

RECLAMATION

Managing Water in the West

Jordanelle Reservoir RMP Environmental Assessment

Jordanelle Reservoir
Bonneville Unit, Central Utah Project, UT
Upper Colorado Region
Provo Area Office

PRO-EA-11-005
PRO-FONSI-11-005

Final



U.S. Department of the Interior
Bureau of Reclamation

April 2012

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

The mission of Central Utah Water Conservancy District is to responsibly develop, conserve, and deliver water.

The mission of Utah Division of the Wildlife Resources is to serve the people of Utah as trustee and guardian of the state's wildlife.

The mission of the Utah Reclamation Mitigation and Conservation Commission is to formulate and implement the policies and objectives to accomplish the mitigation and conservation projects authorized in the Central Utah Project Completion Act in coordination with federal and state fish, wildlife and recreation agencies; local governmental entities; and the general public.

The mission of Utah State Parks and Recreation is to enhance the quality of life by preserving and providing natural, cultural, and recreational resources for the enjoyment, education, and inspiration of this and future generations.

This Resource Management Plan was prepared by the Franson Civil Engineers Consulting Team in cooperation with, and for, the Department of the Interior, Bureau of Reclamation, Upper Colorado Region, under Contract No. R10PC20544, Task Order No. R10PD40068, entitled, *Jordanelle Reservoir Resource Management Plan*.

Jordanelle Reservoir RMP Environmental Assessment

Finding of No Significant Impact

**Jordanelle Reservoir
Bonneville Unit, Central Utah Project, UT
Upper Colorado Region
Provo Area Office**

**United States Department of the Interior
Bureau of Reclamation
Upper Colorado Region
Salt Lake City, Utah**

**Provo Area Office
Provo, Utah**

**PRO-EA-11-005
PRO-FONSI-11-005**

In cooperation with

**Central Utah Water Conservancy District
Utah Division of the Wildlife Resources
Utah Reclamation Mitigation and Conservation Commission
Utah State Parks and Recreation**

April 2012

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PRO-FONSI-11-005

**FINDING OF NO SIGNIFICANT IMPACT
And Decision Document**

**Jordanelle Reservoir Resource Management Plan
Bonneville Unit, Central Utah Project
Wasatch County, Utah**

**United States Department of the Interior
Bureau of Reclamation
Upper Colorado Region
Provo Area Office
Provo, Utah**

Recommended by:

Kerry Schwartz
for Jeffrey M. D'Agostino
Chief, Environmental Group

4/16/12
Date

Concur:

Kerry Schwartz
Kerry L. Schwartz
Manager, Water and Environmental Resources Division

4/16/12
Date

Approved by:

Curtis A. Pledger
Curtis A. Pledger
Area Manager, Provo Area Office

4/16/2012
Date

BACKGROUND

The U.S. Bureau of Reclamation (Reclamation) prepared the Environmental Assessment (EA) for the Jordanelle Reservoir Resource Management Plan (RMP) to evaluate the effects of implementing the Jordanelle Reservoir RMP. The alternatives addressed in the EA are: No Action, a continuation of current management practices; Alternative A, moderate resource development that provides some improvements to most facilities around the reservoir; and Alternative B, maximum resource development that provides for an expanded variety of recreation opportunities in addition to those provided for in Alternative A.

The EA alternatives do not consider modifying reservoir operations. They do include plans to provide comprehensive land resource management options for the approximate 6,704-acre Project Management Area. This acreage includes Reclamation lands adjoining the reservoir, the water surface area, and the West Hills Wildlife Management Area (West Hills WMA). The 743-acre West Hills WMA, managed by the Utah Division of Wildlife Resources, is also included in the analysis because it is a component of the Bonneville Unit wildlife mitigation program, which includes wildlife mitigation for Jordanelle Reservoir.

FINDING

Reclamation has determined that implementing Alternative A, which was analyzed in the EA and presented in the RMP as the Proposed Action, will not have a significant impact on the quality of the human environment. It was determined that an environmental impact statement is not required. This decision was based on a thorough review of the EA and public comments received on the Draft EA. This decision is in accordance with the National Environmental Policy Act (NEPA) of 1969 (Public Law 91-90), as amended, and the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500-1508).

DECISION

Reclamation has decided to implement the Proposed Action as described in the RMP. This Proposed Action consists of the measures described under “Alternative A – Moderate Resource Development” in Section 2.3 of the EA. This action protects, to the extent possible, the environmental aspects mentioned in Chapter 3 of the EA (i.e. geology, soils, and mineral resources; water resources; water quality; air quality, climate, and noise; vegetation, wetlands, and noxious weeds; fish and wildlife resources; threatened, endangered, and special status species; visual resources; recreation; transportation and access; cultural resources; paleontological resources; Indian trust assets; hazardous materials; and sociological factors (environmental justice)).

REASONS FOR THE DECISION

A finding of no significant impact is based on the following:

1. The Proposed Action will have no significant effect on such unique characteristics as cultural resources, wilderness areas, wetlands, and riparian areas.
2. The environmental effects of the Proposed Action do not involve unique or unknown risks.
3. The Proposed Action is not likely to jeopardize the continued existence of endangered fish species known to occur in the area affected by the Proposed Action nor is it likely to adversely modify designated critical habitat.
4. The Proposed Action does not threaten to violate a federal, state, or local law, or requirements imposed for protection of the environment.

Reclamation has analyzed the environmental effects, public comments, and the alternatives in detail. Reclamation believes that the Proposed Action Alternative best meets the purpose and need described in the EA.

PUBLIC INVOLVEMENT AND CONSULTATION

Several approaches were used to assist with issue development for the management of resources in the Project Management Area. These included the formation of a Coordination Team, the creation of a project website, and holding two public meetings. Media releases were used to inform the public of the scheduled public meetings.

Coordination Team members consisted of representatives from the primary stakeholder organizations: Reclamation, Central Utah Water Conservancy District, the Department of Interior – Central Utah Project Completion Act Office, Utah Division of Parks and Recreation, the Utah Reclamation Mitigation and Conservation Commission, Utah Division of Wildlife Resources, the U.S. Fish and Wildlife Service, and Wasatch County. Several Coordination Team meetings were held throughout the development of the RMP and EA. Their purpose was to compile available documents; discuss issues, opportunities, and constraints; and develop the project alternatives identified in the EA. The Coordination Team was given the opportunity to review the RMP and EA documents prior to public release. Other agencies and entities were also consulted with during the process, including the Utah State Historic Preservation Office, Native American Tribes, the Utah Geological Survey, Utah Department of Environmental Quality, and the Bureau of Indian Affairs.

Public meetings were an important part of the public involvement process. The first was held on November 4, 2010 to present the purpose and process for developing the RMP and EA. The meeting provided an opportunity for members of the public to ask questions concerning the project and provide oral comments. A second meeting was held on October 27, 2011, during the public comment period for the Draft RMP and Draft EA. The public meetings were held at the Jordanelle State Park Hailstone Event Center.

To facilitate public involvement, a project website (<http://www.jordanellermmp.com>) was created and maintained during the preparation of the RMP and EA.

SUMMARY OF ENVIRONMENTAL IMPACTS

The expected environmental impacts of Alternative A (Proposed Action) are described in Chapter 4 of the EA. The environmental analysis considered potential impacts to geology, soils, and mineral resources; water resources; water quality; air quality, climate, and noise; vegetation, wetlands, and noxious weeds; fish and wildlife resources; threatened, endangered, and special status species; visual resources; recreation; transportation and access; cultural resources; paleontological resources; Indian trust assets; hazardous materials; and sociological factors (environmental justice). The environmental analysis indicates that the impacts will be temporary, short term, minor and/or mitigated by environmental commitments outlined in the EA.

ENVIRONMENTAL COMMITMENTS

The environmental commitments listed and described in Appendix A of the EA will be implemented to offset potential effects to environmental resources in the Project Management Area. Reclamation, in conjunction with its managing partners, will ensure that all the environmental commitments are met.

Jordanelle Reservoir RMP Environmental Assessment

**Jordanelle Reservoir
Bonneville Unit, Central Utah Project, UT
Upper Colorado Region
Provo Area Office**

PRO-EA-11-005

prepared by:

**Water & Environmental Resources Division
Bureau of Reclamation, Provo Area Office
Mr. Kerry Schwartz
Mr. Brian Joseph**

**Consultants
Franson Civil Engineers Inc.
Frontier Corporation USA
Henrie Engineering
Steve Noyes**

Final



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Bureau of Reclamation**

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Bonneville Unit, Central Utah Project, UT
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Provo Area Office**

**United States Department of the Interior
Bureau of Reclamation
Upper Colorado Region
Salt Lake City, Utah**

**Provo Area Office
Provo, Utah**

PRO-EA-11-005

In cooperation with

**Central Utah Water Conservancy District
Utah Division of the Wildlife Resources
Utah Reclamation Mitigation and Conservation Commission
Utah State Parks and Recreation**

April 2012

Preface

Reclamation determined that new resource data and/or new sampling studies, surveys, or monitoring studies would not be collected in preparation of this RMP. A conscious decision was made to use existing reports and documents to provide the background and baseline conditions for this RMP dating back to the 1979 Central Utah Project Bonneville Unit Municipal and Industrial System Final Environmental Statement and the 1987 Final Supplement to the Municipal and Industrial System Final Environmental Statement. It is understood that this information represents the conditions prior to the construction of Jordanelle Dam and Reservoir and is over 30 years old. Without current baseline information, the RMP provides as best it can to direct future work development and uses of the resources. It cannot however, go into enough detail to determine changing conditions without current baseline conditions, which are needed to detect any kind of actual change. As a result of this decision, it will be necessary in the future to determine the then current baseline conditions for any project requiring NEPA compliance.

