the respondents showed strong interest in developing a Tribal wildlife management area, with high interest in wildlife viewing and nature education. Survey results were compiled by the Tribe and submitted to the Mitigation Commission as a separate report in 1998. Other local public input was solicited through a series of presentations made by the Tribe to area high schools and at Tribal Council meetings.

During the feasibility analyses, many agencies were contacted to solicit input and obtain pertinent existing data on the project vicinity. These agencies included:

- Utah Division of Wildlife Resources,
- Utah Agricultural Statistics Service,
- Utah Department of Community and Economic Development,
- Central Utah Water Conservancy District,
- Natural Resources Conservation Service,
- U.S. Bureau of Reclamation,

- U.S. Fish and Wildlife Service offices in Salt Lake City, Vernal and at the Ouray National Wildlife Refuge,
- U.S. Bureau of Land Management staff at Pariette Wetlands,
- U.S. Bureau of Indian Affairs,
- U.S. Army Corps of Engineers,
- USDA Forest Service,
- U.S. Geological Survey, and
- Ute Indian Tribe Cultural Resources and Fish and Wildlife Departments.

Private individuals who provided technical information on wetlands, wildlife and water resources included Elizabeth Ammon (University of Nevada-Reno), Tod Smith (Whiteing and Smith), Mark Oliver (Basin Hydrology), Mary Landin (Army Corps of Engineers National Mitigation Team Leader), David Cooper (University of Colorado) and Jack Schmidt (Utah State University).

Early in the planning process, the lead federal agencies appointed representatives to be involved in a project Planning Team. Table 5-1 lists the LDWP Planning Team members. The first Planning Team meeting was held on April 15, 1997, in Salt Lake City. Between April 1997 and the initiation of the DEIS with Public Scoping Meetings, 18 additional Planning Team meetings were held, either in Salt Lake City, Heber or Fort Duchesne. The Tribal Project Director communicated regularly with the Tribal Business Committee, the Tribal Natural Resources Director and the Tribal Fish and Wildlife Advisory Board. Business Committee members were invited to attend several Planning Team meetings held between April 1997 and the May 2001 scoping meetings.

Field tours were conducted by the Tribe on July 28-29, 1997; October 29, 1997; and May 16-17, 2001 for members of the Planning Team, interested Tribal members and interested individuals. Comments were solicited from all parties during the field tours and the wildlife personnel from the Ouray National Wildlife Refuge provided key input on the alternative conceptual plans. On April 17, 2001, U.S. Fish and Wildlife personnel conducted a field tour of the Refuge for the LDWP Planning Team, providing technical information on wildlife management strategies that had been the most-cost effective at the Refuge and ways to avoid more costly management strategies.

Public presentations were made in Salt Lake City on March 5, 2000, and February 27, 2001, to update the Mitigation Commission and the interested public on the project and to solicit any comments.

Table 5-1. LDWP Lead and Cooperating Agency Planning Team Members.	
Agency/Organization	**Representative(s)**
Ute Indian Tribe	Ron Groves, Harley Cambridge, Kelly Cambridge
Mitigation Commission	Catherine Quinn, Mark Holden
U.S. Department of the Interior	Ralph Swanson
U.S. Fish and Wildlife Service	Lucy Jordan, Curtis Nelms, Ted Koehler, Larry Zeigenfuss
U.S. Bureau of Indian Affairs	Lynn Hansen
U.S. Bureau of Reclamation	Kerry Schwartz, Russ Findley

5.3 SCOPING PROCESS

A Notice of Intent (NOI) to prepare an EIS was published in the Federal Register on April 25, 2001. Public notices announcing the initiation of public scoping on the project were also published in the Salt Lake Tribune (May 11, 2001) and the Vernal Express (May 9, 2001). In addition to the public notice, the Salt Lake Tribune published a separate article on the proposed project in May 2001. Flyers publicizing the meeting were also posted in conspicuous locations throughout the Uinta Basin in May 2001. Announcements regarding the Uinta Basin meetings were made on two local radio stations (KNEU and KUEL). All relevant agency representatives, including those who participated on the Planning Team, local governments and landowners and others on the project mailing list received invitations to the scoping meetings.

"Scoping" is the public involvement process required by the CEQ regulations to help federal agencies determine issues and alternatives to be analyzed in the EIS. Results of the scoping meetings and comments received during the scoping process were used to establish the scope of the DEIS and focus the environmental analysis on important issues and concerns. Public scoping meetings were held in Fort Duchesne on May 15, 2001 (11 people in attendance), in Roosevelt on May 15, 2001 (15 people in attendance) and on May 16, 2001, in Salt Lake City (11 people in attendance). Information on the project purpose, needs and specific goals, location of the project, alternatives that had been reviewed for feasibility during the planning process, and the types of activities and project features being considered was presented at these meetings. The meetings were recorded and all oral comments entered into the official record. Forms for providing written comments were provided both in the scoping invitations and at the public meetings. Thirty oral comments were received during the public meetings; written comments were received from Duchesne County Water Conservancy District, Duchesne County Commission, Great Salt Lake Audubon, Utah Waters and the Stonefly Society of Trout Unlimited.

The Planning Team met on May 26 and June 5, 2001, to review all of the comments received and summarize issues and concerns raised by the public that would be considered during the NEPA impact analyses. These issues and concerns were restated as questions in the DEIS and used to identify impact topics and methodologies for analyzing impacts on the resources. The questions are listed in each resource section and answered by the impact analyses presented in Chapter 4.

Issues and concerns raised during public scoping are summarized below by resource category. Where individual comments were similar they were combined into a single summary statement.

5.3.1 Project Purpose and Need

- Identify the Tribal goals and the alternative that most appeals to the Tribe.
- The basis for the project size needs to be clarified. The width and length of the river corridor examined needs to be stated and the location of the project area in relation to the impact area explained.
- There is strong support for the completion of the mitigation commitment made in 1965. State and federal agencies should make completion of the project a high priority, as SACS has been completed and supplying water to agricultural lands, but the mitigation obligations have lagged far behind. If the mitigation is not completed in a timely manner, all SACS diversions should be halted until the mitigation is completed.
- The alternatives that rewater oxbows appear to provide the greatest wildlife benefits, but an alternative combining some elements of the riparian flow alternative should be developed.

5.3.2 Project Description

- The timing and duration of construction needs to be explained.
- The project budget and how costs were developed needs to be clarified.
- The location of each of the sites is hard to read on the maps provided. More landmarks are needed on the maps for people to understand where the project is located on the ground.
- The relationship of the project to the state-owned Mallard Springs area needs clarification.
- What is the relationship of this project to other water projects in the Uinta Basin? Will this project affect completion of other CUP water resource projects? What is the relationship of this project to other CUP mitigation projects, and can the different mitigation projects be coordinated or combined? Adding additional partners to the project would benefit the wetland resources by allowing an expanded project area.
- Any changes in access to public lands or the Duchesne River need to be disclosed.
- Planning and funding for the long-term management of the project need to be presented in the NEPA document to allow comparison of the true long-term costs among alternatives.

5.3.3 Biological Resources

- The magnitude of the impacts on wetland and riparian habitats should be quantified and the values of both the impacted wetlands and the proposed mitigation wetlands evaluated.
- Acquisition of land within the Duchesne River floodplain and providing flows sufficient for riparian benefit seems to most closely match the habitats and values that were lost due to the operation of SACS.
- All wildlife should be considered, not just waterfowl.
- Oxbow rewatering has provided substantial wildlife benefits on other projects and should be encouraged on this project to produce high value wildlife habitat restoration.
- Connections between the oxbows and the Duchesne River should be encouraged to provide nursery fish habitat.
- Active management of the project lands needs to be included to prevent weed proliferation.
- Mosquito control is an issue that needs to be addressed.

5.3.4 Water Resources

- Water requirements for each alternative need to be displayed and compared to water availability to determine if there is sufficient water for the project. Water rights need to be evaluated.
- Effects of the project on Duchesne River flows need to be evaluated. Increases, decreases and any effects of altered flows on infrastructure or houses should be examined. Effects of any changes in flows on the Colorado River system should also be analyzed.
- The feasibility of the Riparian Flow Alternative should be reconsidered based on water rights, water availability and water costs.
- The project may affect salinity input to the Duchesne River. Some alternatives, such as the large ponds, may increase Duchesne River salinity through both substantial depletions and evaporation and concentration of salts. Other alternatives may reduce salinity, particularly if land is retired. The effects of each alternative on salinity inputs to the Duchesne River need to be considered.

5.3.5 Land Use and Socioeconomics

- Economic benefits of the projects need to be displayed, including any increases in jobs and/or benefits to Tribal members.
- Payment in lieu of taxes doesn't adequately compensate the county for loss of tax revenue if private land is purchased. Effects of the land acquisition portion of the project on the tax revenues of Duchesne and Uintah Counties needs to be evaluated.
- The counties generally support mitigating losses to Tribal Resources as a result of SACS but acquisition of private property for the project conflicts with county goals of no net loss of private land.

- Would a conservation easement be considered a net loss of private land?
- How will land acquisition be accomplished? Explain what options will be used for land acquisition - willing seller only, condemnation or land exchanges with other Tribal property. Will all land within the area boundary be acquired or will some individuals be allowed to remain on their property within the project area boundary?
- The analysis needs to look at the economic impacts of retiring agricultural land, if that will occur, as land retirement may have an economic impact on Duchesne and Uintah Counties.
- Effects of the project on both agricultural income and lifestyle needs to be considered.

Seven categories of issues and concerns were mentioned more often than others. These were: potential economic impacts, acquisition of private land by the federal government, long-term financing, mosquito and weed control, wildlife benefits and recognition of SACS impacts on wetlands with strong support for immediate completion of the mitigation obligation.

5.4 COORDINATION DURING DEIS DEVELOPMENT

The DEIS was developed through continued coordination between the Planning Team and the specialists on the Technical Team who prepared individual sections and analyses. There was weekly coordination with specialists during chapter preparation. Monthly meetings were held with the entire Planning Team and representatives of the Technical Team. Small group working sessions were scheduled as necessary with specialists and appropriate members of the Planning Team. These small group working sessions were used specifically to guide wildlife, water resources and land ownership analyses.

A draft project description was submitted to Planning Team members on November 8, 2001, with written comments on the project description received from the Mitigation Commission, DOI, Reclamation and a representative of the Tribe Business Committee by December 8, 2001. An Administrative DEIS was prepared with a revised project description and submitted to Planning Team members and other cooperating agencies on April 5, 2002. Written comments on the Administrative DEIS were received May 20, 2002, from the Mitigation Commission, DOI and a representative of the Tribe Business Committee. A Preliminary DEIS (PDEIS) was initiated in January 2003 and distributed to all cooperating and lead agencies, including Planning Team members, on April 30, 2003 for review and comment. The Tribe requested formal written comments on the PDEIS by May 30, 2003. Comments on the PDEIS were used to prepare the DEIS. The following agencies participated in the PDEIS review:

- U.S. Department of the Interior,
- U.S. Bureau of Indian Affairs,
- U.S. Fish and Wildlife Service,
- U.S. Bureau of Reclamation,
- Ute Indian Tribe Business Committee,
- Ute Indian Tribe Fish and Wildlife Advisory Board, and
- Utah Reclamation Mitigation and Conservation Commission.

Written comments on the PDEIS were received from the Mitigation Commission, DOI, Reclamation and a representative of the Ute Tribe Business Committee.

5.5 RELATED STUDIES

Related studies required by law or executive order have been prepared and integrated with this DEIS. The following sections briefly review these studies.

5.5.1 Fish and Wildlife Coordination Act

The Tribe consulted with the FWS on fish and wildlife resources and habitats that would be affected by the LDWP. Consultation meetings were held periodically with FWS between 1998 and 2003 to discuss requirements for wildlife assessments and the schedule to complete the Fish and Wildlife Coordination Act Report. The FWS is preparing a Planning Aid Memorandum on the DEIS to comply with requirements of the Fish and Wildlife Coordination Act.

5.5.2 Endangered Species Act of 1973

The Tribe consulted with the FWS on threatened, endangered and candidate species and received a list of species in the impact area of influence. Section 4.4 of this DEIS was prepared by the FWS and serves as a draft Biological Assessment for the LDWP. Section 4.4 of the FEIS will serve as a final Biological Assessment. The FWS will prepare a Biological Opinion if required.

5.5.3 National Historic Preservation Act

The Tribe and Mitigation Commission consulted with the Utah State Historic Preservation Office (SHPO) on cultural resources that could be affected by the LDWP. A draft Programmatic Memorandum of Agreement (MOA) has been developed (and is included as Appendix F) authorizing the plan for survey, collection and documentation of cultural resources that would be affected by construction of the LDWP. A Final Cultural Resources Technical Report (Alpine Archeology 2002), prepared as a support document to this DEIS, is available from the Mitigation Commission or Tribe upon request.

5.5.4 Clean Air Act

An air quality analysis has been conducted and integrated with this DEIS (see section 4.13 of this document).

5.5.5 Executive Order 11988, Floodplain Management

Protection of floodplains and their management has been included in the environmental analysis and integrated with this DEIS (see section 4.2 of this DEIS).

5.5.6 Safe Drinking Water Act and Clean Water Act of 1977

A detailed water quality analysis has been conducted and integrated with this DEIS (see section 4.6 of this DEIS).