The primary purpose of Jordanelle Reservoir is M&I water supply, so the lake surface will fluctuate significantly. The RMP does not consider modifying reservoir levels, river outlet releases, water operations or the management of water levels to manage the reservoir fishery. Rather, the RMP focuses on land resource management and how best to manage the lands and associated resources in a manner that is compatible and adaptable to the reservoir operations and its annually fluctuating water levels. Therefore, water operations including timing of water deliveries, flood control, water rights, water contracts, hydropower, and water quality would not be impacted in any way by any proposed actions of this document.

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Abbreviations and Acronyms

ac-ft	acre-feet
ac-ft/yr	acre-feet per year
APE	area of potential effects
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	best management practices
B.P.	before present
ca	approximately
CFR	Code of Federal Regulations
cfs	cubic feet per second
cy	cubic yards
CUP	Central Utah Project
CUPCA	Central Utah Project Completion Act
CUWCD	Central Utah Water Conservancy District
DEQ	Utah Department of Environmental Quality
DERR	Division of Emergency and Remedial Response
DJOA	Deer Creek/Jordanelle Reservoirs Operating Agreement
DOI	U.S. Department of the Interior
EA	Environmental Assessment
EIS	Environmental Impact Statement
EDRR	Early Detection Rapid Response
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEIS	final environmental impact statement
FES	final environmental statement
FONSI	Finding of No Significant Impact
FS	final supplement
GIS	geographic information system
IMP	inventory and monitoring program
ITA	Indian Trust Asset
JSSD	Jordanelle Special Service District
JTAC	Jordanelle Technical Advisory Committee
M&I	municipal and industrial
MCL	maximum contaminate levels

Environmental Assessment for
Jordanelle Reservoir Resource Management Plan

Mitigation Commission	Utah Reclamation Mitigation & Conservation Commission
MOA	Memorandum of Agreement
MW	megawatts
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
O&M	operation and maintenance
OHV	off-highway vehicle
PCPI	per capita personal income
PM	particulate matter
PRPA	Paleontological Resources Preservation Act
PRWUA	Provo River Water Users Association
PSD	Prevention of Significant Deterioration
PWC	personal watercraft
Reclamation	U.S. Bureau of Reclamation
RMP	Resource Management Plan
RV	recreational vehicle
SHPO	Utah State Historic Preservation Office
SIO	scenic integrity objective
SIP	Utah's State Implementation Plan
SR	state route or state road
State Parks	Utah Division of Parks and Recreation
SWPPP	Storm Water Pollution Prevention Plan
TDS	total dissolved solids
TMDL	total maximum daily load
UDNR	Utah Department of Natural Resources
UDOT	Utah Department of Transportation
UDWQ	Utah Division of Water Quality
UDWR	Utah Division of Wildlife Resources
ug/L	micrograms per liter
UGS	Utah Geological Survey
UPDES	Utah Pollutant Discharge Elimination System
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
WMA	Wildlife Management Area
WMP	Wildlife Mitigation Plan
WROS	water recreation opportunity spectrum

Contents

Page

Preface

Abbreviations and Acronyms

Chapter 1: Purpose and Need 1-1

1.1	Introduction.....	1-1
1.2	Need for Action.....	1-7
1.3	Location and General Description of Affected Areas.....	1-8
1.4	Description of Current Facilities.....	1-11
1.5	Related Actions and Activities.....	1-19

Chapter 2: Alternatives..... 2-1

2.1	Alternatives Development	2-1
2.2	No Action (required by NEPA)	2-3
2.3	Alternative A – Moderate Resource Development.....	2-4
2.4	Alternative B – Maximum Resource Development.....	2-10
2.5	Alternatives Considered but Eliminated from Further Study	2-16
2.6	Preferred Alternative (Alternative A)	2-16
2.7	Summary of Alternatives	2-17

Chapter 3: Affected Environment 3-1

3.1	Geology, Soils and Mineral Resources.....	3-1
3.2	Water Resources	3-9
3.3	Water Quality.....	3-17
3.4	Air Quality, Climate, Noise	3-21
3.5	Vegetation, Wetlands, Noxious Weeds	3-24
3.6	Fish and Wildlife Resources	3-37
3.7	Threatened, Endangered, and Other Special Status Species.....	3-41
3.8	Visual Resources.....	3-50
3.9	Recreation	3-53
3.10	Transportation and Access.....	3-57
3.11	Cultural Resources	3-58
3.12	Paleontological Resources	3-63
3.13	Indian Trust Assets	3-64
3.14	Hazardous Materials	3-65

3.15	Socioeconomic Factors (Environmental Justice).....	3-66
Chapter 4:	Environmental Consequences.....	4-1
4.1	Geology, Soils and Mineral Resources	4-1
4.2	Water Resources	4-7
4.3	Water Quality.....	4-8
4.4	Air Quality, Climate, Noise	4-12
4.5	Vegetation, Wetlands, Noxious Weeds	4-16
4.6	Fish and Wildlife Resources	4-19
4.7	Threatened, Endangered, and Other Special Status Species.....	4-25
4.8	Visual Resources.....	4-31
4.9	Recreation	4-33
4.10	Transportation and Access.....	4-40
4.11	Cultural Resources	4-42
4.12	Paleontological Resources	4-43
4.13	Indian Trust Assets	4-44
4.14	Hazardous Materials	4-44
4.15	Socioeconomic Factors (Environmental Justice).....	4-45
4.16	Cumulative Impacts	4-46
Chapter 5:	Consultation and Coordination	5-1
5.1	Coordination and Public Involvement	5-1
5.2	Additional Agencies Contacted	5-2
5.3	Native American Consultation.....	5-3
5.4	List of Preparers.....	5-3
Chapter 6:	References & Glossary	6-1
6.1	References.....	6-1
6.2	Glossary of Terms.....	6-9

Appendices

Appendix A: List of Environmental Commitments

Appendix B: Distribution List

Appendix C: Public Comments and Responses

List of Figures

Chapter 1: Purpose and Need

Figure 1-1: Location Map	1-2
Figure 1-2: Bonneville Unit Map.....	1-3
Figure 1-3: Project Vicinity Map.....	1-5
Figure 1-4: Management Areas	1-9
Figure 1-5: Existing Hailstone Recreation Area.....	1-13
Figure 1-6: Existing Ross Creek Recreation Area.....	1-15
Figure 1-7: Existing Rock Cliff Recreation Area	1-17

Chapter 2: Alternatives

Figure 2-1: Proposed Hailstone Recreation Area Alternative	2-23
Figure 2-2: Proposed Crandall Point & Northwest Shore Alternatives.....	2-25
Figure 2-3: Proposed Ross Creek Recreation Area Alternatives.....	2-27
Figure 2-4: Proposed Rock Cliff Recreation Area Alternatives	2-29

Chapter 3: Affected Environment

Figure 3-1: Geologic Map.....	3-3
Figure 3-2: Soils Map	3-5
Figure 3-3: Provo River Daily Inflow to Jordanelle Reservoir.....	3-11
Figure 3-4: Provo River Annual Inflow to Jordanelle Reservoir.....	3-12
Figure 3-5: Releases from Jordanelle Reservoir	3-12
Figure 3-6: Theoretical Reservoir Elevations	3-16
Figure 3-7: Historical Reservoir Elevations	3-16
Figure 3-8: Drainages into West Side of Jordanelle Reservoir.....	3-19
Figure 3-9: Project Management Area Vegetation Map.....	3-29
Figure 3-10: Primary Activity at Jordanelle State Park	3-55
Figure 3-11: Annual Visitation to Jordanelle Reservoir	3-68
Figure 3-12: Average Monthly Visitation.....	3-68
Figure 3-13: Wasatch County Population Trend	3-70
Figure 3-14: Education Attainment	3-73

List of Tables

Chapter 2: Alternatives

Table 2-1: Summary of Alternatives.....	2-19
---	------

Chapter 3: Affected Environment

Table 3-1: Soil Limitations	3-7
Table 3-2: Water Rights Associated with Jordanelle Reservoir	3-10
Table 3-3: Jordanelle Reservoir Capacity Allocation.....	3-15
Table 3-4: General Habitat Types in the Project Management Area.....	3-25
Table 3-5: Noxious Weed List for Wasatch County, Utah.....	3-31
Table 3-6: Listed Threatened, Endangered, & Candidate Species	3-42
Table 3-7: Jordanelle State Park Revenues and Expenditures.....	3-57
Table 3-8: Regional County Populations.....	3-70
Table 3-9: Wasatch County Race/Ethnic Distribution.....	3-71
Table 3-10: Unemployment Rates	3-72
Table 3-11: Poverty Rates.....	3-72
Table 3-12: Household Characteristics.....	3-73

Chapter 4: Environmental Consequences

Table 4-1: Impacts Table	4-51
--------------------------------	------

Chapter 1: Purpose and Need

This Environmental Assessment (EA) is prepared in compliance with the National Environmental Policy Act of 1969 (NEPA) to analyze the potential effects of implementing a Resource Management Plan (RMP) for Jordanelle Reservoir and associated facilities and resources (Jordanelle Project). The location of Jordanelle Reservoir is shown in Figure 1-1. The Jordanelle Project was planned and constructed by the Bureau of Reclamation (Reclamation); and the dam and reservoir operations are currently managed by the Central Utah Water Conservancy District (CUWCD). The RMP will address the management of resources associated with the reservoir but it will not address any issues related to the actual operation of the dam and reservoir.

1.1 Introduction

Jordanelle Reservoir is the primary feature of the Municipal and Industrial System (M&I System) of the Bonneville Unit of the Central Utah Project (CUP). Located on both sides of the Wasatch Mountains in central and northeastern Utah, the Bonneville Unit is the largest and most comprehensive water project in Utah's history. The Bonneville Unit collects and distributes water in both the Uintah Basin of eastern Utah, and the Bonneville Basin of central Utah. The Bonneville Unit, which provides water for irrigation and municipal and industrial uses, was divided into separate systems, as shown in Figure 1-2. Other features include the Olmsted, Jordan, and Alpine Aqueducts; Trial, Washington, and Lost Lakes, which are 3 small reservoirs at the headwaters of the Provo River that are operated to provide storage for service areas in Summit County above Jordanelle Reservoir; and other stabilized reservoirs whose water was moved by change application to Jordanelle.

Developing the Jordanelle Project included the acquisition of land for the dam and reservoir, relocation of roads around the reservoir, and construction of the dam and appurtenant facilities. The Jordanelle Project was completed in April 1993. CUWCD has operated the dam and reservoir since that time; while the Utah Division of Parks and Recreation (State Parks) has managed the recreation and public use areas around the reservoir.

The primary purpose of the Jordanelle Project is to develop water for municipal, industrial, and agricultural purposes in Salt Lake, Utah, and Wasatch Counties. Secondary purposes include recreation, fish and wildlife, flood control, and power. Power generation at Jordanelle Dam is authorized by the U.S. Department of the Interior (DOI) under a "lease of power" privilege. The purpose of the RMP is to identify management measures that enhance resource management and achieve an improved future condition, at the same time protecting the primary

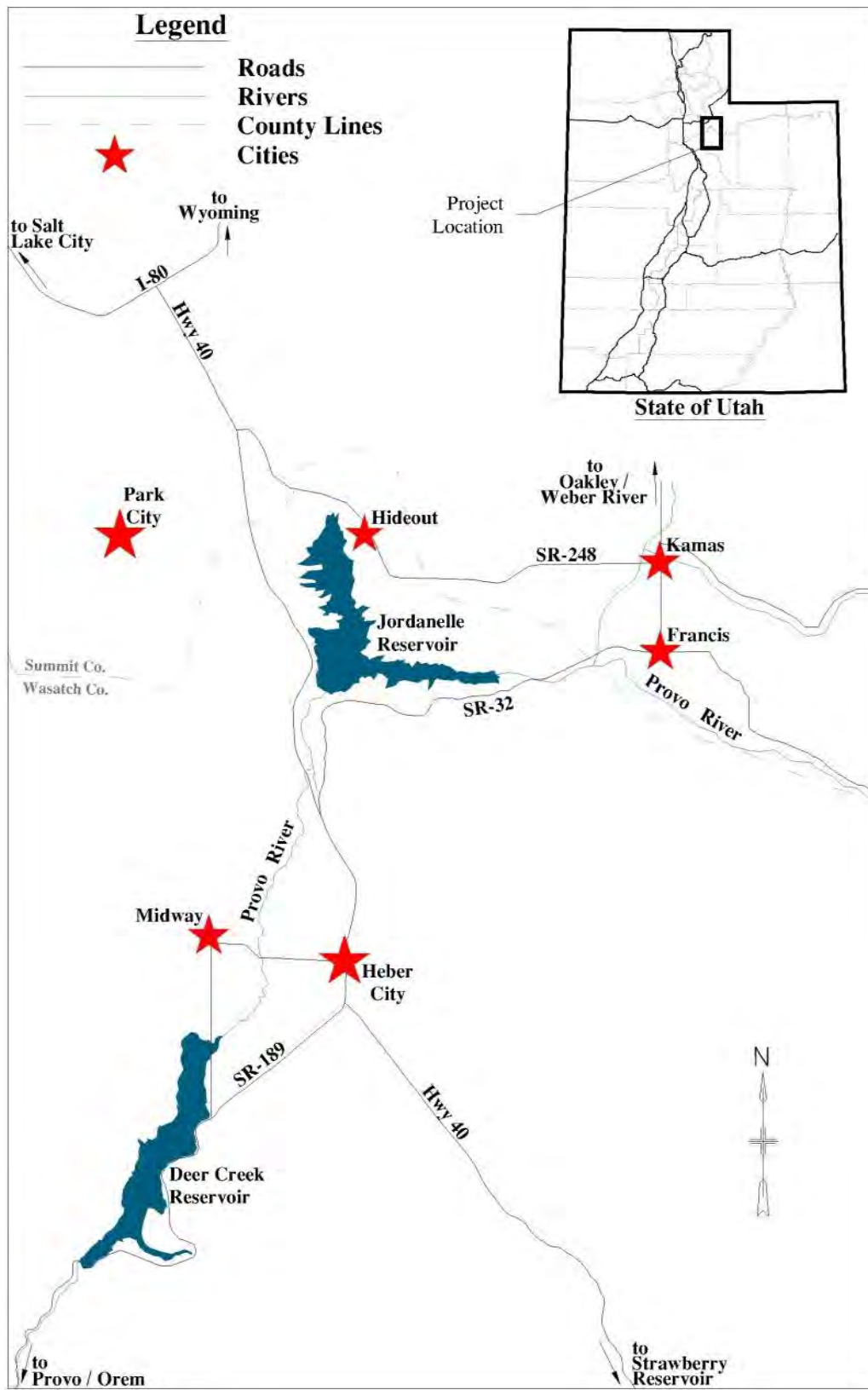
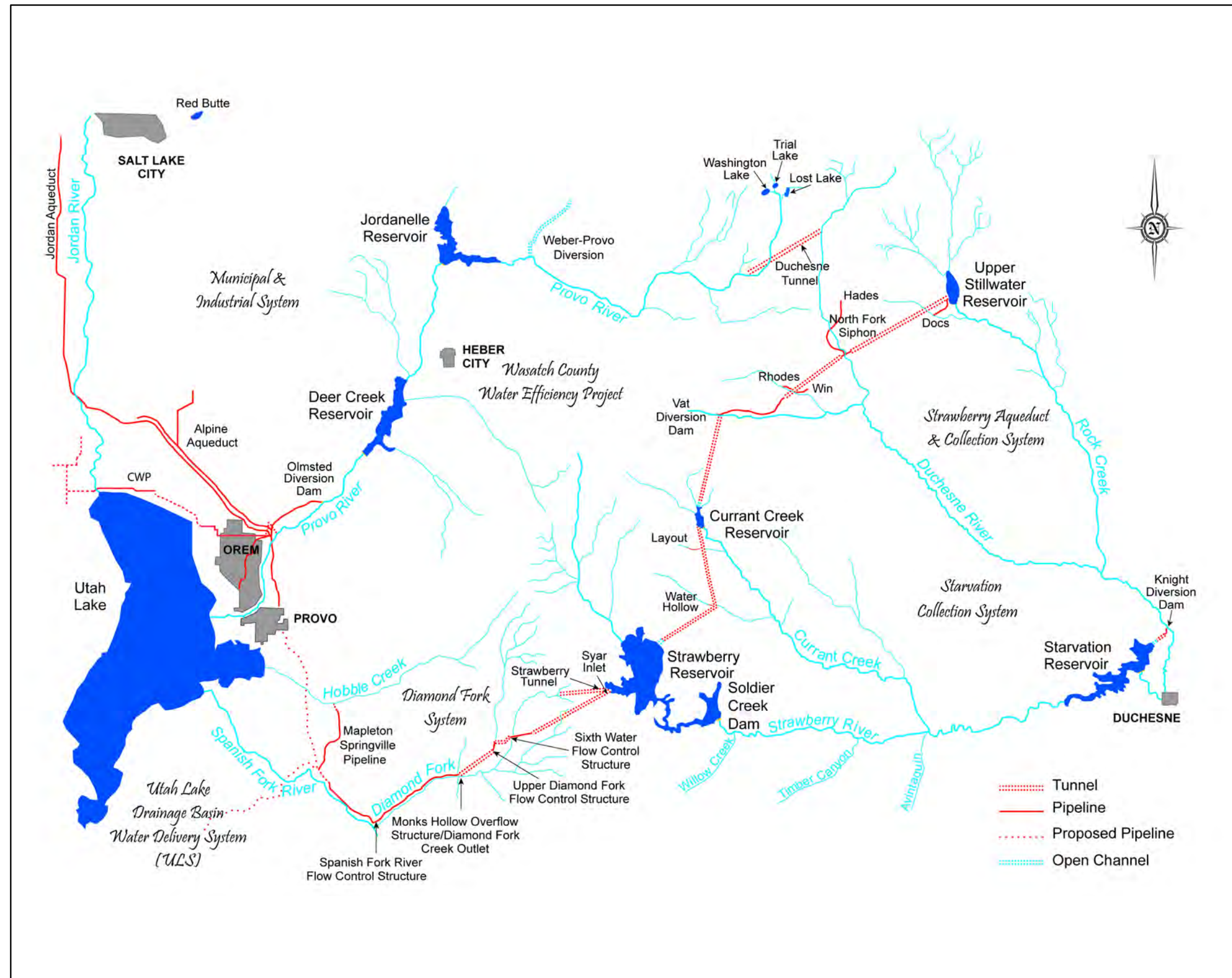