5.5.7 Executive Order 11990, Protection of Wetlands

A detailed wetlands analysis has been conducted and integrated with this DEIS (see section 4.2 of this DEIS).

5.5.8 Executive Order 13186, Protection of Migratory Bird Habitat

A detailed analysis of wildlife habitat, including migratory bird habitat, has been conducted and integrated with this DEIS (see sections 4.2 and 4.3 of this DEIS).

5.5.9 Executive Order 13112, Invasive Species

A detailed analysis of invasive species has been conducted and integrated with this DEIS (see sections 4.2 of this DEIS).

5.6 DEIS COORDINATION

This section describes the coordination that will be conducted during public review of the DEIS. A complete mailing list of all agencies, organizations and individuals that will receive the DEIS is available upon request from:

Ron Groves
Ute Indian Tribe, Wetlands-Fish and Wildlife
PO Box 190
Fort Duchesne, UT 84026

Additional copies of the DEIS and technical reports referenced therein are available on request from the same office.

5.6.1 Request for Official Comments

The following agencies and organizations will receive the DEIS for review:

- U.S. Department of Interior,
- U.S. Bureau of Indian Affairs,
- U.S. Fish and Wildlife Service,
- U.S. Army Corps of Engineers,
- U.S. Environmental Protection Agency,
- U.S. Department of Agriculture-Natural Resources Conservation Service,
- U.S. Bureau of Reclamation,
- Ute Indian Tribe Business Committee,
- Ute Indian Tribe Fish and Wildlife Advisory Board,
- Utah Department of Natural Resources,
- Utah Division of Wildlife Resources,
- Utah Division of Water Rights,

- Utah Reclamation Mitigation and Conservation Commission,
- Duchesne County Commission,
- Duchesne County Water Conservancy District,
- Uintah County Commission,
- Mosquito Abatement Districts in Duchesne and Uintah Counties,
- Audubon Society,
- Stonefly Society,
- Utah Waters,
- Private individuals who have requested a copy, and
- Other interested agencies.

5.6.2 Public Hearings

Three public hearings will be held on the DEIS; one in Fort Duchesne, one in Roosevelt and one in Salt Lake City. Following are the hearing dates, times and locations:

Fort Duchesne DEIS Public Hearing

Date: December 16, 2003
Time: 6:00 p.m.
Location: West Junior High
East Highway 40
Fort Duchesne, Utah

Roosevelt DEIS Public Hearing

Date: December 17, 2003
Time: 6:00 p.m.
Location: Crossroads Senior Center
50 East 200 South
Roosevelt, Utah

Salt Lake City DEIS Public Hearing

Date: December 18, 2003
Time: 6:00 p.m.
Location: Bureau of Land Management
Salt Lake Field Office
324 South State Street
Salt Lake City, Utah

Oral comments will be recorded at each of the meetings. Written comments will also be accepted for 30 days following the public hearings and will be due on January 16, 2004. Written comments should be sent to the address listed in section 5.5.

LIST OF PREPARERS

Name	Title	Qualifications	Topic Area
UTE INDIAN TRIBE			
Ron Groves	Project Director	10 years experience with CUP	Project Management
Harley Cambridge	Technical Assistant	5 years experience with CUP	Public Participation, Consultation and Coordination
Kelly Cambridge	Technical Assistant	3 years experience with CUP	Public Participation, Consultation and Coordination
Betsy Chapoose	Cultural Resources Specialist	B.S. Cultural Resources	Cultural Resources
Tod Smith	Tribal Trust Resources Advisor	J.D. Law	Tribal Trust Assets, Environmental Justice
U.S. BUREAU OF INDIAN AFFAIRS			
Lynn Hansen	BIA Liaison	B.S. Water Resources	Water Rights, Mosquitos
U.S. DEPARTMENT OF INTERIOR			
Ralph Swanson	DOI Project Coordinator	B.S. Zoology M.S. Marine Environment	Project Coordination
U.S. FISH AND WILDLIFE SERVICE			
Lucy Jordan	FWS CUP Liaison	M.S. Botany PhD Range Science	Mitigation Requirements
Larry Zeigenfuss	Ecologist	B.S. Natural Resource Management M.S. Fishery Biology	Wildlife Resources, T&E Fish and Wildlife
UTAH RECLAMATION MITIGATION AND CONSERVATION COMMISSION			
Mark Holden	Project Manager	B.S. Biology M.S. Fish and Wildlife Biology	Project Management

Name	Title	Qualifications	Topic Area
EIS TEAM			
Leslie Gecy	Technical Advisor/Ecologist	B.S. Wildlife Biology M.S. Plant Ecology	Technical Review, Wetlands and Riparian Habitats, T&E Plants, Mosquitos, Comparative Analysis of Alternatives
Andi Bauer	Editor	B.A. English	Editor
Ken Berg	Mapper	B.S. Civil Engineering	AutoCad Maps and Analysis
Cindy Burton	Socio-cultural Analyst	B.S. Range Conservation	Agriculture and Land Use, Air Quality
Susan Chandler	Cultural Specialist	B.A. Southwestern Studies M.A. Anthropology	Cultural Resources
Darrell Mensel	Socio-cultural Analyst	B.A. Political Science B.A. Journalism M.A. International Studies	Agriculture and Land Use, Socioeconomics, Transportation,Water Rights
John Nolte	Draftsman	B.S. Environmental Science	AutoCad Map Assistance
Mark Oliver	Physical Scientist	B.S. Hydrology	Water Resources
Mindy Wheeler	Weed Control Specialist	B.S. Biology M.S. Rangeland and Ecosystem Science Licensed Weed Control Applicator	Weed Control
Dan Woodbury. P.E.	Engineer	B.S. Civil Engineering	Construction Details
Lee Duncan	Technical Assistant	B.S. Environmental Sciences	Assistant Editor
Susan Schnelle	Editor	B.S. Engineering Technology M.S. Engineering Technology	Assistant Editor

ACRONYMS AND ABBREVIATIONS

AUM. Animal Units per Month

BIA. U.S. Bureau of Indian Affairs

BLM. Bureau of Land Management

BTI. *Bacillus thuringiensis*

CEQ. Council on Environmental Quality

cfs. Cubic feet per second

COE. U.S. Army Corps of Engineers

CREF. Colorado River Endangered Fish (Recovery Program)

CUP. Central Utah Project

CUPCA. Central Utah Project Completion Act

CUWCD. Central Utah Water Conservancy District

CWA. Clean Water Act

DBA. A weighted decibel scale (a unit used to measure noise)

DEIS. Draft Environmental Impact Statement

DEQ. Utah Department of Environmental Quality

DO. Dissolved oxygen

DOI. U.S. Department of the Interior

DPR. Definite Plan Report

DRACR. Duchesne River Area Canal Rehabilitation Program

DWQ. Utah Division of Water Quality

DWRi. Utah Division of Water Rights

EIS. Environmental Impact Statement

EPA. Environmental Protection Agency

ESA. Endangered Species Act

FEIS. Final Environmental Impact Statement

FWCA. Fish and Wildlife Coordination Act

FWS. U.S. Fish and Wildlife Service

GLO. Government Land Office

HABS/HAER. Historic American Building Survey/Historic American Engineering Record

I/O. Input/output model

LDWP. Lower Duchesne River Wetlands Mitigation Project

LOS. Level of Service

MAD. Mosquito Abatement District

MOA. Memorandum of Agreement

Mg/L. Milligrams per liter (equivalent to ppm)

Mitigation Commission. Utah Reclamation Mitigation and Conservation Commission

MLWUA. Moon Lake Water Users Association

MSWMA. Mallard Springs Wildlife Management Area

MTC. Myton Townsite Canal

NAAQS. National Ambient Air Quality Standards

NEPA. National Environmental Policy Act

NRHP. National Register of Historic Places

NOI. Notice of Intent

NPDES. National Pollutant Discharge Elimination System

NRCS. Natural Resources Conservation Service (formerly the Soil Conservation Service)

O & M. Operation and Maintenance

ONWR. Ouray National Wildlife Refuge

PILT. Payment in Lieu of Taxes

ppb. Parts per billion

ppm. Parts per million

PRP. Provo River Project

PSD. Prevention of Significant (air) Deterioration

Reclamation. U.S. Bureau of Reclamation

RWIP. Riverdell Water System Improvement Project

SACS. Strawberry Aqueduct and Collection System

SHPO. Utah State Historic Preservation Office

SLE. St. Louis Encephalitis

SOP. Standard Operating Procedure

SVP. Strawberry Valley Project

Tribe. Ute Indian Tribe

TDS. Total Dissolved Solids

UBRP. Uinta Basin Replacement Project

uS/cm. Microsiemens per centimeter

WEE. Western Equine Encephalitis

WNE. West Nile Encephalitis

GLOSSARY

Acre-feet. A unit of measurement of volume of water, equivalent to an acre of water one foot deep.

Allotted Indian Lands. Land held in trust by the United States for individual Tribal members.

Alluvial. Formed by flowing water.

Alternative. A proposition or situation offering a choice between two or more proposals. An opportunity for deciding between two or more courses or propositions.

Ambient. Referring to conditions in the encompassing atmosphere.

Anastomosing. A stable, multiple-channel stream with vegetated islands.

Animal Units per Month (AUM). The amount of forage consumed by a cow and a calf in one month.

Aquifer. A subsurface body of water.

***Bacillus thuringiensis* (BTI).** A biological control agent.

Backwater. A hydraulic (flowing water) habitat type characterized by slackwater on the downstream side of meander bends.

Bankfull. Water flowing in a channel at the elevation of the channel banks. Any additional flow would cause water to leave the channel and overtop the banks.

Base flow. Late summer low stream flows.

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

Berm. A raised area or mound of material. For this project, the proposed berms are to be constructed of compactable earth and will be used to disperse water in the oxbows.

Bonneville Unit. One of six units of the Central Utah Project. The Bonneville Unit extends from Starvation and Upper Stillwater Reservoirs west to the Great Basin.

Candidate species. Any species for which substantial biological information exists to support the biological appropriateness of proposing to list the species as endangered or threatened under the Endangered Species Act.

Canopy coverage. A measure of the percent of ground covered by vegetation.

Class I Cultural Inventory. A professional study of existing data that includes a compilation, analysis and interpretation of all available archaeological, historic and paleoenvironmental data. Investigators conducting a Class I Inventory use all relevant data sources except extensive field work to gather new data.

Class II Attainment Area. An air quality category in which air is typically rated as good to excellent.

Class III Cultural Inventory. A professionally conducted continuous intensive survey of the entire area of potential effect. Detailed protocol must be followed for a Class III Cultural Inventory.

Cofferdam. A temporary dam constructed in a channel to isolate certain areas and keep them relatively dry during construction.

Conservation easement. An agreement between a resource agency and an individual landowner to protect specific resources on the land in exchange for monetary compensation. Under a conservation easement the individual landowner continues to hold fee title to the land.

Critical habitat. Specific areas that contain physical or biological features essential for the conservation of a listed species and that may require special management considerations or protection.

Crop. One of three categories developed by the Bureau of Indian Affairs to evaluate current uses of land. The *crop* category describes land currently in production for alfalfa, corn and/or small grains. See also *other* and *pasture*, the other two land use categories.

Cumulative effects. Defined by the Council on Environmental Quality as "the impact on the environment which results from the incremental impacts of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such action" (Section 1508.7).

Cyprinid. Any fish belonging to the minnow family (*Cyprinidae*).

Decibel. A unit for expressing the relative intensity of sounds on a scale from zero for the average least perceptible sound to 130 for the average pain level.

Detailed design. The final design of a project that includes engineering details and specific locations and measurements of all project features.

Draft Environmental Impact Statement (DEIS). See Environmental Impact Statement.

Ecosystem. A community of animals and plants and their interrelated environment.

Eligibility for the National Register of Historic Places (NRHP). A quality of cultural resource properties that meet the criterion for inclusion in the NRHP, determined by the BLM in consultation with the State Historic Preservation Officer (SHPO) and the Keeper of the National Register.

Eminent domain/condemnation. A process by which the federal government can acquire private land to complete a project.

Encephalitis. A virus carried by mosquitoes that can cause encephamyelitis.

Encephamyelitis. A disease caused by various strains of encephalitis viruses.

Endangered species. Any species that is in danger of extinction throughout all or a significant portion of its range.

Endemic. Native to a particular region.

Environmental Impact Statement (EIS). A document that discusses the likely significant impacts of a proposal, methods to lessen the significance of impacts and alternatives to a proposed action. This documentation is required by the National Environmental Policy Act.

Environmental justice. A requirement that federal agencies ensure that their actions do not have a disproportionally high and adverse human health or environmental effect on minority or low income populations. Low income is defined as income below the federal poverty guidelines.

Feasibility analysis. A preliminary analysis of a project to determine if it can be constructed within project parameters such as costs, acreage requirements, legal requirements and physical features.

Fee Owned Lands ("Homestead Lands"). Land owned by non-Tribal members within the boundaries of the Uintah and Ouray Indian Reservation as established in 1861 and amended in 1882.

Floodplain. The area covered by floodwaters from channel overflows. A floodplain is generally associated with a particular recurrence interval (e.g., a 100-year floodplain is the area covered by floodwaters from a 100-year flood).