Figure 1-1: Location Map



Map Courtesy of CUWCD

Figure 1-2: Bonneville Unit Map

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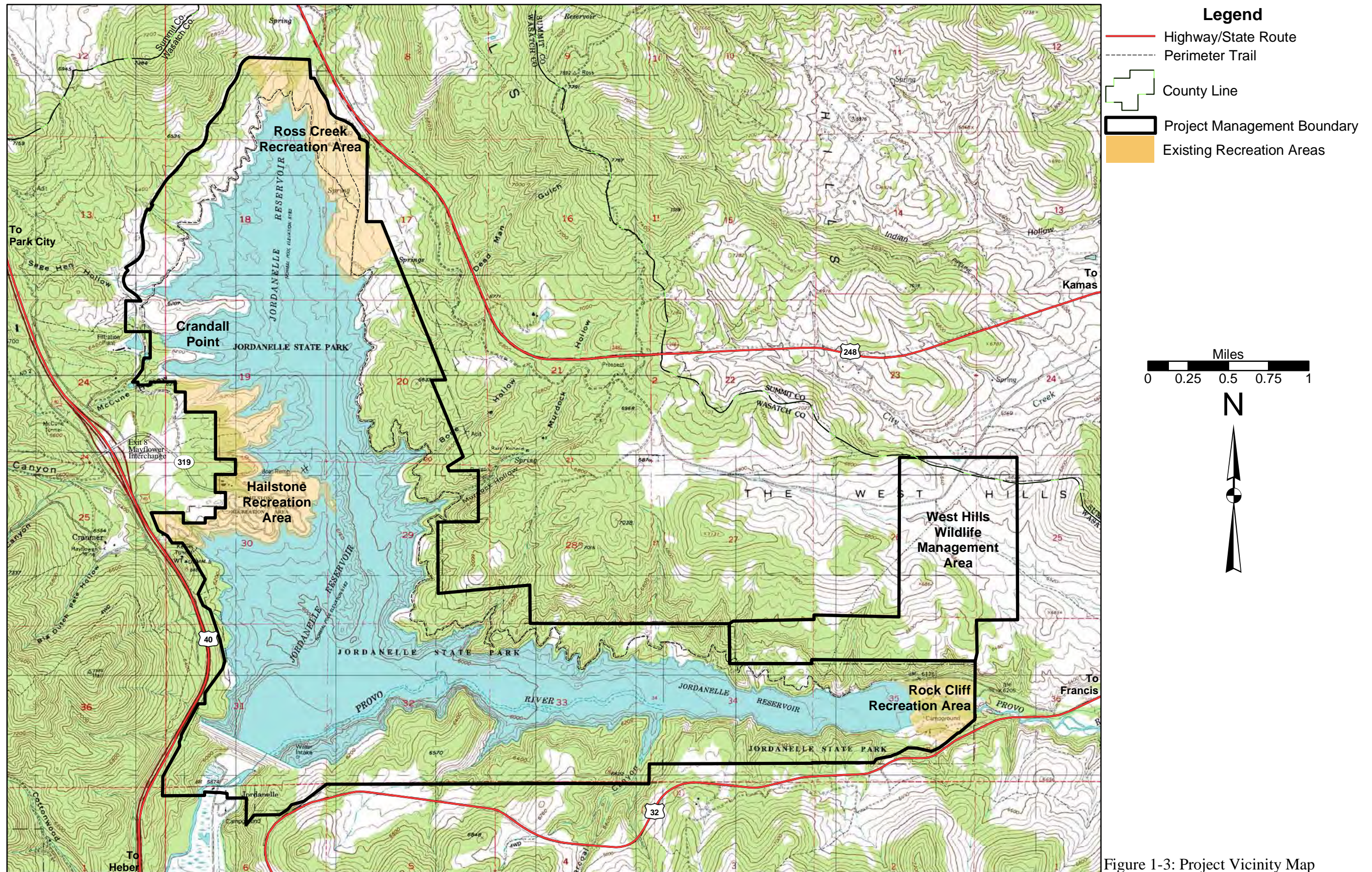


Figure 1-3: Project Vicinity Map

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purpose and possibly enhancing the secondary purposes of the project. Water operations including timing of deliveries, flood control, water rights, water contracts, hydropower, and water quality would not be impacted in any way by any proposed actions of this document.

Reclamation has prepared this EA to comply with NEPA procedural requirements, according to Public Law 91-90, as amended; and to comply with the Council on Environmental Quality and Department of the Interior regulations implementing NEPA. This EA analyzes the potential impacts of each proposed action in comparison with a no action alternative. As required by the NEPA implementing regulations, if potentially significant impacts to the human environment were identified, an environmental impact statement would have been prepared. Since no significant impacts were identified, Reclamation issued a Finding of No Significant Impact (FONSI).

The intent of this EA is not to analyze impacts for specific resource management actions. Some alternatives presented in the RMP may require additional compliance with NEPA prior to implementation of that specific action.

1.2 Need for Action

The Jordanelle Project was completed in 1993 and has been in operation since that time. During the 18 years of operation, a number of issues and concerns have been raised with respect to the management of lands and resources associated with the project. In order to most effectively address these issues and concerns, a coordination team was formed as part of the RMP/EA scoping process. Coordination team members consisted of representatives from the primary stakeholders: Reclamation, CUWCD, the U.S. Department of the Interior – Central Utah Project Completion Act (DOI-CUPCA) office, State Parks, the Utah Reclamation Mitigation and Conservation Commission (Mitigation Commission), Utah Division of Wildlife Resources (UDWR), U.S. Fish and Wildlife Service (USFWS), and Wasatch County.

Issues and concerns identified by the coordination team are listed below. These issues are addressed in the RMP and this EA.

- Protect the primary purpose of the Jordanelle Project to deliver water for municipal, industrial, and agricultural purposes;
- Protect the secondary purposes of the Jordanelle Reservoir, which include recreation, fish and wildlife, flood control, and power;
- Protect water quality;
- Honor existing contracts and agreements, including but not limited to water delivery, flood control, and power contracts; and

- Protect the ability of Reclamation and/or CUWCD to enter into future contracts with third-party entities to enhance the primary and secondary project purposes within Reclamation law and the scope and authorization of the Jordanelle Project.
- Providing high quality recreation opportunities that have minimal operation and maintenance costs and assist the park in becoming financially self-sufficient.
- Retrofitting existing recreation facilities to eliminate functional deficiencies and more fully meet public expectations.
- Developing new facilities and infrastructure that are well designed, well maintained, appropriately budgeted, feasibly staffed, and consistent with the area's natural aesthetics.
- Maintaining the area's natural landscape and visual resources.
- Providing educational opportunities and fostering public awareness for natural resources conservation and protection.
- Conserving wildlife habitat values in accordance with Reclamation's existing mitigation commitments.
- Protecting federally-listed threatened and endangered species and conserving habitat for other species of special concern.
- Protecting against the introduction and spread of noxious weeds and invasive aquatic species.
- Protecting wetlands values.
- Protecting, preserving, restoring, recognizing, and interpreting cultural and paleontological resource sites.
- Developing and providing controlled access to the reservoir water, shoreline, and trails.

The purpose of the RMP is to provide for the orderly and coordinated management of the lands and recreation resources associated with the Jordanelle Project. Reclamation's goal is to manage, protect, and enhance fish and wildlife habitat, natural resources, cultural resources, paleontological resources, and recreational resources in a manner that meets public expectations and is aesthetically and environmentally safe. The RMP identifies and proposes lands and recreation management initiatives for the next 10 years.

1.3 Location and General Description of Affected Areas

Jordanelle Dam and Reservoir are located approximately 6 miles north of Heber City, Utah as shown on the location map (Figure 1-1). Figure 1-3 shows the lands managed by State Parks by agreement with Reclamation that are included in this analysis. This consists of all lands within the reservoir "takeline" (Project

Legend

- Highway/State Route
- Major Road
- Perimeter Trail
- Project Management Boundary
- Hailstone Recreation Area
- Crandall Point Area
- Ross Creek Recreation Area
- Rock Cliff Recreation Area
- Northwest Shore
- Primitive Shoreline
- Primary Jurisdiction Zone
- West Hills Wildlife Management Area
- Access points

Feet
0 1,500 3,000 4,500 6,000

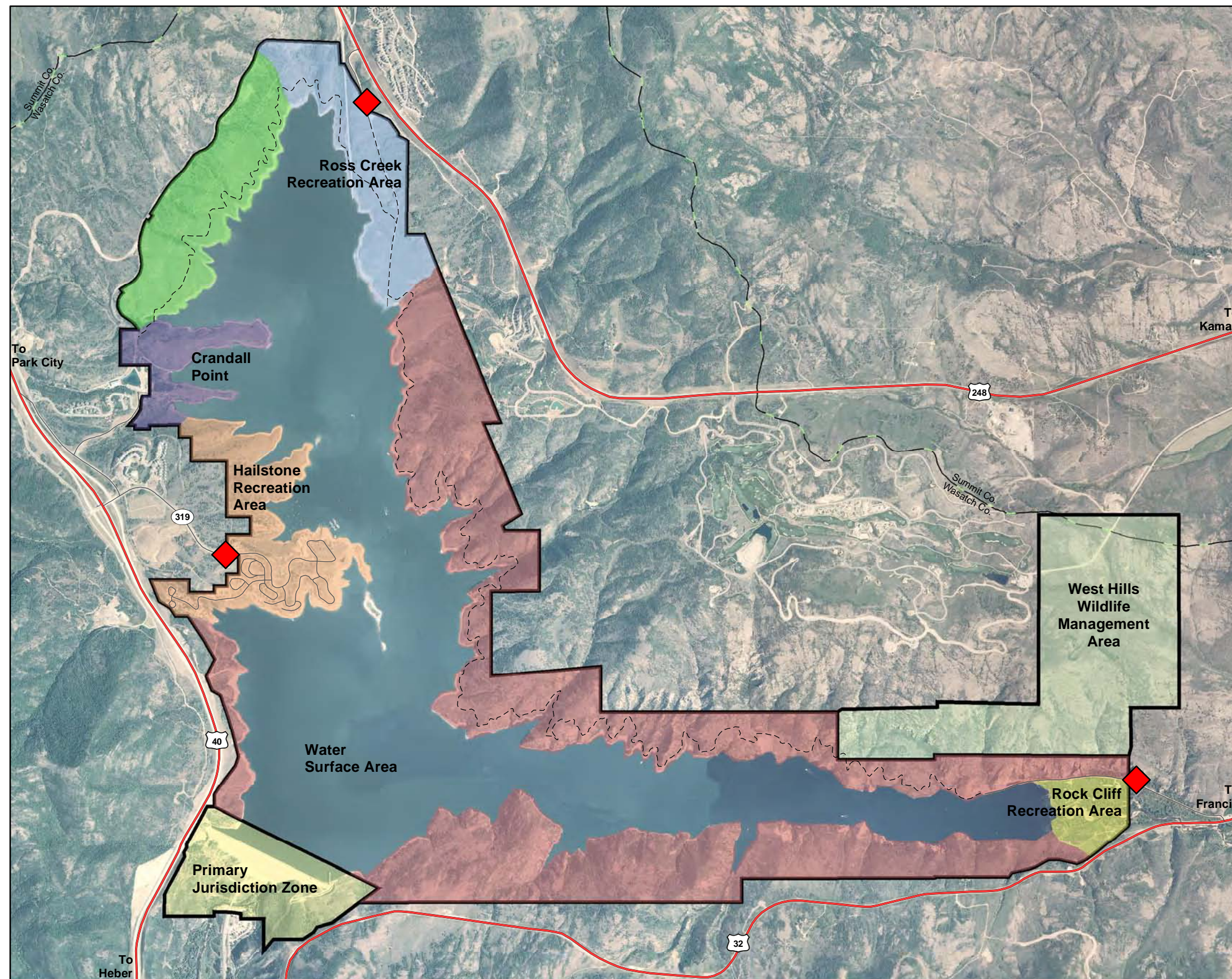


Figure 1-4: Management Areas

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Management Boundary). The 743-acre West Hills Wildlife Management Area (West Hills WMA) at the northeast boundary of the reservoir, which is managed by UDWR, is also addressed in this analysis because it is a component of the Bonneville Unit wildlife mitigation program, which includes wildlife mitigation for Jordanelle Reservoir. For purposes of this analysis, the lands are divided into eight areas. These areas are described briefly below and shown on Figure 1-4.

- Hailstone Recreation Area – Developed recreation area on the west side of the reservoir, managed by State Parks.
- Crandall Point Area – Undeveloped area on the west side of the reservoir north of the Hailstone Recreation Area, managed by State Parks.
- Northwest Shore Area – Undeveloped area along the northwest shore of the reservoir between Crandall Point and the Ross Creek Recreation Area.
- Ross Creek Recreation Area – Developed recreation area on the northeast end of the reservoir, managed by State Parks.
- Rock Cliff Recreation Area – Developed recreation area at the east end of the east arm of the reservoir, managed by State Parks.
- Primitive Shoreline – Undeveloped areas along the east shore between the Ross Creek Recreation Area and the Rock Cliff Recreation Area, and along the south and west shores of the reservoir between the Rock Cliff Recreation Area and the Hailstone Recreation Area, exclusive of the Primary Jurisdiction Zone.
- Jordanelle Dam Primary Jurisdiction Zone – Restricted area used exclusively by CUWCD for security, operation, and maintenance of Jordanelle Dam and project facilities.
- West Hills WMA – The WMA consists of 743 acres of land northeast of the reservoir acquired by Reclamation as part of their wildlife mitigation responsibilities for development of the M&I System. Such mitigation is required under authority of U.S. Fish and Wildlife Coordination Act. The 743-acre WMA was transferred to UDWR for management and wildlife habitat purposes. The primary management goals include management for big game (deer and elk) habitat, sage-grouse habitat, and protection of golden eagle breeding and nesting habitat.

1.4 Description of Current Facilities

1.4.1 Jordanelle Project Facilities

Jordanelle Project facilities within the project area are described briefly below.

Jordanelle Dam

Jordanelle Dam is an earth-fill structure with a height above the streambed of 299 feet, a crest width of 40 feet, and a crest length of 3,700 feet with a volume of 14,500,000 cy. The dam has a multi-level outlet works with a capacity between

1,200 and 2,400 cfs. The multi-level outlet tower allows water to be released from various levels within the reservoir to optimize water quality and temperature in the Provo River below the dam. Jordanelle spillway is a fuse-plug type spillway with a capacity of 5,030 cfs.

Jordanelle Reservoir

Jordanelle Reservoir has a total capacity of 363,354 ac-ft made up of an active capacity of 310,980 ac-ft, an exclusive flood control capacity of 49,348 ac-ft, and an inactive or dead capacity of 3,026 ac-ft. When full (top of active), the reservoir area is 3,024 acres.

Jordanelle Dam Hydropower Plant

The Jordanelle Dam Hydropower Plant was constructed by CUWCD in 2007. The power plant has a capacity of 13 megawatts and generates 39,000 megawatt-hours of electricity annually, enough energy to supply 9,000 homes. The project includes a cast-in-place reinforced concrete powerhouse building with welded penstock and a rip rap lined tailrace channel. The powerhouse was constructed adjacent to the existing outlet works control structure, which remains in operation.

1.4.2 State Park Facilities

Jordanelle State Park consists of three primary recreation areas and a trail system known as the Perimeter Trail. The recreation areas are the Hailstone Recreation Area, the Ross Creek Recreation Area, and the Rock Cliff Recreation Area. The location of each is shown on Figure 1-3, and described briefly below.

Hailstone Recreation Area

The Hailstone Recreation Area, as shown in Figure 1-5, is approximately 299 acres in size, and includes day-use facilities and three campground facilities as follows:

- Day-use facilities include an event center, a children's play area, two boat ramps (one ramp for personal watercraft), three group-use pavilions, 41 day-use cabanas, a beach house, a marina store and restaurant, fish cleaning stations, pump-out facilities, dry storage units, restrooms, hot showers, laundry facilities, a boat decontamination station, and an outdoor amphitheater.
- Hailstone RV Campground has 103 developed campsites overlooking the reservoir. Access is by a paved, pull-through drive or a single spur. The developed campground is serviced by two modern restrooms and one camp-service center with children's play area.
- Keetley Hike-in Campground is a walk-in facility only, which includes modern restrooms and 41 tent sites in a scrub oak draw. Each site has a concrete pad, an 8-foot aluminum table, stand-up grill, and fire pit. Five sites are accessible to disabled campers. Five sites are reservable for boat-in camping.

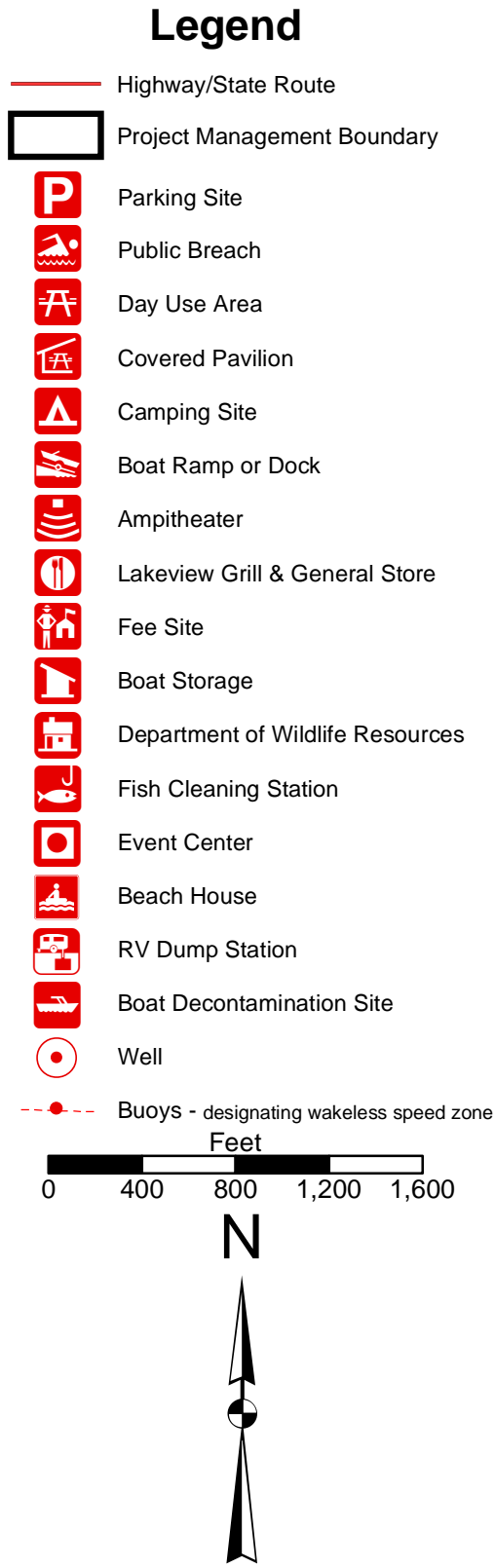
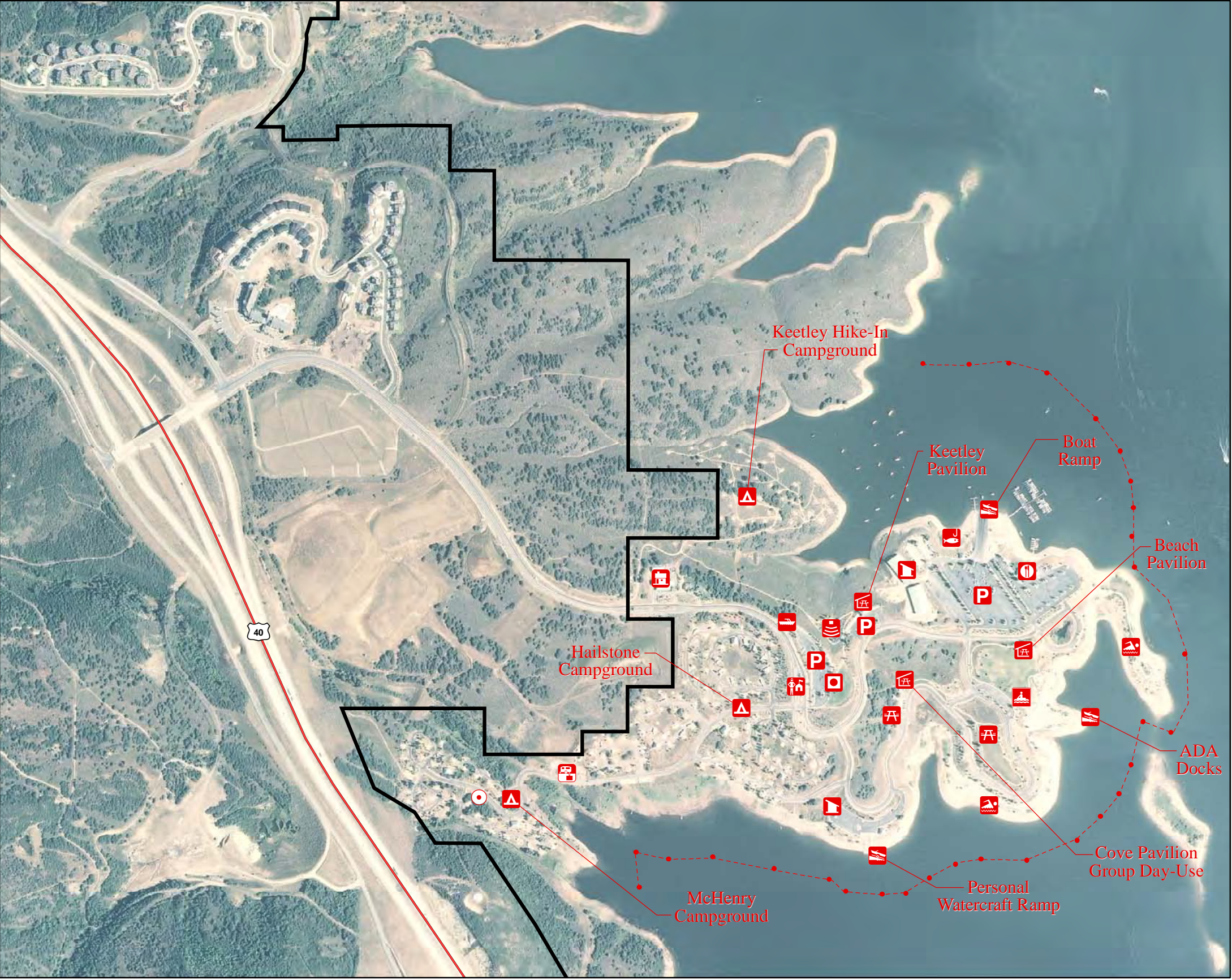