Flow-through system. A wetland water management system designed to provide water in excess of the wetland water requirements to control salinity.

Foliar. Of or pertaining to a leaf.

Freeboard. The additional height provided by a berm as a safety factor to prevent overtopping.

Gradient. The land surface slope between two identified points.

Herbaceous. Non-woody vegetation.

Historic standing structure. A historic standing building with walls and roof still intact; also intact engineering structures such as canals, bridges and culverts.

Hydrograph. The pattern of river flows.

Hydrologic. Dealing with the properties, distribution and circulation of water.

Irretrievable and irreversible commitment of resources. Resources that would be permanently committed to a project and could not later be recovered.

Impoundment. Ponds created by constructing berms to restrict (i.e., impound) water flow.

Inlet. The opening to a waterbody.

Interim Duty Schedule. An agreement that allows water to be diverted into a given canal based on a rate of 4.0 acre-feet of water per irrigable acre.

Input/output model. A model that estimates multiplied economic effects resulting directly or secondarily from an initial stimulus to other economic sectors within any given defined economy (e.g., the Uinta Basin economy).

Interrelated projects. Projects that could cause cumulative impacts if any one of the alternatives, including the proposed action, was implemented.

Interspersion. The degree to which different habitat types are mixed within a given site.

Inverted siphon. A pipe used to convey water under an existing feature.

Levels of Service (LOS). A highway rating system that evaluates traffic flow patterns on various road segments.

Listed species. Any species listed by the U.S. Fish and Wildlife Service under the Endangered Species Act as threatened, endangered, candidate or proposed threatened or endangered.

Management change. A change in the management of a cover type without changing the cover type itself. Examples include the removal of grazing or protection from possible future threats through preservation.

Mean annual flood. Water flow that occurs on average every 2.3 years.

Meander. A bend in the channel alignment of a river or stream.

Mitigation. Compensation for adverse impacts of a project. Mitigation can include enhancement, restoration or creation.

Neotropical migratory songbirds. Birds that migrate to North America during the spring and back to the tropics or the southern hemisphere in the fall.

Nonconsumptive recreation. Wildlife-associated recreation that does not include hunting or fishing or other activities that would result in wildlife mortality for the purposes of sport or food consumption. Non-consumptive recreation includes observing, feeding and photographing wildlife.

Noxious weed. A plant species that is listed by either the State of Utah or an individual county that is mandated to be controlled under Section 4-17-3 of the Utah Noxious Weed Act.

Operating agreement. An agreement among lead agencies to identify areas of responsibility and authority, commit funding sources and identify management responsibilities once the project is constructed.

Other. One of three categories developed by the Bureau of Indian Affairs to evaluate current uses of land. This category describes all land that is not defined as crop or pasture. It includes non-irrigated land, wetlands, riparian areas and dry hillsides. Some lands in this category are grazed. See also *crop* and *pasture*, the other two land use categories.

Oxbow. The abandoned meander of a former river channel.

Parasite. An organism that obtains food, shelter or other life needs from another host organism without benefit to the host. An example of a parasite is the brown-headed cowbird, which disrupts the nest and eggs of another bird species and lays its own eggs for the host bird to raise. In this manner, the host bird expends resources (food, nursing, shelter) caring for the cowbird young believing them to be its own.

Pasture. One of three categories developed by the Bureau of Indian Affairs to evaluate current uses of land. This category describes lands consisting only of irrigated or potentially irrigated pasture. See also *crop* and *other*, the other two land use categories.

Payment in Lieu of Taxes (PILT). Federal payments made to counties to offset the costs of having non-taxable federal lands within their jurisdictions.

Perennial. A plant species that lives more than one year.

PM_{10}. Particulate matter and dust in the air less than 10 microns in diameter.

Point bar habitat. Riparian habitat typically underlain by a gravel or other coarse-textured substrate occurring in the 2- to 5-year floodplain of a river.

Point count technique. A bird survey technique that lists all birds observable at a randomly selected point for a specified period of time.

Prehistory. The study of the life and activities of humankind up to the beginning of recorded history.

Project area. The areas depicted in Chapter 1 of this DEIS.

Projectile points. Pointed projectiles usually made of chipped stone used 10,000 years ago as spear points and more recently as dart and arrow points.

Proposed Action. The proposal or proposed project by a lead agency in an EIS.

Proposed endangered species. Any species that has been proposed for listing as endangered under the Endangered Species Act.

Proposed threatened species. Any species that has been proposed for listing as threatened under the Endangered Species Act.

Raptor. Any species identified as a bird of prey including eagles, hawks, falcons and ospreys.

Reasonably foreseeable projects or actions. Those projects or actions that are identified and described in an appropriate public document that have a reasonable chance of being funded or approved.

Restoration. Returning the functions of a disturbed, degraded or altered site to its historical condition.

Riparian. Features of the environment (e.g., vegetation types) living in or located on the bank of a natural watercourse such as a stream or river.

Rip (a road). To loosen compacted soil to a depth of six to eight inches using mechanical equipment.

Riprap. Rocks used to protect and stabilize a stream or river bank to prevent erosion.

River miles. Along the Duchesne River, river miles indicate the distance along the river upstream from the confluence with the Green River.

Riverdell North property. Those lands acquired by the Bureau of Reclamation in 1990 where mitigation activities for the Duchesne River Area Canal Rehabilitation Program (DRACR) were to have been conducted. This parcel of land is within the LDWP project area, and is immediately adjacent to the Riverdell South property.

Riverdell North/South property. A term referring to both the federally-owned Riverdell North property and the Tribal Trust and fee land comprising the Riverdell South property.

Riverine. Flowing fresh waters (salinity less than 0.5 parts per thousand) with less than 30 percent persistent vegetation cover; of or relating to a river.

Rookery. A group of nest sites used every breeding season by colonial waterbirds such as herons.

Rotation croplands. Farms on which specific crops, such as corn, small grains or alfalfa, are produced in varying years.

Salt loading. A measurement of the amount of salt in a waterbody derived by multiplying the concentration of total salts in the water times the volume of water. Salt loading can be tabulated as a daily value (e.g., pounds per day) or as an annual value (e.g., tons per year).

Secondary channel. An active river side channel that carries river flow.

Sensitive receptors. Constructed establishments that are especially susceptible to noise impacts such as schools, nursing homes, hospitals and residences.

Sentinel chickens. A flock of birds maintained by the State of Utah in areas subject to encephalitis. The birds are repeatedly tested for the presence of encephalitis viruses to provide an early warning system for a potential disease outbreak.

Seral. A stage of succession in which the existing vegetation is replaced by different vegetation more suited to the new characteristics of the site.

Sill. A solid feature (typically concrete, wood or rock) extending across a channel to prevent down-cutting of the channel and maintain the bottom elevation at a given level; similar to a diversion dam.

Slough. A marshy area containing slowly-moving open water.

Soil quality. The combination of physical and chemical soil characteristics that determines the suitability for the production of food, feed, forage, fiber and oilseed crops.

Spillway. A structure in a dam or canal that allows water to overpour at a controlled location when water levels reach a maximum allowable level.

Substrate. Sediment particles that make up a stream or lake bottom.

Take. A term defined in the Endangered Species Act as an impact to threatened, endangered or candidate species through "harm, hunting, wounding, killing, or harassment." As further defined by the Act, harassment includes activities resulting in increased stress during critical life history stages such as nesting, migration or wintering.

Threatened species. Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Total Dissolved Solids (TDS). The amount of particulate matter suspended in water; usually expressed as a concentration with units of milligrams of suspended solids per liter of water.

Trans-basin diversion. A water diversion from one hydrologic drainage basin to another.

Transient room tax. A tax levied per nightly stay on persons using a hotel, motel, inn or other temporary lodging facility.

Tribal Trust. Indian Reservation land held by the United States on behalf of the Indian Tribe.

Trust Resources. Lands, minerals, hunting and fishing rights, water rights and other assets or property rights held by the United States for the use and benefit of Indian tribes.

Unavoidable adverse impacts. Adverse impacts to resources that remain after implementation of Standard Operating Procedures and mitigation measures.

Uresk Drain. A 2.5 mile drainage ditch constructed in 1936 to remove the high water table from the land southwest of Myton.

Wasatch Front. The western side of the Wasatch Mountains in Utah where most of the state's population is concentrated.

Waterfowl. Any bird that frequents rivers and lakes, especially a swimming bird.

Water quality control factor. Factors applied to wetland water budgets to account for the extra water required to flow through the wetland to prevent accumulation of salts.

Weed. A plant species that is undesirable, conflicts, restricts or otherwise causes problems with intended land-use goals and objectives.

Weir. A dam in a stream to raise the water level or divert its flow.

Wetland. An area inundated by surface or groundwater often enough to support, under normal circumstances, vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.

Wissiups Project. Former name for the Lower Duchesne River Wetlands Mitigation Project.

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Lower Duchesne River Wetlands Mitigation Project

Draft Environmental Impact Statement

APPENDICES

APPENDIX A

STANDARD OPERATING PROCEDURES

APPENDIX A: STANDARD OPERATING PROCEDURES

This section defines standard operating procedures (SOPs) for the LDWP. SOPs would be followed during construction and maintenance of the project to avoid, or minimize, adverse impacts to people and natural resources. The mitigation measures identified in section 4 are designed to avoid or minimize the adverse and significant impacts of the project expected to occur after the SOPs have been successfully implemented.

Agriculture

- Farm owners who may be affected by project construction would be notified of construction procedures and schedules to prevent conflicts with agricultural operations. Procedures to avoid conflicts with agricultural operations would be followed during construction to the maximum extent possible. Unavoidable damage to facilities would be replaced or restored during project construction. Farmers and/or landowners who experience additional unavoidable impacts on agricultural facilities and operations would be compensated for their direct cost of moving or reconstructing facilities.

Air Quality

- EPA's recommendations for aggregate storage pile emissions (AP-42, Section 11.2.3) would be followed to the extent feasible to minimize dust generated by the project. This would consist primarily of periodic watering of equipment staging areas and dirt roads used during construction.
- Construction machinery would be routinely maintained to ensure that engines remain tuned and emission-control equipment is properly functioning as required by law.

Aquatic Resources

- Heavy equipment use in stream beds and riparian areas during construction would be restricted to the construction of temporary access roads in the Uresk Drain and the re-connection of the Flume to the secondary channel, and potentially the Ted Flat North oxbow system to the Duchesne River. The duration of heavy equipment intrusion into the existing channel would be minimized to the extent possible and scheduled to avoid high flow periods.
- Impacts on aquatic resources can be avoided and minimized by following hazardous materials procedures included under the health and safety SOPs, revegetation and erosion control SOPs and wetlands SOPs.

Cultural Resources

- A detailed site inventory would be conducted for the selected project after the EIS process is completed and before construction is started. This would be conducted by cultural resource experts and concentrated in areas that are directly impacted by construction. Data would be recovered, and mitigation procedures used, when adverse impacts are unavoidable. A Programmatic Agreement among the DOI, Mitigation Commission, BIA, Ute Tribe and Utah State Historic Preservation Office would be executed prior to completion of the FEIS.

Environmental Justice

- Construction contractors would be required to give preference to members of the Ute Indian Tribe in hiring.

Energy Conservation

- Standard energy conservation measures would be used during construction, operation and maintenance (e.g., avoiding unnecessary idling, and keeping vehicles and equipment tuned and maintained).
- The shortest possible transportation routes would be used during construction to conserve fuel.

Health and Safety

- The Utah Occupational Safety and Health Act and the conditions of the Federal Occupational Safety and Health Standards would be followed during construction. Copies of these publications and the health and safety SOPs would be provided to project workers at construction sites.
- Onsite and offsite construction activities would fully conform with appropriate federal standards. These standards include the following items:
    - Good housekeeping practices for routine scrap removal from work sites
    - Proper handling, storage, use and disposal of toxic materials
    - Prohibiting use of alcohol, drugs and firearms
    - Restricting public access to work areas to the extent possible
    - Providing onsite training to employees exposed to hazards associated with work assignments
    - Weekly safety meetings conducted by supervisors for employees under their supervision

- Providing adequate first-aid supplies, trained personnel and emergency evacuation procedures
- Dissemination of information on the hazards of chemicals used, stored or produced in workplaces to employees, contractors, visitors and the public who could potentially be exposed
- Mandatory use of appropriate protective work clothing
- Use of dependable, trained and qualified signal and flag persons wearing high-visibility apparel for traffic control
- Adherence to a detailed fire protection plan (e.g., fuel storage and refueling facilities)
- Proper storage of materials used in construction
- Operation of equipment only by employees qualified to operate the type of equipment assigned
- Providing necessary barricades and posting for public protection before the start of excavation operations

Noise

- The location of all residences in the project area would be considered when scheduling construction activities with significant noise levels.
- Construction contractors would be required to follow federal noise exposure and hearing conservation standards and practices to protect potentially exposed project workers and the public from harmful noise levels.