Figure 1-5:
Existing Hailstone Recreation Area

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Legend

- Highway/State Route
- Perimeter Trail
- Project Management Boundary
- Vault Restroom
- Parking
- Self-Pay Fee Station
- Hitching Post

Feet
0 400 800 1,200 1,600

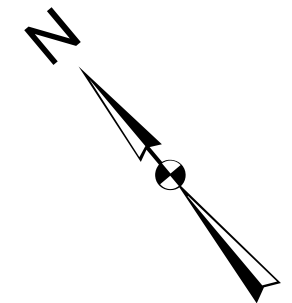


Figure 1-6:
Existing Ross Creek Recreation Area

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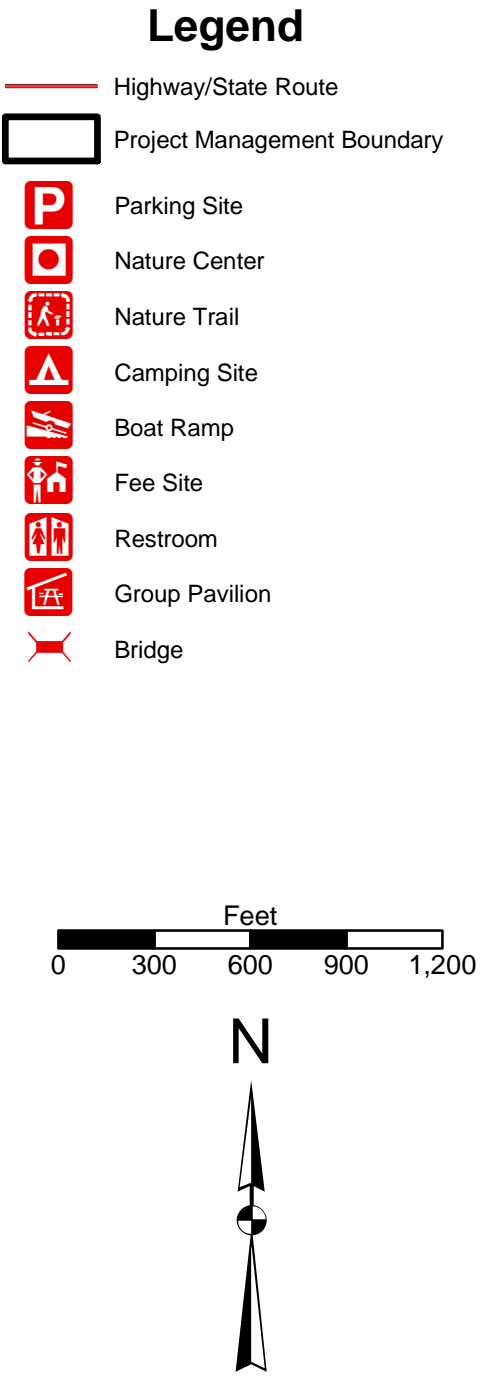
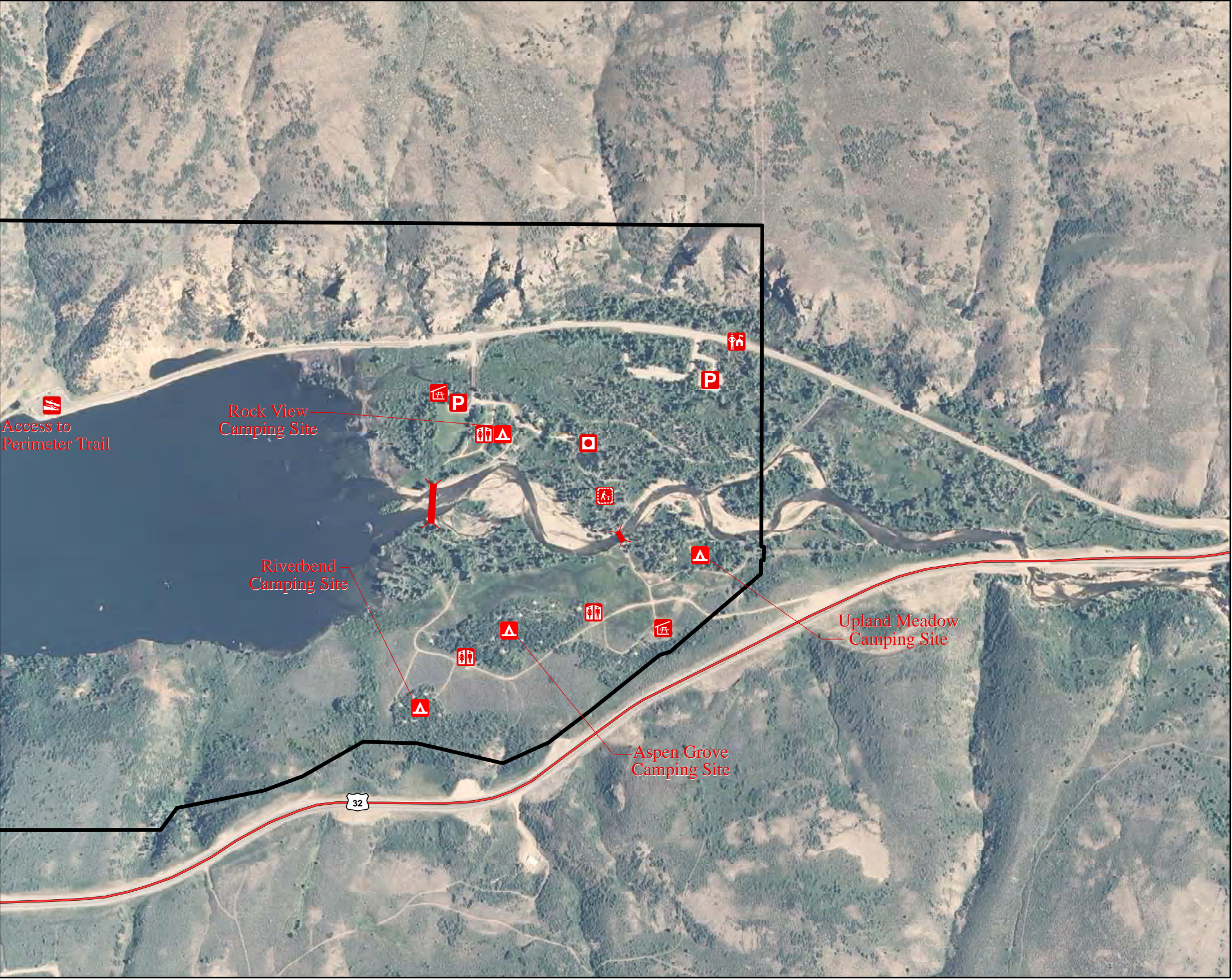


Figure 1-7:
Existing Rock Cliff Recreation Area

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- McHenry Campground has 42 tent/recreation vehicle sites with no utilities. The campground is sheltered between a scrub oak stand and a quiet perennial creek. Each site has a concrete pad, an 8-foot aluminum table, stand-up grill, fire pit, and tent pad. Parking is available for two vehicles with detached trailer. A camp-service center provides modern restrooms, hot showers, laundry facilities, and a children's play area.

Ross Creek Recreation Area

The Ross Creek Recreation Area is approximately 258 acres in size. The Ross Creek facilities, as shown in Figure 1-6, include a parking lot with a self-pay iron ranger fee station, a trailhead, hitching posts, and vault restrooms. The Ross Creek Recreation Area has been developed since the 1987 FS to the 1979 FEIS for the M&I System, and was not analyzed under the NEPA process at that time. However, the existing Ross Creek Equestrian Trailhead was addressed in a site-specific categorical exclusion in 2008, which included a new road to access trailhead parking, a parking area pad, and a vault toilet.

Rock Cliff Recreation Area

The Rock Cliff Recreation Area is approximately 82 acres in size. As shown in Figure 1-7, it is located two miles west of Francis on SR-32. Facilities include a Nature Center (which has offered educational exhibits as well as day and evening programs), three modern restrooms, two group-use pavilions, and four walk-in campgrounds. These pristine sites are reached by an elevated boardwalk or trail through aspen/cottonwood trees. All campgrounds are serviced by three modern restrooms with hot showers.

Perimeter Trail

A Perimeter Trail, as shown in Figure 1-3, is located around much of the reservoir. The 13-mile unpaved, non-motorized trail provides access along the reservoir for hikers, mountain bikers, horse-riders, and cross-country skiers. Currently, access to the trail is provided at the Ross Creek and Rock Cliff Recreation Areas. No access is available from the Hailstone Recreation Area.

1.5 Related Actions and Activities

Related activities or actions that may affect resource management within the Project Management Area are described in the following paragraphs. They include two EA's that would evaluate the conversion of Jordanelle Reservoir water originally allocated for agricultural use to M&I use and expand their service areas.

1.5.1 Francis Sub-Area M&I Conversion EA (Block 1A)

In December of 2008, CUWCD and the DOI-CUPCA office, as Joint Lead Agencies, completed an EA and FONSI to convert Development Block Notice 1A (Block Notice 1A) water currently dedicated to the Francis Sub-Area for

irrigation to M&I use and to expand the boundary of the Francis Sub-Area to which the project water could be delivered. The conversion was limited to 3,000 ac-ft of irrigation water delivered to agricultural tracts that have been deemed irrigable under Reclamation law. The irrigation water would be converted incrementally to M&I use over a period of up to 25 years. The expanded Francis Sub-Area would be restricted to lands within the CUWCD boundary in the upper Provo River drainage, upstream of Jordanelle Reservoir.

1.5.2 Heber Sub-Area M&I Conversion EA (Block 1A)

CUWCD and the DOI-CUPCA office are planning to administratively convert Block Notice 1A water dedicated to the Heber Sub-Area from irrigation to M&I use. This action would also expand the service area to which CUP M&I water can be delivered. The Final EA has been completed and the FONSI was signed in September 2011. The conversion would be limited to the 12,100 ac-ft of irrigation water currently intended for supplemental irrigation use in Wasatch County. The irrigation water will be converted incrementally to M&I use, when requested by petitioners and contract holders, over a period of up to 25 years.

Through the EA process, CUWCD and the DOI-CUPCA office analyzed the impacts of installation and operation of a temporary water-delivery system in the event of an emergency that affects the water supply to JSSD's Keetley Water Treatment Plant at Jordanelle Reservoir. During an emergency, this system would provide JSSD with a temporary method to receive its contracted portion of the Block 1A water. Because the temporary water-delivery system would be installed on federal land, the DOI-CUPCA office would need to issue a license agreement to JSSD as part of the process.

Chapter 2: Alternatives

This chapter presents and describes the resource management alternatives considered for the Jordanelle Reservoir RMP. NEPA compliance calls for consideration and evaluation of reasonable alternatives to a proposed federal action that meets the purpose, need, and objectives of the project while minimizing or avoiding environmental impacts. NEPA states that federal agencies shall study, develop, and describe appropriate alternatives to any proposal that involves unresolved issues concerning alternative uses of available resources. In this case, the Environmental Assessment (EA) is being prepared in response to the proposal to prepare and implement an RMP for Jordanelle Reservoir. Throughout the planning process, the focus remains on the primary purpose of Jordanelle Reservoir: to provide clean drinking water to over a million people along the Wasatch Front and to provide agriculture water in the Wasatch and Summit Counties, while meeting the environmental commitments of the Bonneville Unit of the CUP. Jordanelle Reservoir is an important resource that can and does provide more benefit to the community than just its stated primary purpose. The alternatives presented in this chapter and the underlying purpose of the RMP and associated EA is to evaluate what development of the resource can and should occur that does not jeopardize the primary purpose of the reservoir.

The alternatives described in this chapter and evaluated in this document were developed by Reclamation and reflect input received from the public, state and federal agency representatives, existing documents, and the coordination team. The development of alternatives and scoping process has been used to identify and select options for future management of the recreational, land, and developmental resources, which will help address a variety of public and agency interests and needs. Chapter 3 provides information about the existing conditions within the Project Management Area, and Chapter 4 provides a detailed discussion of the impacts associated with each alternative.

2.1 Alternatives Development

Two Action Alternatives (i.e. alternatives that prescribe a change in resource management) have been developed and evaluated in detail, in addition to a No Action Alternative (i.e. an alternative that prescribes no change in resource management), for Jordanelle Reservoir. The alternatives include:

- No Action Alternative
- Alternative A – Moderate Resource Development (Preferred)
- Alternative B – Maximum Resource Development

It should be noted that Reclamation does not have the authority to approve construction of, nor does Reclamation intend to independently construct, all recreation facility improvements identified in the RMP alternatives under consideration. Instead, Reclamation may solicit existing managing partner(s) to implement most of the facility improvements. Existing managing partners include State Parks, CUWCD, and UDWR. CUWCD is the managing partner for the Primary Jurisdiction Zone and UDWR for the West Hills WMA.

As part of the resource management planning process, a selection process was implemented to analyze a range of possible management actions including facilities development and redevelopment plans, and natural resource management planning options. Management actions are specific tasks intended to guide Reclamation management and managing partners in accomplishing the activities required to properly manage Reclamation lands.

Selecting possible management actions is a multi-step process that involves the consideration of many factors including:

- Issues, opportunities, and constraints for management and development.
- Reclamation policies and authorities.
- Comments from the Coordination Team throughout the project.
- Comments and other public input obtained during public meeting on November 4, 2010 and throughout the public comment period to November 19, 2010 and throughout the public review period from September 15, 2011 to November 15, 2011.
- Agency and local government needs and requirements.

2.1.1 Wildlife Mitigation Commitments

Each alternative includes a continued commitment to manage and maintain the wildlife mitigation commitments specified in the 1979 M&I System FES and the 1987 Final Supplement to the M&I System FES, to the extent practicable. Wildlife mitigation commitments included both on-site and off-site measures to fully replace the loss of mule deer, elk, sage-grouse, and other wildlife populations affected by the construction of the dam and associated M&I facilities, road relocations, and reservoir inundation.

On-site mitigation was to include the adoption of land use and development designations and management practices within the Project Management Boundary that would be conducive to wildlife and reduce the need for wildlife mitigation. As specified in the 1979 M&I System FES, the habitats within the fenced Project Management Boundary would have value for wildlife because private development would be prohibited and livestock grazing would be curtailed. The overall land acquisition and land use for the Jordanelle Reservoir project was intended to provide partial compensation for deer and sage-grouse habitat loss and

partially offset habitat losses for other wildlife as well. Land uses inside the Project Management Boundary were to curtail construction and recreation activities during critical breeding and nesting seasons, and during winter on crucial deer winter range.

Under each alternative, the objective would be to retain as much of the wildlife values within the Project Management Boundary as possible, while allowing the additional recreational developments and uses to expand. The presumption will be that wildlife values will be lost within the footprint of expanded or additional developed recreation areas. The loss of these areas within the Project Management Boundary for wildlife use would require offsetting mitigation.

Off-site mitigation under the 1987 plan included various wildlife management and habitat improvements on approximately 9,461 acres of land administered by Reclamation in Wasatch and Duchesne Counties. Off-site mitigation also included the acquisition of the approximately 743-acre West Hills WMA. In 1992, Reclamation entered into a management agreement with UDWR for the West Hills WMA. This agreement added a third management objective to manage and improve habitat for big game (mule deer and elk).

The West Hills WMA was subsequently transferred to the State of Utah in 2001, and is currently managed by UDWR. The West Hills WMA borders the eastern boundary of the Project Management Area near the Rock Cliff Recreation Area. The two main mitigation objectives for the West Hills WMA were to provide protection and management for important sage-grouse and golden eagle breeding and nesting areas.

Wildlife mitigation specified in the 1987 FS of the M&I System FES also included the installation of wildlife warning reflectors along relocated road segments to help minimize vehicular collisions with big game. The roadside reflectors were found to be ineffective, and following several further studies involving UDWR, Utah State University and Utah Department of Transportation, the decision was made in 2005 to mitigate for the wildlife mortality associated with highway relocations through off-site mitigation (Mitigation Commission, 2005). Reclamation also made environmental commitments to protect wildlife values within the Project Management Boundary by consulting with the USFWS and UDWR on the development of future recreational facilities and land use plans.

2.2 No Action (required by NEPA)

The No Action Alternative is defined as a continuation of current practices. On-going maintenance and associated replacement or repair of existing facilities would continue under this alternative to maintain current values.

Some replacement of facilities/structures associated with the Rock Cliff Recreation Area would likely continue in the short term; however, deferred maintenance will be done only if money is available.

The No Action Alternative also includes minor, but needed, improvements at the recreation sites around the reservoir, including the current expansion of parking spaces and enlarging the 8-lane boat ramp to nine lanes at Hailstone Recreation Area. These actions are part of the No Action Alternative because they are in process of being constructed and will be completed before the RMP and associated EA. Site-specific NEPA compliance is being completed for these improvements. The Rock Cliff Recreation Area is a flood-prone environment and susceptible to damage. No further repairs would be made to washed out facilities under the No Action Alternative.

Public information programs and interpretive opportunities are included in this alternative, as well as an increased management commitment to defining access and enforcing regulations. Activities that help to clarify management policy and minimize resource degradation are included.

2.3 Alternative A – Moderate Resource Development

This alternative provides for a variety of multiple uses including developing and enhancing recreation opportunities, mitigating the loss of wildlife habitat values that would result from future development, and protecting and enhancing natural resources within the Project Management Boundary in accordance with Reclamation's existing mitigation commitments. These improvements and management actions could reasonably be accomplished within the 10-year planning period, given current economic conditions and previous levels of available funds for capital improvements. This alternative focuses on identifying those improvements that will meet the most pressing needs and priorities, which were identified during the public involvement process by the public, Reclamation, and state and federal agencies. Elements of this alternative seek to solve some existing problems with facility layout, access, or deferred maintenance on structures or facilities. Additionally, Alternative A is consistent with and meets the project purposes.

A direct management decision was made, that not all recreation areas would provide every opportunity under the scenario of this alternative. By focusing certain activities at the various recreation areas, the complexity associated with managing for a wide array of opportunities at one site is decreased and the effectiveness of management and enforcement is increased. Improvement of information dissemination, especially through the internet for issues like lake use restrictions, lake levels, webcams and alternative recreation opportunities will improve indirect management actions. Alternative A reflects this management decision and actions.