Revegetation and Erosion Control

- Revegetation and erosion control SOPs would be used where project construction would disturb soil. Disturbed areas would be reclaimed to desired riparian, agricultural and upland plant communities within one year after construction. The contractor would be required to use specified plant materials and reclamation techniques.
- If possible, water levels within the oxbow systems would be managed during the first three to five years following construction to promote the establishment of desired wetland and riparian plants. This would allow the wetland and riparian vegetation to become established until it could provide erosion control.
- Revegetation and erosion control areas would be monitored and repairs made if necessary. Revegetated areas would be monitored for invasion of noxious weeds and other weed species, as required by Section 4.17.3 of the Utah Noxious Weed Act, and appropriate weed control measures implemented. These measures would include establishing a cover of desirable plant species as quickly as possible after

construction, interim seeding of topsoil stockpiles if they would remain barren for lengthy periods of time, completion of weed surveys during the fall and spring after initial seeding, applying pesticides or removing the weeds by hand before they develop seeds or spread roots, and applying pesticides in accordance with federal application and record-keeping requirements. Monitoring for revegetation success would be conducted for a minimum of three years following completion of initial revegetation. Appendix B provides the details of a noxious weed control program.

Threatened and Endangered Species

- Prior to construction, field surveys of construction impact areas within the selected alternative will be made for threatened and endangered species with potential habitat in the construction area. Riparian wet meadow habitats would be surveyed for Ute ladies'-tresses prior to planting with woody vegetation and planting would be restricted on any floodplain surfaces containing the species. Other requirements arising out of ESA Section 7 consultation will be implemented.
- Known Uinta Basin hookless cactus populations and other listed and candidate species or habitat found during pre-construction surveys will be fenced during construction to prevent inadvertent access.
- Temporary displacement of wintering bald eagles by construction activities in November through March (primarily weed control and planting) will be limited by scheduling late fall and early spring activities in areas away from key wintering roosts, as much as possible.

Transportation

- No staging areas for construction material and equipment will be allowed in residential areas. Heavy equipment and worker traffic will be required to use the designated truck route around Myton.
- Traffic control and other safety measures in construction and maintenance areas would be followed to minimize the risks of accidents to vehicles and pedestrians during construction and maintenance of the project.
- Roads damaged by project construction activities would be restored to at least the level that existed prior to construction.
- Deliveries of materials will be scheduled to avoid peak traffic periods, to the extent possible.

Visual Resources

- Disturbed areas would be landscaped to match existing and characteristic land forms. When feasible, disturbed areas would be recontoured and slopes rounded along berm edges to blend with surrounding natural contours.

- New plantings would be blended with natural vegetation at the edges, and would be configured to match existing vegetation patterns and provide horizontal and vertical/visual diversity.

Water Quality

- The SOPs described for aquatic resources also would help protect water quality.
- The hazardous materials procedures included under the health and safety SOPs and the erosion control SOPs would help avoid and minimize adverse water quality impacts.

Wetlands

- Direct and indirect impacts on wetlands would be avoided, unless there are no other practicable alternatives ("practicable" as defined in 40 CFR 230.3 means capable of being done, after taking into consideration cost, existing technology and logistics in light of overall project purposes). Procedures to avoid impacts would include protection of wetlands with silt fencing during construction and avoiding impacts on surface water and groundwater resources that serve as a source of water for wetlands.
- Heavy equipment in wetland areas would be operated on geotextile mats with gravel overlay to minimize soil and vegetation disturbance.
- When necessary, construction barriers would be installed to prevent unnecessary construction damage to adjacent wetlands.
- Wetland topsoil requiring removal would be stockpiled, replaced and disturbed areas would be graded to match previous contour elevations.
- Temporarily disturbed wetland areas would be revegetated with a mixture of native wetland plant species.

Wildlife Resources

- All construction facilities would be located and constructed to avoid the removal of large trees.
- To the extent feasible, construction activities on or around important game or non-game species habitat (e.g., deer fawning areas, raptor nests) would be scheduled to avoid the period of greatest use by these wildlife species.
- Impacts on wildlife resources can also be avoided and minimized by hazardous materials procedures included under the health and safety SOPs, the revegetation and erosion control SOPs and wetlands SOPs.

APPENDIX B

WEED CONTROL PLAN

APPENDIX B: WEED CONTROL PLAN

B.1 Introduction

Noxious weed control is an essential component of the LDWP and control of invasive plants is crucial for the overall success of the project. The State of Utah maintains a list of noxious weeds and a mandate that these plant species be controlled on public and private lands under Section 4-17-3 of the Utah Noxious Weed Act. At present, 18 species are listed as noxious weeds in the State of Utah; however, each county maintains its own list of noxious weeds.

The three species of greatest concern in the LDWP project area are Russian olive (*Eleagnus angustifolia*), tamarisk (*Tamarix ramosissima*) and perennial pepperweed (*Lepidium latifolium*). Although Russian olive is not on the State of Utah's noxious weed list, both Duchesne and Uintah counties have listed this species as noxious. Tamarisk does not appear on any noxious weed lists, but this species is a non-native invasive species. Perennial pepperweed appears on the State's noxious weed list.

Within the LDWP at this time, perennial pepperweed populations are relatively small. It is possible and advantageous to strive for eradication of this species in the project area. However, eradication is neither physically nor fiscally feasible for Russian olive and tamarisk. The goal for these species is, therefore, to prevent further expansion of the populations and to prevent reestablishment in planted riparian areas. Noxious weed control would take place during all phases of the project, from construction to operation and maintenance. This appendix describes methods for control of these species and provides a plan to prevent further spread of noxious weeds under the LDWP.

B.2 Noxious Weed Control

B.2.1 Construction Phase

B.2.1.1 Russian Olive and Tamarisk

All areas identified as dominated by Russian olive or tamarisk on aerial photos (greater than 30 percent canopy cover) are to be treated before and during construction. Treatment would occur for two successive years according to the timing of specific areas to be planted. Russian olive and tamarisk in a defined planting block of approximately 120 acres will first be treated in the fall, with riparian planting proceeding on the same block the following spring. Treatment methods may include applying Garlon 4™ to a newly cut stump, aerial spraying of Arsenal™ or mechanical removal of Russian olive and tamarisk.

B.2.1.2 Perennial Pepperweed

Chemical control with Escort™ has shown to be effective for this species. Escort ™ (or a similar chemical) would be used along the oxbows to be restored and for spot treatments along the Uresk Drain. Careful application of Escort™ is necessary since most perennial pepperweed populations occur close to water and regulations prohibit spraying of the chemical (including incidental drift) in water. Revegetation would occur shortly after treatment to prevent pepperweed reinvasion.

B.2.2 Operation and Maintenance

Cost estimates for noxious weed control were based on treatment of 25 acres per site per year for the life of the project. This equates to 100 acres per year for the Proposed Action (4 sites total), and 75 acres per year for the other alternatives (3 sites total). The operation and maintenance weed control goals would focus on:

- Eradication of perennial pepperweed
- Prevention of re-establishment of weeds in the planted areas
- Control of expanding populations of tamarisk and Russian olive

B.2.3 Other Weed Control Measures

Every weed control program should ideally consist of an integrated program of chemical, mechanical, biological (if available), and cultural methods to keep invasive species manageable. Additionally, a few simple procedures would be used to reduce the potential for noxious weed establishment and spread:

- Construction disturbance would be kept to a minimum to decrease the area of bare exposed soil. Noxious weeds are better suited than native plants to colonize bare soil. Any excess soil following construction would not be spread on the site to minimize areas of bare soil.
- Newly disturbed upland areas would be seeded with rapidly growing, innocuous species (such as Re-Green, annual rye) to minimize the length of time the soil is exposed. Disturbed wetland soil would be seeded with rapidly growing wetland species such as three-square bulrush and alkali bulrush.
- Any soil that may contain perennial pepperweed seed would be hauled off-site and disposed of properly. This soil would not be used in construction activities due to its potential to harbor noxious weed seeds.
- If necessary, water levels within the project site would be manipulated to flood out non-desirable species.
- Periodic mowing or high intensity grazing of grassland areas may inhibit re-establishment of Russian olive and tamarisk. Mowing should occur at least once

every three years to keep the saplings smaller than 1 inch in diameter. Care would be taken to avoid any desirable cottonwood saplings. All cuttings would be removed from the site to prevent re-sprouting.

B.2.4 Other Species of Concern

As in any construction project, the potential exists for other noxious weeds to become established. Particular species that would be of concern are Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*) and purple loosestrife (*Lythrum salicaria*). Additionally, cattails (*Typha latifolia*) and common reed (*Phragmites australis*) can also become a threat to the project as a whole. Although these species are considered native, they can become problematic for wildlife habitat enhancement efforts if allowed to become too thick. Additionally, a non-native hybrid of common reed has been shown to be spreading throughout North America (Saltonstall 2002). This non-native hybrid has been shown to be much more invasive and problematic than the native specie. If these or any other noxious weed species appear in the project area, they would be reported and treated immediately.

Monitoring of the site would be an essential part of the LDWP. Monitoring would detect noxious weed invasions early when it is most feasible (economically and physically) to eradicate undesirable species. Monitoring would also identify the survival rate of plantings and encourage timely replacement of dead plantings. Other weed control measures and monitoring plans will be detailed in the LDWP Comprehensive Conservation and Management Plan developed as part of the project operating agreements.

B.2.5 References

Saltonstall, Kristin. 2002. Cryptic invasion by a non-native genotype of the common reed, *Phragmites australis*, into North America. Proceedings of the National Academy of Sciences. 99(4): 2445-2449.

APPENDIX C

WETLAND FUNCTIONAL ASSESSMENT RESULTS

APPENDIX C: WETLAND FUNCTIONAL ASSESSMENT RESULTS

C.1 Introduction

Wetland functions and values were assessed for each of the proposed major wetland complexes within the LDWP project area. Because the ability of a wetland to perform certain functions is strongly related to its hydrogeomorphic position (Smith et al. 1995), two broad classes of wetlands were evaluated: riparian wetlands along the Duchesne River (riverine fringe) and non-riparian wetlands (palustrine depressional). The non-riparian wetland functions were evaluated using the NAI Wetland Evaluation Procedure (Normandeau Associates 1990), as modified to include criteria pertinent to the project area (such as the influence of ditches and irrigation return flows on hydrology). The NAI Wetland Evaluation procedure was developed to provide a rapid functional assessment technique based on hydrogeomorhpic setting and readily identifiable wetland topographic, hydrologic and structural characteristics. The model output provides a numeric value for each function, which is then converted to a ranking of low, medium or high.

As a rapid functional assessment procedure, the model output is useful for comparing the relative abilities of wetlands to perform certain functions based on their overall structure, but does not identify the actual performance levels. A relative functional assessment was used in this DEIS because (1) wildlife habitat is the focus of the mitigation project and wildlife benefits/adverse impacts and the results of detailed wildlife surveys are described in section 4.3 and supporting documents, (2) data is provided elsewhere in the DEIS for other functions (such as water quality maintenance) and (3) more detailed assessment methods will be used to identify how close the Proposed Action or alternatives are meeting specific goals listed in the LDWP Comprehensive Conservation and Management Plan. These methods will likely include use of the Habitat Evaluation Procedure and other direct measures of wetland function such as water quality sampling and flow measurements.

Riparian wetlands were evaluated qualitatively based on generally recognized functions of riparian wetlands (Briggs 1996, Brinson et al. 1995, Hauer et al. 2002). Riparian habitat was evaluated for the riparian shrub habitat as a whole, as the project proposes to restore riparian shrub habitat along the Duchesne River in a series of discrete floodplain surfaces, which would be difficult to evaluate independently. Cottonwood forest habitat was evaluated for each discrete planting block over 50 acres. The cottonwood forest evaluation units consisted of the Flume terrace, the Riverdell North terrace and the Ted's Flat North terrace.

C.2 Functions Evaluated

Wetland and riparian functions evaluated were (Table C-1):

- Hydrologic functions: Energy dissipation, Sediment stabilization, Flood flow attenuation, Ground water discharge/recharge, Downstream hydrological support.
- Biogeochemical Functions: Water quality maintenance (including both nutrient/contaminant retention and transformation).
- Biological functions: Wildlife diversity/abundance, Aquatic diversity/abundance.
- Social Values: Uniqueness and heritage, Aesthetics.

C.3 Functional Assessment Results

C.3.1. Baseline Conditions

C.3.1.1 Non-Riparian Wetlands

The existing wetlands have the potential to provide a variety of functions under baseline conditions (Table C-2). Most of the wetlands (except the Ted's Flat North Oxbows) have the ability to improve or maintain downstream water quality at a moderate level. In general, the wetlands have a low to moderate capability to provide wildlife habitat, due to the lack of vegetation diversity and interspersion, and the high degree of water level fluctuations associated with variability in irrigation return flow input.

The Goose Pond Wetland, Ted's Flat South Oxbows and the Swamp Wetland have a moderate to high capability to perform most functions, reflecting their lesser degree of hydrologic alteration, and the higher degree of existing vegetative diversity and interspersion. Conversely, the other three oxbow systems and remaining isolated wetlands have a low ability to perform almost all wetland functions, except water quality maintenance.

Table C-1. Summary of Characteristics Used in Evaluating Potential Wetland Functions.	
Function Group	**Key Evaluation Characteristics**
Non-Riparian Wetlands	
Hydrologic Functions	Topographic position, hydrologic regime, water level fluctuation, number and type of inlets and outlets, presence of constrictions, presence of ditches, surficial geology, water table slope, known artesian conditions, dominant vegetation class, vegetation density
Biogeochemical Functions	Hydrologic regime, basin slopes, number and type of inlets and outlets, presence of constrictions, flow velocity, duration and extent of seasonal flooding and/or soil saturation, presence of channelization, adsorphic properties of soil, wetland size, density and distribution of vegetation
Biological Functions	Dominant wetland type, number of wetland types, vegetation interspersion, interspersion of water and vegetation, plant species diversity, proportion of plants with known wildlife food value, vegetation density, water level fluctuation, size, degree of soil disturbance, salinity, variety of depths, dissolved oxygen concentration
Social Functions	Wetland type, number of wetland types, percent open water, access, local scarcity, beauty value, degree of management, presence of culturally important wildlife and plant species, support of species with restricted habitat requirements, presence within an area of high degree of wetland alteration
Riparian Habitats	
Hydrologic Functions	Frequency, depth and duration of overbank flooding, shrub density, herbaceous species density, presence of coarse woody debris
Biogeochemical Functions	Hydrologic regime, duration and extent of seasonal flooding and/or soil saturation, presence of channelization, adsorphic properties of soil
Biological Functions	Topographic complexity, frequency, depth and duration of overbank flooding, connectivity, dominance of native riparian species, presence of overhanging vegetation, habitat interspersion, number and type of vegetation classes, number of seral stages, presence of species with known wildlife or aquatic habitat value
Social Functions	Presence of culturally important wildlife and plant species, support of species with restricted habitat requirements, presence within an area of high degree of riparian alteration

C.3.1.2 Riparian Wetlands

The riparian habitats have a relatively low capability to perform hydrologic and biologic functions (Table C-3). This is due to a combination of two factors: (1) hydrologic alternation of the Duchesne

River, which has resulted in reduced frequency, depth and duration of overbank flooding and (2) a general low dominance of native riparian vegetation. The exception is the Ted's Flat North terrace, which contains an existing stand of mature cottonwoods. Under baseline conditions, the Ted's Flat North riparian habitat provides moderate wildlife habitat and a high degree of uniqueness/heritage value as this is one of only a few sites along the Duchesne River containing mature cottonwoods-a species with restricted habitat requirements, and one that is of high cultural value to the Tribe.

C.3.2 Changes in Wetland Functions and Values

C.3.2.1 Non-Riparian Wetlands

Under the Proposed Action, the ability of wetlands to perform a variety of functions is increased, with most of the wetlands rated as moderate to high for hydrologic support, water quality maintenance, flood flow attenuation, wildlife habitat, aquatic diversity, aesthetics and unique/heritage value (Table C-4). The increases in functional ability reflect the changes in hydrologic support from return flows to a stable water supply, changes in the size, shape and connectivity of wetlands, removal of ditches, increases in duration of soil saturation and increases in the number of vegetation types, interspersion, plant species diversity and plant density. There would be no decrease in any of the functions performed by the wetland complexes from baseline conditions.

C.3.2.2 Riparian Habitats

The value of the riparian shrub wetlands for energy dissipation and sediment stabilization would increase under the Proposed Action (Table C-5) as a result of increased shrub and herb densities and the potential for increased coarse woody debris input by planting cottonwoods on adjacent terraces. The cottonwood forest habitats would continue to remain of generally low value for hydrologic and biogeochemical functions as they are isolated from the floodplain and the LDWP would not change the Duchesne River hydrology. The greatest increase in functions would be that for (1) wildlife habitat, as cottonwoods and associated shrubs are planted, providing an increase in structural diversity, seral stages, and the wildlife food value of vegetation adjacent to the Duchesne River and (2) uniqueness/heritage values as the extent of cottonwood forest is increased. There would be no decrease in the functional ability of any of the riparian habitats under the Proposed Action.

As explained in section C.1, the following table provides the results of the assessment and converts those results into a ranking of low, medium or high.

Table C-2. Results of the Wetland Functional Assessment for Non-Riparian Wetlands under Baseline Conditions. Both the raw model output and the relative ranking for each function are listed.

Wetland Complex	Hydrologic Functions					Biogeochemical	Biological		Social	
	Energy dissipation[1,2]	Sediment stabilization[1,2]	Flood flow attenuation	Ground water	Hydrologic support	Water quality maintenance	Wildlife habitat/ productivity	Aquatic diversity[1,3]	Aesthetics[1]	Uniqueness /Heritage[1]
Uresk Drain										
Main Site	N/A	N/A	77 M	40 M	48 M	72 H	79 M	L	M	M
West Fields	N/A	N/A	59 L	36 L	36 M	56 M	51 L	N/A	L	L
Goose Ponds	N/A	N/A	79 M	50 M	24 L	73 H	107 M	M	M	M
Flume										
Flume Oxbows	N/A	N/A	59 L	34 L	30 M	56 M	71 L	L	L	L
Pit Wetland	N/A	N/A	71 M	51 M	20 L	57 M	79 M	L	L	L
Full Connector	N/A	N/A	74 M	28 L	2 L	0 L	0 L	N/A	L	L
Riverdell North/South										
South Oxbows	N/A	N/A	59 L	32 L	26 L	49 M	54 L	L	L	L
Ted's Flat North/South										
South Oxbows	N/A	N/A	60 M	48 H	52 M	54 M	76 M	L	H	L
North Oxbows	N/A	N/A	57 L	32 L	25 L	49 L	58 L	L	L	L
Swamp	N/A	N/A	80 M	48 M	52 M	76 H	113 M	M	M	H

[1] Assessed qualitatively; no numeric results [2] Only assessed if erosive forces present [3] Only assessed if open water present L = Low M=Medium H=High

Table C-3. Results of the Wetland Functional Assessment for Riparian Habitats under Baseline Conditions. Assessment was qualitative and only the relative ranking for each function is listed.

Riparain Complex	Hydrologic Functions			Biogeochemical	Biological	Social	
	Energy dissipation	Sediment stabilization	Flood flow attenuation/ Alluvial recharge	Water quality maintenance	Wildlife habitat/ Productivity	Aesthetics	Uniqueness/ Heritage
Riparian Shrub	M	M	L	L	L	L	L
Flume Terrace	L	L	L	L	L	L	L
Riverdell North Terrace	L	L	L	L	L	L	M
Ted's Flat North Terrace	L	L	L	L	M	M	H

L = Low M=Medium H=High

Table C-4 Results of the Wetland Functional Assessment for Non-Riparian Wetlands under the Proposed Action and Alternatives. Both the raw model output and the relative ranking for each function are listed.

Wetland Complex	Hydrologic Functions					Biogeochemical	Biological		Social	
	Energy dissipation[1,2]	Sediment stabilization[1,2]	Flood flow attenuation	Ground water	Hydrologic support	Water quality maintenance	Wildlife habitat/ Productivity	Aquatic diversity[1,3]	Aesthetics[1]	Uniqueness/ Heritage[1]
Uresk Drain										
Main Site	N/A	N/A	91 H	51 M	62 H	91 H	138 H	H	H	H
West Fields	N/A	N/A	91 H	52 M	38 M	86 H	71 L	N/A	L	M
Goose Ponds	N/A	N/A	84 M	49 M	58 M	82 H	113 H	M	H	H
Flume										
Flume Oxbows	H	H	91 H	52 M	62 H	86 H	135 H	H	H	H
Pit Wetland	N/A	N/A	77 M	51 M	20 L	61 M	138 H	M	H	M
Full Connector	N/A	N/A	95 H	54 M	20 L	85 H	96 M	N/A	M	H
Riverdell North/South										
South Oxbows	N/A	N/A	61 M	48 M	62 H	86 H	124 H	H	H	H
Ted's Flat North/South										
South Oxbows	N/A	N/A	61 M	48 M	62 H	57 M	134 H	H	H	H
North Oxbows	H	H	90 H	52 M	62 H	86 H	119 H	M	M	H
Swamp	H	H	91 H	52 M	62 H	86 H	145 H	H	H	H

[1] Assessed qualitatively; no numeric results [2] Only assessed if erosive forces present [3] Only assessed if open water present L = Low M=Medium H=High

Table C-5. Results of the Wetland Functional Assessment for Riparian Habitats under the Proposed Action and Alternatives. Assessment was qualitative and only the relative ranking for each function is listed.

Riparain Complex	Hydrologic Functions			Biogeochemical	Biological	Social	
	Energy dissipation	Sediment stabilization	Flood flow attenuation/ Alluvial recharge	Water quality maintenance	Wildlife habitat/ Productivity	Aesthetics	Uniqueness/ Heritage
Riparian Shrub	H	H	M	M	H	M	H
Flume Terrace	M	M	L	L	H	M	H
Riverdell North Terrace	L	L	L	L	H	H	H
Ted's Flat North Terrace	H	H	L	L	H	H	H

L = Low M=Medium H=High

APPENDIX D

LDWP DEIS IMPACT ANALYSIS METHODS

APPENDIX D:
LDWP DEIS IMPACT ANALYSIS METHODS

D.1 Introduction

Appendix D summarizes the methods used to analyze impacts for each resource listed in section 4 of the LDWP DEIS. Impact methods are presented by resource in the order in which they occur in section 4.

D.2 Wetland and Riparian Resources Analysis Methods

D.2.1 Assumptions

Baseline wetland and riparian habitat types and adjacent uplands and agricultural lands were identified based on 1997 aerial photographic interpretation and field verification. The 1997 conditions are used in this document to represent baseline conditions. Details of the 1997 habitat mapping can be found in WWS (1998).

D.2.2 Impact Analysis Methods

The baseline habitat types were digitized onto rectified orthophotos using the AutoCAD software program. The digitized habitat maps were used to evaluate direct project impacts. Potential direct adverse construction impacts were evaluated by digitally superimposing the location of physical project features (such as access roads, berms, and water control structures) and associated temporary impact areas over the habitat maps. Acres of impact by impact type (temporary or permanent) were calculated from the overlay.

Potential beneficial impacts through wetland creation, restoration or enhancement were calculated through a series of steps. The first step was to classify each mapped habitat polygon into more of the following categories based on field evaluation of each polygon:

- **Potential Wetland/Riparian Enhancement Sites**: Existing wetland or riparian habitats that could be improved through changes in water quality, changes in grazing, removal of wetland or riparian weeds, or increasing native species cover or diversity.
- **Potential Wetland/Riparian Restoration Sites**: Habitats along former oxbows, or the current or historic Duchesne River floodplain, that previously supported wetlands but either did not under baseline conditions or supported a highly altered wetland were noted. The historic condition of habitats were identified through review of 1936, 1939 and 1955 aerial photographs, mapping of old river channels by Brink and Schmidt (1986), and a 1939 soils survey of the project area. Typically, the habitats that historically supported wetlands that either did not support wetlands or supported

only highly degraded wetlands had been affected by changes in hydrologic support. Those habitats in which wetland hydrology mimicking historic conditions could be restored were identified as potential wetland restoration sites.

Potential cottonwood forest restoration sites were identified by mapping all degraded cottonwood forest polygons and other areas formerly supporting cottonwood forests on the historical aerial photographs that occurred within approximately 10 vertical feet of the Duchesne River low flow levels. Potential riparian shrub restoration sites were identified as those sites within the 2- to 5-year floodplain. Surveyed cross sections and associated hydrologic analyses (see WWS 1998) were used to identify these surfaces.

- **Potential Wetland/Riparian Creation Sites**: Upland habitats that, due to their location along an oxbow system or adjacent to an existing wetland, could be converted to wetland or riparian habitat were classified as potential creation sites.

Once existing habitats were classified as to their existing condition, their historic condition and their potential condition, a series of surveyed cross sections perpendicular to the oxbows were developed. The surveyed cross sections were used to estimate the lateral expansion of wetlands that could be expected once water was reintroduced and berms placed along the oxbows. Similarly, surveyed cross sections and a surveyed topographic map were used to estimate the expansion and/or changes in wetlands in the Uresk Drain with the proposed berm construction. WWS (2000) contains a more detailed summary of the cross sectional and topographic data.

Net changes in wetland and riparian habitats were identified by summing the acres of habitats to be created or restored and then subtracting the acres of permanent loss of habitats through physical feature construction. The acres of habitats to be enhanced were listed separately as these represent existing habitats in which the project would not change the extent of the habitat or change its hydrologic support but would increase its wetland values.

The acres of wetland and riparian weeds to be removed were identified by summing all habitat polygons in which Russian olive and tamarisk provided more than 30 percent canopy cover.

Methods for the analysis of wetland and riparian functions and values can be found in Appendix C.

D.3 Wildlife Resources Analysis Methods

D.3.1 Assumptions

Baseline conditions for wildlife resources were based on the summary of the following data sources:

- Field surveys conducted by the Tribe and FWS in the LDWP project area from November 1998 through August 1999 and summarized in Koehler (2000).

- Wildlife survey and habitat assessment results summarized in CUWCD (1996a), WWS (1998a) and Ammon (1997).
- Discussions with the Tribe Fish and Wildlife Office regarding wildlife resources on Tribal Trust lands.
- Mapping of habitat types in the project area based on 1997 aerial photographic interpretation and field verification, which is described in section D.2.

D.3.2 Impact Analysis Methods

The overall approach of the analysis was to first summarize the existing survey data regarding wildlife species and habitat use in the area, and then project these findings to probable habitat use in the project area both during and after construction.

Since most species require a diversity of habitats to successfully complete feeding, resting, nesting and migrating, multiple important supporting habitats used by each wildlife group were taken into account when conclusions were made regarding ultimate gains or losses of habitat. Therefore, adjacent habitat types were assessed in terms of function and value for each wildlife group to assist in the final determination of habitat gains and/or losses. This allowed an ecological approach to wildlife viability and management.

Wildlife habitat utilization was categorized based on grouping the wetland and non-wetland vegetation types into habitats of principal importance to the species identified. The three habitat categories include:

- Wetland associated wildlife: Includes wildlife primarily dependent upon wet meadow, emergent marsh, or open water.
- Riparian associated wildlife: Includes wildlife primarily dependent upon riparian shrub, cottonwood forest
- Upland associated wildlife: Includes wildlife primarily dependent upon cropland, annual weed/ fallow, desert shrub

Wildlife impacts were assessed by comparing changes in habitat quantity or quality under each alternative to the baseline conditions.

D.4 Threatened and Endangered Species Analysis Methods

D.4.1 Assumptions

Baseline habitat types were identified based on 1997 aerial photographic interpretation and 1997-1998 field verification. The 1997-1998 conditions are used in this document to represent baseline conditions. Details of the 1997 habitat mapping can be found in WWS (1998a) and habitat maps are on file with the Tribe Wetlands Office.

Soils and geologic formation characterization was based on data supplied by the Natural Resources Conservation Service (SCS 1959, NRCS 2002) and U.S. Geological Survey 1:250,000 geologic maps for the Salt Lake and Vernal quadrangles.

D.4.2 Impact Analysis Methods

The FWS identified the threatened, endangered and candidate species and any critical habitat that might occur within the project vicinity (see FWS letter in Appendix E). This letter identified all known listed species occurring within Uintah and Duchesne Counties. The first step in the impact analysis was to collect data on the known habitat and life history requirements, and distribution of the nine species on this list. Data sources used included consultation with individual species experts in the FWS Ecological Services Grand Junction and Salt Lake City offices, Utah Natural Heritage database, literature review including individual species listing proposals, recovery plans and status updates, the results of wildlife surveys conducted by the Ute Tribe and the FWS (Koehler 2000), and plant species lists and habitat characterizations made during the project feasibility analyses (WWS 1998a and 2000).

Once the data was compiled, a list was made of all species with known occurrences in or immediately adjacent to the project area. Data on species' habitat requirements were compared to habitats in the project area to identify if suitable habitat occurred for any of the species. A second list was then prepared identifying all species with known or potential habitat occurring in the project area and for which a detailed impact analysis would be conducted.

The factors considered in the detailed impact analysis varied slightly among plant, fish and wildlife species. The main factor considered for listed plant species was how, or if, the project would change occupied or potential habitat. Direct construction impacts on occupied or potential habitat were identified by overlying the proposed project features on the habitat maps. Indirect impacts through habitat conversion were based on the summary of which habitats would be converted to wetland or riparian habitats provided in section 4.2 and Koehler and Gamo (2000). Potential project impacts on listed wildlife species included evaluations of how the project would change habitats used for roosting, feeding, nesting and/or migration, as well as any impacts on key food sources. Habitats impacts were identified as described above for plants. Impacts on wetland food sources were based on data provided in the Wetland and Riparian Habitats analysis (section 4.2) and impacts on prey species were based on data provided in the Wildlife Resources analysis (section 4.3). For listed fish species, the main parameters of concern were potential impacts of the project on water quality and quantity and the potential for entrapment in the re-connected oxbows. Potential impacts through hydrologic changes were based on the hydrologic impacts analysis results found in sections 4.5 and 4.6. The potential for entrapment of listed fish species in oxbows was assessed based on the professional judgement of key FWS Colorado River fish researchers.

D.4.5 Water Resources Analysis Methods

D.5.1 Assumptions

The water resources analysis relies on water budgets developed for each proposed wetland. Water budgets were developed using standard hydrologic models (Maidment 1992) to estimate the wetland water requirement. These models and the input data required a number of assumptions. Proposed water budgets represent maximum demand and contain some assumptions that will require verification during final design. The following key assumptions were used to estimate water requirements. Full details of water budget analyses can be found in Basin Hydrology (1987), WWS (1998a) and WWS (2000).

- The wetland water requirement is equal to the amount of water lost through soil seepage, the amount of water required to meet evapotranspiration demands, and the water quality control factor. The equation summarizing this formula is:

  Water Requirement = Soil seepage PLUS (Evapotranspiration MINUS Effective precipitation) TIMES Water Quality Control Factor

- Soils in the project area are predominantly silty clays and clays but there is little measured soil permeability data. Estimated permeabilities of these soil range between 0.0001 inches/day to more than 0.34 inches/day. Water budgets were based on an estimated average permeability of 0.125 inches/day. Accounting for changes in wetland extent over the growing season (i.e., wet meadows will only have a high water table in the spring), total seepage loss is estimated at 2.81 acre feet/acre of wetland.
- Annual evapotranspiration was estimated at 3.4 acre-feet/acre based on evaporation data available from the Pelican Lake weather station.
- The water quality control factor represents 27 to 50 percent of the evapotranspiration rate (0.92 to 1.70 acre-ft per acre) depending on the quality of the inflowing water. The salinity control factor was applied only to the proposed open water, emergent marsh and wet meadow habitats.
- Total water requirements for individual habitats were identified as 7.1 acre feet/acre for open water, emergent marsh and wet meadow habitats, 3 acre-feet/acre for grasslands, and 4 acre-feet/acre for cropland. Mesic shrub habitats were assumed to be supported by lateral seepage from the adjacent wetlands.
- Non-consumptive uses of water include soil seepage losses and water used for salinity control in a flow through system. Non-consumptive uses represent 52.3 percent of the wetland water budget for open water, emergent marsh and wet meadow habitats. All non-consumptive use of water returns to the Duchesne River.
- Riparian shrubs would obtain their hydrologic support from the Duchesne River.
- Temporary irrigation for cottonwoods would require 0.73 acre-feet/acre of cottonwoods placed on 20 foot centers and 0.20 acre-feet/acre for cottonwoods on

40 foot centers for three years per planting block and up to 10 years on sites with large planted riparian areas such as Riverdell North and Ted's Flat.

- From 40 to 70 percent of existing wetlands in the project area are supported at least partially by irrigation. Water requirements include the water needed to maintain these wetlands in perpetuity.
- Cropland is not generally included in the proposed water budgets as cropland will be acquired under conservation easements with the water rights remaining with the landowner. The exception is for the Riverdell North property in which new cropland may be established and managed solely for wildlife.

The following key assumptions were used to identify water availability:

- Water would be supplied by the Duchesne River to reconnected oxbows only during high spring flows and would not represent consumptive use of irrigation water.
- All of the water rights associated with land in the project area, except those associated with the Riverdell North Property, are senior water rights with a diversion right of 4.0 acre feet of water per irrigable acre on an annual basis.

D.5.2 Impact Analysis Methods

The overall approach to identifying the water requirements of the Proposed Action and alternatives was to develop a database identifying water needs by habitat type for each site, or portion of a site if there were differences in hydrologic support or potential water sources. Components included in the individual sites or subsite water budgets were:

- Support for newly created or restored wetlands
- Support to maintain and enhance existing wetlands in perpetuity and improve water quality
- Non-consumptive use of water for water quality control or losses through seepage
- Continued irrigation of grasslands
- Temporary irrigation of cottonwoods.

The modeled individual site water budgets were then compared to the amount of water available through water rights appurtenant to the land purchased, leased or obtained under conservation easements for the LDWP. An impact was identified if (1) the water requirements exceeded the available water, potentially affecting the legal water rights of downstream users or if (2) the water requirements would require a change in water diversions.

Return flows to the Duchesne River from the LDWP include all non-consumptive uses of the water applied to the land in the project area. The LDWP would not change irrigation of existing lands in the project area, so there would be no change in return flows from existing cropland, pasture land or

wetlands. To identify the changes in return flows, the total acres of proposed created or restored open water, emergent marsh and wet meadow wetlands and the acres of existing wetlands that would be subject to increased flows for salinity control were tallied for the Proposed Action and alternatives and the non-consumptive use of water identified. All non-consumptive use of water was assumed to return to the Duchesne River (see section D.5.1).

D.6 Water Quality Analysis Methods

D.6.1 Assumptions

D.6.1.1 Water Quality Concentration and Physical Parameters

Water quality data has been collected within the water quality area of influence (i.e., the project area and the Duchesne River from Bridgeland to the confluence with the Green River at Ouray) by numerous studies. Each study targeted a different part of the project area of influence, with some studies focusing only on the wetlands in the project area, while other studies focused only on the Duchesne River or on the local irrigation system. Not all studies sampled all water quality parameters and data from multiple studies was necessary to characterize the baseline condition. The following studies were used to represent the baseline conditions for each component of the project area of influence (project area wetlands, canals providing water to the wetlands, Duchesne River).

- The water quality data collected in the project area between 1997 and 1999 by USGS (1998) and WWS (2000) represents the baseline water quality of the existing wetlands in the project area.
- The water quality data collected by the USGS (Mundoff 1977) and the CUWCD (1996b) represents the baseline water quality of the Duchesne River.
- The water quality data collected by the USGS (ReMillard et al. 1995) represents the water quality in the local canals that would be used to supply water to the project area.

Based on the above studies, the water quality parameters of concern are salinity, TDS, boron, temperature, dissolved oxygen and pH.

D.6.1.1 Salinity Loading

- The assumptions and methods used by Reclamation in their Salinity Control Program Policy apply to this project as far as completing estimates of salinity loading. These assumptions identify that rewatering of historic water sources and previously irrigated land do not contribute new sources of salts.
- The irrigation delivery records as displayed in Swanson (2003) represent the baseline conditions for current salinity loading to the Duchesne River.

D.6 .2 Impact Analysis Methods

D.6.2.1 Water Quality Concentration and Physical Parameters

The existing or baseline water quality conditions were based on the water quality data sources identified above. Potential water quality impacts of each alternative were identified by comparing the baseline water quality conditions to the conditions expected to be under the Proposed Action and alternatives.

Water quality impacts due to changes in concentrations of salts or contaminants were evaluated using a variation of a mass balance analysis. In general a mass balance analysis is used to identify the quality of water flowing out of a site given the quality and quantity of input water and losses due to evapotranspiration. In the LDWP project, the quality of the outflowing water was fixed at a not-to-exceed level of constituents, the evapotranspiration level was fixed by local weather data, and the quality of the inflowing water was known. The quantity of outflowing water in the equation, however, was changed to ensure that the outflow water quality remained at its desired level. To do this, individual water quality control factors were developed for each site based on the methods of Christensen and Low (1970) in which the baseline water quality of the inflow water, the baseline quality of the outflow water and the desired quality of the outflow water are used to identify how much non-consumptive water is necessary to be used in a flow-through system to meet the desired outflow water quality. The measured factors supplied in Christensen and Low (1970) were used to identify the amount of non-consumptive water needed to maintain the outflowing water of each wetland at either the baseline or reduced salinity levels. Once these factors were included in the water budgets, the outflowing water quality was assumed to meet the pre-set standard.

Changes in physical parameters (temperature, pH, dissolved oxygen) were assessed by comparing the physical parameters in the existing wetlands to those of the proposed water sources to identify any differences. Because differences in physical parameters were minor, impacts of the proposed changes on physical parameters were qualitatively assessed.

D.6.2.1 Salinity Loading

The salinity loading analysis used for this project followed the standard procedures used by Reclamation in evaluating projects. The equation used to identify both baseline salt loads and post-project loads is similar in that the equation uses three variables: current soil salinity (same for both baseline and post-project conditions), estimated upper and deep percolation rates (same for both baseline and post-project conditions), and acres on which water is to be applied or removed. Thus, the main equation variable that changes in this equation is the acreage to which water is applied.

This general equation can be summarized as:

Soil Salinity Factor TIMES Deep Soil Percolation TIMES Acres to be Irrigated

For the LDWP, NRCS identified that the entire project area fell within a category of soils capable of producing 2.58 tons of salt per acre foot of deep percolation water. The percolation loss was estimated as 50 percent of the water applied to an acre of land. The acres of land irrigated under baseline conditions was based on records of past diversion amounts and data provided in Swanson (2003).

D.7 Soils Analysis Methods

D.7.1 Assumptions

Baseline soil conditions were assumed to be consistent with soil characteristics described in the published soil survey for the project area (SCS 1959) and also consistent with other soil descriptions completed within the project area (WWS 1998a, WWS 2000, WWS and Basin Hydrology unpublished wetland data sheets).

D.7.2 Impact Analysis Methods

D.7.2.1 Soil Erosion and Stability

Construction plans were reviewed to identify the location of potential stream channel modifications, oxbow connections, berms, borrow areas and other areas in which soils might be disturbed during construction. Areas of potential soil disturbance were then examined to assess the potential impact of construction activities on soil erosion. SOPs associated with erosion issues were reviewed to assess their potential effectiveness once implemented.

D.7.2.1.2 Soil Productivity

Data were reviewed regarding the physical and chemical characteristics of the soil to evaluate soil productivity under baseline conditions. Potential changes in soil physical characteristics from construction activities were assessed by considering factors such as soil stratification, moisture, texture and topsoil attributes. Potential changes in soil chemistry were assessed by reviewing factors such as soil salinity and leaching rates. Changes in soil productivity were assessed by comparing baseline soil productivity rates to potential productivity rates following construction of the Proposed Action and alternatives.

D.8 Agriculture and Land Use Analysis Methods

D.8.1 Assumptions

The agricultural and land use analyses made the following assumptions:

- Project implementation will create permanent changes in the agricultural sector as grazing is eliminated from project lands and conservation easements restrict the amounts of marketable crop production on other lands.

- Lands in the project area consist of a mix of irrigated pasture land, dry pasture land and cropland. 1997 aerial photographs were used to identify the baseline status of individual parcels used in the agricultural analysis.
- The estimated number of AUMs which could be supported by pasture land in the project area, as well as, the current market value for AUMs and cropped hay was based on data provided by the BIA. This information was developed by field visits to individual parcels.
- Grazing in the project area is primarily devoted to cow/calf pairs during six months out of the year

Information on crop and livestock production in Duchesne and Uintah counties obtained from 2001 Utah Agricultural Statistics (Utah Agricultural Statistics Service 2001) was assumed to represent baseline conditions and market values in the two-county area.

D.8.2 Impact Analysis Methods

D.8.2.1 Livestock Grazing and Production

Changes in livestock production were assessed in terms of how local changes would affect total agricultural production in the two counties. The value of grazing in the project area under baseline conditions was based on the number of AUMs that the land supports, multiplied by the 2001 market value for an AUM of $15 (Hansen 2001). This figure provided an estimate of the monetary losses to the agricultural sector when grazing is eliminated from project lands.

Because the counties compile livestock data in terms of number of animals and the BIA production estimates are based on AUMs, a different methodology was used to evaluate what percentage of livestock production in the two counties would be lost as a result of project implementation. Grazing in the project area is primarily devoted to cow/calf pairs during six months out of the year. One AUM was estimated as equaling one cow/calf pair. Total AUMs on project lands were then divided by six to determine the number of cow/calf pairs that would be eliminated by project development. This figure was then compared to the total number of cow/calf pairs currently produced by the two counties.

D.8.2.2 Cropland and Crop Production

The value of crops produced on lands in the project area was determined by multiplying the estimated crop production per acre by the 2002 market value of the crop. With conservation easements on cropland, twenty percent of the crop would be left for wildlife use and not sold. Crop value under project conditions was determined by multiplying the pre-project value by eighty percent, the amount of crop that would be sold under project conditions. This amount was compared with the total value of crop production in the two-county area to identify how the local reduction in marketable yield would affect the agricultural economy.

D. 9 Socioeconomics Analysis Methods

D.9.1 Assumptions

Baseline socioeconomic conditions in Uintah and Duchesne counties were identified as those conditions existing in 2001. Baseline data was gathered from a variety of sources. The value of grazing lands, measured in animal units per month (AUMs) was taken from information supplied by the BIA. Statistics on population, employment, per capita income, total county economic output, agricultural output and income, and other direct economic measures were taken from the annual 2002 Economic Report to the Governor (GOPB 2002). Specific information on crop and livestock production and prices was found in reports prepared by the Utah Dept. of Agriculture and U.S. Dept. of Agriculture.

Statistical information on socioeconomic factors such as health, education, and law enforcement is not available. Information on the quality and availability of these public services was obtained through interviews with officials in agencies that provide these services. Information on county property taxes was obtained through discussions with state officials and local officials in the county assessor's office.

Information about socioeconomic conditions on the Uintah and Ouray Indian Reservation was Provided by the BIA. Due to high unemployment and relatively low personal income on the Reservation, the assumption was made that if the project generated any economic benefits to the Tribe, it would be considered significant.

D.9.2 Impact Analysis Methods

D.9.2.1 Economic Impacts in the Uinta Basin

Potential impacts to the Uinta Basin economy from project construction and operation were evaluated using a computer-generated input/output (I/O) model developed by the Governor's Office of Planning and Budget. This model utilizes 141 different categories of inputs to evaluate the total economic output of the Basin in any given year. For purposes of the LDWP analysis, two different periods were chosen for evaluation: one year during the construction period when employment and construction-related activities were at a peak, and one year during the maintenance and operation phase. All project-related activities expected to occur during either of those two periods were given a dollar value and assigned to one of the 141 categories in the I-O model. Economic losses that could be attributed to the project, such as losses in grazing fees, were also estimated and inserted into the model. The model was then processed to evaluate how these new economic inputs would affect baseline economic conditions in the Basin. The model provides predicted changes in three main variables: new jobs created, personal earnings, and total economic output in the Basin.

D.9.2.2 Population, other Socioeconomic Variables

Impacts on population, social services, and other socioeconomic conditions were evaluated qualitatively using professional judgment. The assumption was made that the project could affect population in the Basin if it created jobs that brought people in from other regions. Once population impacts were determined, social services were evaluated to determine whether they could handle any population impacts without experiencing a decline in the existing levels of service. Theoretically, the project could impact social services in the area in other ways, such as through increasing personal income, but such impacts would be minor and difficult to quantify.

Potential tax impacts on the Uintah and Duchesne counties were evaluated in several different ways. Expenditures associated with the project will generate small increases in transient room taxes, gasoline taxes and sales taxes. Potential changes in these taxes were evaluated qualitatively. Potential impacts to county property taxes as private land in the project area is acquired by the federal government were also evaluated. Current tax revenues on these lands was evaluated by determining their taxable value under the Farmland Assessment Act (Green Belt) and multiplying that value by the current tax rate of $0.013142. Federal and state officials were then consulted to determine whether or not these tax losses would be offset by payments-in-lieu-of-taxes (PILT) from the federal government.

D.9.2.3 Socioeconomic Impacts to the Uintah and Ouray Reservation

Socioeconomic data on conditions on the Reservation is incomplete and outdated, so impacts were assessed qualitatively, relying on professional judgment and evaluations provided by the BIA and others.

D.10 Public Health and Safety Analysis Methods

D.10.1 Assumptions

Habitats with the potential to produce mosquitoes include all habitats that are shallowly flooded for a portion of the growing season, including both wetlands and irrigated pastures. Baseline wetland habitats and irrigated agricultural lands were identified based on 1997 aerial photographic interpretation and field verification. The 1997 conditions are used in this document to represent baseline conditions. Details of the 1997 habitat mapping can be found in WWS (1998a).

D.10.2 Impact Analysis Methods

Baseline habitat types were digitized onto rectified orthophotos using the AutoCAD software program. The digitized habitat maps were used to classify habitats as to their potential to produce mosquitoes. All irrigated pastures, wet meadow and emergent marsh habitats were classified as potential mosquito-producing habitat. Other factors potentially affecting mosquito production, such as irregularly flooded hydrologic regimes, presence of stagnant water, water depths and dissolved oxygen concentrations were based on data presented in section 4.6.5 and wetland data collected in

1999 and presented in WWS (2000). The Mosquito Abatement District (MAD) in Duchesne and County provided data on the current methods of mosquito control and baseline acres treated by the MADs (Waite 2002).

The total acres of potential mosquito-producing habitats under the Proposed Action and alternatives were identified by summing the acres of wetlands to be created, restored, or enhanced and the number of acres of irrigated pasture under the project. The net changes in mosquito-producing habitat were obtained by subtracting the number of acres of wetland and irrigated pasture under baseline conditions from the number of acres of wetland and irrigated pasture under the project.

Local MADs were contacted to discuss how the Proposed Action and alternatives would change their abilities to treat potential mosquito-producing habitat. The potential for the LDWP to change three key mosquito treatment parameters were reviewed. The three factors were: (1) total and percent increase in acres MADs would need to treat and associated treatment costs, (2) whether or not the LDWP would allow access to potential mosquito-producing habitats and (3) any restrictions on treatment methods that would generally require a change in how MADs currently treat mosquitoes. Changes in these factors as a result of the LDWP were evaluated by comparing existing treatment methods and approaches, as defined by MADs, to those proposed in section 2.1.4.5 as part of an LDWP Operating Agreement.

D.11 Recreation Analysis Methods

D.11.1 Assumptions

Baseline recreation conditions were obtained by interviewing personnel of the Fish and Wildlife Department of the Ute Indian Tribe, members of the Tribe and management personnel of the Utah State Division of Wildlife Resources regarding recreation at Mallard Springs. It is assumed the information gathered from these interviews regarding recreation within the project area most accurately reflects the recreation resources within the project area at this time.

D.11.2 Impact Analysis Methods

Potential changes in recreation were evaluated by comparing the present level with the projected level of recreation use within the project area. Since quantitative data were not available for either present or projected level of use, qualitative information was used in conjunction with other attributes of the project area to estimate potential changes in recreation opportunities. These include the qualitative information gathered from interviews regarding present recreation use and Tribal goals for the project area, the rules and regulations regarding non-Indian access to Tribal Trust lands and the changes in parking accommodations within the project area.

D.12 Transportation Analysis Methods

D.12.1 Assumptions

The transportation analysis assumed that U.S. Highway 40, which is the main arterial route through the Uinta Basin, would be the primary route used by construction workers, management, equipment, and material transporters to reach the general project area around the town of Myton. There are other less-traveled roads in the impact area as well, such as Independence Road and River Road but use of these roads would be intermittent and unpredictable. Accordingly, impacts to these roads were evaluated qualitatively, but not quantitatively.

Nearly all workers and supervisory personnel are expected to be hired from communities within the impact area. Although there is a possibility of carpooling, a “worst case analysis” was used, assuming that there would be one construction worker per vehicle. There was no attempt to evaluate whether personnel on the project might be commuting on these same roads to other employment in the absence of the project. The majority of construction materials and other supplies will come from within the impact area and, if necessary, will be scheduled to avoid peak traffic conditions. However, for the analysis, construction deliveries were added to the total number of worker vehicular trips during peak periods on U.S. 40.

Traffic statistics were available only for segments of U.S. 40, and were taken from the Traffic Book 2000, compiled by the U.S. Department of Transportation. Baseline traffic volumes and road conditions for other roads in the area were evaluated through conversations with employees of the local highway departments.

D.12.2 Impact Analysis Methods

The impact analysis for transportation relied on the "Level of Service" (LOS) methodology developed for highway engineers. Highway segments were given one of five different ratings from A to E, depending on traffic volumes, vehicular speed, passing frequency, and other parameters. The analysis assumed that traffic increases generated by the project would be significant only if they caused a particular highway segment to fall into a lower LOS classification.

Various construction, management, and maintenance activities, as well as material deliveries, were identified to predict the number of daily vehicle trips these activities would generate during different phases of the project. This data was evaluated to determine what phase of the project would likely generate the greatest amounts of traffic, as well as the time of day when that traffic would occur.

Peak traffic estimates generated by the project were subsequently compared to traffic volumes on U.S. 40 to determine whether the project would cause a change in the LOS. Although daily traffic data is available for Highway 40, there is no time-of-day data available to evaluate morning and evening peak flows. Accordingly, local highway officials were consulted to evaluate what portion of the daily traffic volume occurs during the peak hours between 4:00 and 6:00 p.m. The maximum

number of daily trips generated by the project was then added to estimated high volume flows which occur on Highway 40 during the evening peak.

Impacts to smaller roads in the area were assessed qualitatively with input from local highway officials. Standard Operating Procedures (SOPs) for the project, such as a requirement to repair any highway damage caused by the project, were also taken into account in this evaluation.

D.13 Air Quality Analysis Methods

D.13.1 Assumptions

Typical emission factors defined by the U.S. Environmental Protection Agency (EPA) were used to represent emissions during construction of the Proposed Action and alternatives. A worst-case scenario was used in which all equipment that would potentially be used on the project would be running continuously eight hours per day for a nine month period.

D.13.2 Impact Analysis Methods

The Uinta Basin's status as an attainment area was confirmed and applicable air quality standards defined by contacting the staff of the Utah Air Quality Board. Information concerning construction procedures, schedules and equipment was provided by the project feasibility design team and summarized in chapter 2 of this DEIS. Typical EPA emission factors were defined and applied to determine the maximum emissions that would occur during construction over a one-year period. The projected air quality impacts of the project were reviewed to determine if the maximum allowable limits for attainment areas would be exceeded.

Results of the recreation and transportation impact analysis were used to assess potential air quality impacts related to the recreation impacts of the Proposed Action and alternatives. Unlike construction-related air quality impacts, these would not be subject to air quality regulations.

The proposed construction procedures and related SOPs were reviewed to assess the potential for dust impacts or emissions during construction.

D.14 Noise Analysis Methods

D.14.1 Assumptions

The noise impact analysis assumed that typical noise levels associated with construction activities during the Proposed Action and alternatives would be the same as those defined in the Handbook of Noise (EPA 1979), which in turn presumes that all noise mufflers on equipment are functioning properly. The analysis also assumed that sensitive receptors (locations especially susceptible to noise impacts, such as schools, hospitals, nursing homes and residences) would be in the same location when considering either baseline or proposed conditions.

D.15.1 Assumptions

The cultural resources analysis assumed that research and limited field assessment sampling of the impact area of influence in the Duchesne River corridor, would provide sufficient data to conduct the impact analysis for this document. The analysis also assumed an intensive cultural resources survey would be conducted in areas that would be disturbed by construction before beginning work. A Memorandum of Agreement (MOA) has been developed between the Tribe and other lead agencies to guide the intensive cultural resources survey and documentation of survey results.

D.15.2 Impact Analysis Methods

Analysis of potential impacts on cultural resources is based on research from pre-existing historical and prehistorical data for the impact area of influence. The research was conducted in July and August 2002 and the following major data sources were consulted for the Class I Inventory:

- Internet search of the BLM General Land Office records for Land Patents
- General Land Office plats for the townships contained within the project area, on microfilm at the BLM, Utah State Office Public Room
- Site file search at the Division of State History, Antiquities Section
- Internet search of the National Register of Historic Places (NRHP)

Baseline conditions were defined based on the results of the Class I survey. The location of features identified during the survey were plotted in relation to specific construction features, including locations of berms, intensive planting areas and areas subject to inundation to identify if any known cultural resources would be impacted by the project.

The Tribe reviewed the Tribal database to identity if there were any traditional or religious use areas within the LDWP project areas that would require further documentation or research.

APPENDIX E

THREATENED AND ENDANGERED SPECIES LISTS

ORIGINAL

United States Department of the Interior

FISH AND WILDLIFE SERVICE
UTAH FIELD OFFICE
2369 WEST ORTON CIRCLE, SUITE 50
WEST VALLEY CITY, UTAH 84119

DOI OFFICIAL FILE COPY
CUP COMPLETION ACT
RECEIVED
'03
7/7 ABS 1230

In Reply Refer To
FWS/R6
ES/UT
03-0972

July 1, 2003

Ronald Johnston
Program Director
CUP Completion Act Office
302 East 1860 South
Provo, Utah 84606-7317

Attn: Ralph Swanson

RE: Species List for Lower Duchesne River Wetlands Enhancement, Uintah and Duchesne Counties, Utah

Dear Mr. Johnston:

Based on information provided in your letter of June 30, 2003, below is a list of endangered (E), threatened (T), and candidate (C) species that may occur in the area of influence of your proposed action.

Common Name	Scientific Name	Status
DUCHESNE		
Uinta Basin Hookless Cactus	*Sclerocactus glaucus*	T
Ute Ladies'-tresses	*Spiranthes diluvialis*	T
Bonytail[4,10]	*Gila elegans*	E
Colorado Pikeminnow[4,10]	*Ptychocheilus lucius*	E
Humpback Chub[4,10]	*Gila cypha*	E
Razorback Sucker[4,10]	*Xyrauchen texanus*	E
Bald Eagle[3]	*Haliaeetus leucocephalus*	T
Mountain Plover	*Charadrius montanus*	PT
Western Yellow-billed Cuckoo	*Coccyzus americanus occidentalis*	C

UINTAH

Uinta Basin Hookless Cactus	*Sclerocactus glaucus*	T
Ute Ladies'-tresses	*Spiranthes diluvialis*	T
Bonytail[4,10]	*Gila elegans*	E
Colorado Pikeminnow[4,10]	*Ptychocheilus lucius*	E
Humpback Chub[4,10]	*Gila cypha*	E
Razorback Sucker[4,10]	*Xyrauchen texanus*	E
Bald Eagle[1]	*Haliaeetus leucocephalus*	T
Mountain Plover	*Charadrius montanus*	PT
Western Yellow-billed Cuckoo	*Coccyzus americanus occidentalis*	C

[1] Wintering populations (only four known nesting pairs in Utah).
[4] Critical habitat designated in this county
[10] Water depletions from any portion of the occupied drainage basin are considered to adversely affect or adversely modify the critical habitat of the endangered fish species, and must be evaluated with regard to the criteria described in the pertinent fish recovery programs.

The proposed action should be reviewed and a determination made if the action will affect any listed species or their critical habitat. If it is determined by the Federal agency, with the written concurrence of the Service, that the action is not likely to adversely affect listed species or critical habitat, the consultation process is complete, and no further action is necessary.

Formal consultation (50 CFR 402.14) is required if the Federal agency determines that an action is "likely to adversely affect" a listed species or will result in jeopardy or adverse modification of critical habitat (50 CFR 402.02). Federal agencies should also confer with the Service on any action which is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat (50 CFR 402.10). A written request for formal consultation or conference should be submitted to the Service with a completed biological assessment and any other relevant information (50 CFR 402.12).

Candidate species have no legal protection under the Endangered Species Act (ESA). Candidate species are those species for which we have on file sufficient information to support issuance of a proposed rule to list under the ESA. Identification of candidate species can assist environmental planning efforts by providing advance notice of potential listings, allowing resource managers to alleviate threats and, thereby, possibly remove the need to list species as endangered or threatened. Even if we subsequently list this candidate species, the early notice provided here could result in fewer restrictions on activities by prompting candidate conservation measures to alleviate threats to this species.

Only a Federal agency can enter into formal Endangered Species Act (ESA) section 7 consultation with the Service. A Federal agency may designate a non-Federal representative to conduct informal consultation or prepare a biological assessment by giving written notice to the Service of such a designation. The ultimate responsibility for compliance with ESA section 7, however, remains with the Federal agency.

Your attention is also directed to section 7(d) of the ESA, as amended, which underscores the requirement that the Federal agency or the applicant shall not make any irreversible or irretrievable commitment of resources during the consultation period which, in effect, would deny the formulation or implementation of reasonable and prudent alternatives regarding their actions on any endangered or threatened species.

Please note that the peregrine falcon which occurs in all counties of Utah was removed from the federal list of endangered and threatened species per Final Rule of August 25, 1999 (64 FR 46542). Protection is still provided for this species under authority of the Migratory Bird Treaty Act (16 U.S.C. 703-712) which makes it unlawful to take, kill, or possess migratory birds, their parts, nests, or eggs. When taking of migratory birds is determined by the applicant to be the only alternative, application for federal and state permits must be made through the appropriate authorities. For take of raptors, their nests, or eggs, Migratory Bird Permits must be obtained through the Service's Migratory Bird Permit Office in Denver at (303) 236-8171.

We recommend use of the *Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances* which were developed in part to provide consistent application of raptor protection measures statewide and provide full compliance with environmental laws regarding raptor protection. Raptor surveys and mitigation measures are provided in the Raptor Guidelines as recommendations to ensure that proposed projects will avoid adverse impacts to raptors, including the peregrine falcon.

If we can be of further assistance or if you have any questions, please feel free to contact Lucy Jordan, Fish and Wildlife Biologist, of our office at (801)975-3330 extension 143.

Sincerely,

For Henry R. Maddux
Utah Field Supervisor

cc: URMCC (Attn: Mark Holden)
FWMAO - Vernal (Attn: Larry Zeigenfuss)

APPENDIX F

CULTURAL RESOURCES DRAFT MEMORANDUM OF AGREEMENT

MEMORANDUM OF AGREEMENT
AMONG THE

UTAH RECLAMATION MITIGATION
AND CONSERVATION COMMISSION

UINTAH AND OURAY UTE INDIAN TRIBE

AND THE

UTAH STATE HISTORIC PRESERVATION OFFICE

REGARDING THE
UINTAH AND OURAY LOWER DUCHESNE WETLANDS MITIGATION PROJECT

WHEREAS the Utah Reclamation Mitigation and Conservation Commission (Commission) proposes to partially mitigate for the impacts on wetlands and associated wetland-wildlife resources resulting from construction and operation of the Strawberry Aqueduct and Collection System (SACS) by restoring, creating, and enhancing wetland and riparian habitat along the Duchesne River. This undertaking is described in the Uintah and Ouray Lower Duchesne Wetlands Mitigation Project (LDWP) Draft Environmental Impact Statement (2002) and in the Class I Overview prepared by Alpine Archeological Consultants (Chandler and Berry 2002); and

WHEREAS the Commission is the lead agency in the Project for purposes of compliance with Section 106 of the National Historic Preservation Act as amended (16 USC 470) and the U.S. Department of the Interior, and the Uintah and Ouray Ute Indian Tribe will work together to permanently acquire land required for project implementation and management ; and

WHEREAS the Commission has established that the area of potential effects (APE) for the LDWP as the land within the selected alternative that has been or will be acquired by fee or easement by the Federal government. These lands and are shown on the attached map; and

WHEREAS the Commission has determined that the Project may have adverse effects on historic properties that have not yet been identified within this APE; and

WHEREAS pursuant to 36 CFR 800.6(c)(2) the Commission has invited the Ute Tribe to sign this Memorandum of Agreement (MOA), because the Tribe will manage the project lands and the Tribe has historical ties and potential traditional cultural properties within the APE; and

WHEREAS the Commission has consulted with the Cultural Rights and Protection Department Director for the Uintah-Ouray Ute Tribe, Ms Betsy Chapoose, and she has verified that no Traditional Cultural Properties nor sacred sites are present within the project area;

NOW, THEREFORE, the Commission, the Ute Tribe, and the SHPO agree that the Commission and the Ute Tribe shall ensure that the following stipulations are implemented in order to take

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into account the effects of the Project on historic properties, and that these stipulations shall govern the Project until this MOA expires or is terminated.

STIPULATIONS

1. The Commission and the Ute Tribe shall insure that an intensive cultural resource inventory of the LDWP project area shall be completed prior to project implementation. Inventory and evaluation shall be limited to those areas where vegetation cover will allow for identification of historic properties.
2. On federal lands, the Commission and the Ute Tribe shall insure that a final report on the inventory and evaluation of historic properties, prepared in accordance with the Secretary of the Interior Standards and containing all supporting documentation (i.e., site forms, maps, and paleontological report), shall be submitted to the Utah SHPO and the Uintah and Ouray Ute Indian Tribe in a form acceptable for inclusion in SHPO records. Intermountain Antiquities Computer System (IMACS) or Historic Building forms, acceptable to the SHPO and containing high-quality photographs, shall be filed with the SHPO in hard copy format. The necessary encoding sheets shall be completed and filed for inclusion in the statewide database.
3. On tribal lands, the Commission and the Ute Tribe shall insure that a final report on the inventory and evaluation of historic properties, prepared in accordance with the Secretary of the Interior Standards and containing all supporting documentation (i.e., site forms, maps, and paleontological report), shall be submitted to the Uintah and Ouray Ute Indian Tribe in a form acceptable for inclusion in tribal records. Intermountain Antiquities Computer System (IMACS) or Historic Building forms containing high-quality photographs shall be filed with the Ute Tribe in hard copy format.
4. The Commission and the Ute Tribe shall ensure that a comprehensive Treatment Plan that will address the effects of the proposed undertaking on historic properties (including Traditional Cultural Properties) is prepared and implemented in consultation with the Parties hereto. The Treatment Plan shall identify the nature of the effects to which each historic property will be subjected and the treatment strategies proposed to avoid, minimize or mitigate the effects of the undertaking. The Treatment Plan shall also include a monitoring and discovery plan.
5. The Commission and the Ute Tribe shall ensure that all work carried out pursuant to this MOA is carried out by or under the direct supervision of a person or persons meeting, at a minimum, the Secretary of the Interior Professional Standards for Archaeology (48 FR 44739).
6. Any party to this MOA may propose to the Commission that the MOA be amended, whereupon the Commission and the Ute Tribe shall consult with the other parties to consider such an amendment.
7. If the terms of this MOA have not been implemented two years from date of signing, this MOA shall be considered null and void. In such an event, The Commission and the Ute Tribe shall notify the parties to this MOA, and if it chooses to continue with the undertaking, shall re-initiate review of this undertaking in accordance with 36 CFR 800.

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8. If either the Commission or the Ute Tribe determines that it cannot implement the terms of this MOA, or if the SHPO determines that the MOA is not being properly implemented, either the Commission, SHPO, or Ute Tribe may propose to the other parties to this MOA that the MOA be terminated. The party proposing termination shall so notify all other parties, explaining the reasons for termination and affording them at least 30 days to consult to try and resolve any objections or seek alternatives prior to termination. Should the consultation fail, any of the parties may terminate the MOA by notifying all other parties in writing. Upon termination, the Commission and the Ute Tribe shall either consult in accordance with 36 CFR 800 to develop a new MOA, or request the comments of the Advisory Council on Historic Preservation.

Execution of this MOA by the Commission, the Ute Tribe, and the SHPO and implementation of its terms, evidence that the Commission has afforded an opportunity to comment on the Project and its effects on historic properties, and that the Commission has taken into account the effects of the Project on historic properties.

UINTAH AND OURAY UTE INDIAN TRIBE

By:_____ Date:_____

UTAH RECLAMATION MITIGATION AND CONSERVATION COMMISSION

By:_____ Date:_____

UTAH STATE HISTORIC PRESERVATION OFFICER

By:_____ Date:_____

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UTE INDIAN TRIBE

UINTAH AND OURAY AGENCY

P.O. Box 190
Fort Duchesne, Utah 84026

In Reply:

INTEROFFICE MEMORANDUM

TO: Ronald A. Groves, LDWMP Manager Director

FROM: Betsy L. Chapoose, Cultural Rights and Protection Director

DATE: March 28, 2002

SUBJECT: Cultural and Archeological Background Review

I have reviewed the land located within your proposed project areas. At this time there are no cultural resources that will be impacted. As with all land disturbing project we ask that this department be notified in the event that any cultural resources are located and that all construction stop until a plan of action can be implemented. We will respond as quickly and appropriately as possible. If you have further questions I can be contacted at my office, 722-4992.

Bc

Cc: LDWMP File

MAPS

Maps 1 – 8

Available only in Hard Copy