The following are the elements for each specific recreation and/or management area. The goal for all recreation areas is to develop facilities and infrastructure that are well designed, well maintained, appropriately budgeted, feasibly staffed, and consistent with the area's natural aesthetics.

2.3.1 Hailstone Recreation Area

Alternative A is to provide high quality recreational facilities by providing a range of opportunities to spend multiple-day vacations in the area while having minimal maintenance costs that are self-sustained by user fees. The Recreation Park Manager will continue to manage this recreational area. The following actions may be incorporated.

- Continued maintenance of existing facilities by Recreation Park Manager.
- Continue mandatory boat inspection for aquatic invasive species and continue to provide boat decontamination.
- Provide improvements to campgrounds including RV pad modifications and cabin development.
- Provide improved access and facilities at Keetley Campground.
- Drill well to develop additional water for landscape irrigation. Water for landscaping may be obtained from a surface water source instead of from a well.
- Create internal trail system between facilities at Hailstone.
- Redesign and reconstruct the entrance station to accommodate visitors at a quicker rate and reduce traffic congestion.
- Extend Perimeter Trail from Hailstone to Crandall Point.
- Maintain the existing wakeless use areas for beaches, fishing and non-motorized watercraft use, e.g., sailing and wind surfing.
- Enlarge existing dry storage facility for non-motorized watercraft including laser sailboats.
- Create educational opportunities.
- Increase parking for day-users.
- Recreation Park Manager to continue land management activities necessary to protect against the spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety, and to promote the growth of native species within the defined recreation area.
- Consult with USFWS, Mitigation Commission, and UDWR regarding the development of new project facilities and land use plans to protect wildlife values envisioned in the 1987 FS to M&I System FES.
- Consult with UDWQ and CUWCD about water quality impacts of any new projects.

2.3.2 Crandall Point

Alternative A provides facilities to create a primitive area. A primitive area is defined by no power, water, or sewer facilities. Another feature is to develop and provide controlled access to the water, shoreline, trails, and other recreation opportunities. The Recreation Park Manager would manage this recreational area. Development in this area was not analyzed in the 1987 FS to M&I System FES. The following actions may be incorporated.

- Develop trailhead including: gravel parking lot, self-pay fee station, vault toilet restrooms, and Perimeter Trail access.
- Extend Perimeter Trail from Hailstone to Crandall Point.
- Allow connection to Perimeter Trail from other trail systems.
- Install additional trails for pedestrian and fisherman access to reservoir.
- Pursue access for parking lot.
- Recreation Park Manager to continue land management activities necessary to protect against the spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety, and to promote the growth of native species within the defined recreation area.
- Consult with USFWS, Mitigation Commission, and UDWR regarding the development of new project facilities and land use plans to protect wildlife values envisioned in the 1987 FS to M&I System FES. Mitigate for areas lost to recreational development and use.
- Consult with UDWQ and CUWCD about water quality impacts of any new projects.

2.3.3 Northwest Shore

Alternative A provides facilities to create a primitive area, as defined by no power, water, or sewer facilities. Alternative A does, however, allow Reclamation and the Recreation Park Manager to respond to requests by private entities to develop public facilities. Access other than by boat or the Perimeter Trail will be dependent upon future development of adjacent lands. The Recreation Park Manager would manage this recreational area. Development in this area was not analyzed in the 1987 FS to M&I System FES. The following actions may be incorporated.

- Continue maintenance of existing Perimeter Trail by the Recreation Park Manager.
- Develop unique shoreline day-use areas, accessible by boat or by Perimeter Trail to be managed by the Recreation Park Manager. Primitive Area: no power, water, or sewer.
- Allow access to Perimeter Trail from other trail systems.
- Respond to private concessionaire requests to develop, operate, and maintain new public facilities.

- Recreation Park Manager to protect against introduction and spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety, and to promote the growth of native species within the defined recreation area.
- Consult with USFWS, Mitigation Commission, and UDWR regarding the development of new project facilities and land use plans to protect wildlife values envisioned in the 1987 FS to M&I System FES. Mitigate for areas lost to recreational development and use.
- Consult with UDWQ and CUWCD about water quality impacts of any new projects.

2.3.4 Ross Creek Recreation Area

Alternative A provides facilities to create a primitive area as defined by no power, water, or sewer facilities. Another feature is to develop and provide controlled access to the water, shoreline, trails, and other recreation opportunities. Lastly, this alternative will link the Ross Creek area to the rest of Jordanelle State Park and the surrounding community through a trail system. The Recreation Park Manager will continue to manage this recreational area. Development in this area was not analyzed in the 1987 FS to M&I System FES. However, the existing Ross Creek Equestrian Trailhead was addressed in a site-specific categorical exclusion in 2008, which included a new road to access trailhead parking, a parking area pad, and a vault toilet. The following actions may be incorporated.

- Continue maintenance of existing facilities by the Recreation Park Manager including: parking lot, self-pay fee station, vault toilet restrooms, hitching posts, and access to Perimeter Trail.
- Install access trails to reservoir.
- Provide infrastructure improvements.
- Pursue improved access from SR 248.
- Designate the existing wakeless use areas for beaches and non-motorized watercraft use.
- Allow access to Perimeter Trail from other trail systems.
- Pursue concession opportunities, e.g., bike, non-motorized boat, and/or horse rental.
- Respond to private concessionaire requests to develop, operate, and maintain new public facilities.
- Recreation Park Manager to continue land management activities necessary to protect against the spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety, and to promote the growth of native species within the defined recreation area.
- Consult with USFWS, Mitigation Commission and UDWR regarding the development of new project facilities and land use plans to protect wildlife

values envisioned in the 1987 FS to M&I System FES. Mitigate for areas lost to recreational development and use.

- Consult with UDWQ and CUWCD about water quality impacts of any new projects.

2.3.5 Rock Cliff Recreation Area

Alternative A maintains the existing overnight walk-in camping with the potential addition of yurt or cabin sites on either side of the river. The Recreation Park Manager will continue to manage this recreational area. The following actions may be incorporated.

- Continue maintenance of existing facilities by the Recreation Park Manager including: parking lot, fee station, access to Perimeter Trail, small boat ramp, and Nature Center.
- Consider alternative camping methods (e.g., yurts, cabins).
- Add pavilions as needed.
- Maintain Nature Center and pursue other opportunities or uses to maintain and create additional education facilities.
- Maintain current boat ramp for small watercraft (motorized and non-motorized).
- Maintain the existing wakeless use areas for beaches and non-motorized watercraft use.
- Require mandatory boat inspection for aquatic invasive species and provide boat decontamination station and trained technician.
- Allow access to Perimeter Trail from other trail systems.
- Continue stream stabilization activities as necessary to protect existing facilities, while respecting river character.
- Remove utilities from the bridge and relocate to stabilize as appropriate. Directional drilling could be used to put utilities under the river or utilities could be placed in the access road and highway to avoid crossing the river in the park.
- Evaluate flood plain to determine the liability to facilities. Make improvements as necessary.
- Pursue improved access from State Route 32.
- Pursue opportunities to improve facilities.
- Provide electrical hookups for camp host.
- Recreation Park Manager to continue land management activities necessary to protect against the spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety, and to promote the growth of native species within the defined recreation area.

- Consult with USFWS, Mitigation Commission and UDWR regarding the development of new project facilities and land use plans to protect wildlife values envisioned in the 1987 FS to M&I System FES. Mitigate for areas lost to recreational development and use.
- Consult with UDWQ and CUWCD about water quality impacts of any new projects.

2.3.6 Primitive Shoreline

Alternative A provides for the preservation of wildlife habitat values by continued management to maintain wildlife values envisioned in the 1987 Final Supplement to the M&I System FES while maintaining the existing Perimeter Trail.

Alternative A includes the following.

- Continue management to maintain wildlife values envisioned in the 1987 FS to M&I System FES.
- Continue maintenance of existing Perimeter Trail by the Recreation Park Manager.
- Recreation Park Manager to protect against introduction and spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety.

2.3.7 Primary Jurisdiction Zone

Alternative A is to continue conducting actions identified under the No Action Alternative which includes continued maintenance of the existing facilities by CUWCD under the direction of Reclamation. Access must continue to be restricted in the Primary Jurisdiction Zone. This is facilitated by maintaining a permanent row of buoys 500 feet from the face of Jordanelle Dam. The Recreation Park Manager will assist with security monitoring along the buoys to keep people away from the dam. CUWCD and Reclamation will protect against introduction and spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety.

2.3.8 West Hills Wildlife Management Area

Protection and management of important sage-grouse and golden eagle breeding and nesting areas and improvement of big game habitat were the main mitigation objectives for the West Hills WMA. Alternative A would include the following:

- Continue management by UDWR to implement the 1987 Wildlife Mitigation Plan.
- UDWR to protect against introduction and spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety.

- Reevaluate mission and accomplishments of West Hills Wildlife Management Plan and adjust to ensure fulfillment of 1987 wildlife mitigation requirements.
- Evaluate potential alternative mitigation sites for required wildlife mitigation, if needed.

2.4 Alternative B – Maximum Resource Development

The focus of Alternative B is to provide for and expand a variety of recreation opportunities in addition to those provided for in Alternative A. This alternative incorporates all of the same elements identified in Alternative A, but includes additional elements: such as upgrading of facilities, expansion of facilities, and bringing facilities up to current standards. Alternative B also includes elements that would require a managing partner(s), private developer(s), and marina concessionaire that were identified during the public involvement process. These improvements and management actions could reasonably be accomplished within the 10-year planning period, but would require a greater level of funding than required for Alternative A. Facilities, policies, and management practices that improve or protect environmental quality are secondary to providing recreational opportunities to the public in this alternative.

2.4.1 Hailstone Recreation Area

Alternative B implements the improvements identified under Alternative A and provides for additional recreation opportunities and concessions. The following improvements are included in Alternative B.

Alternative A Improvements

- Continued maintenance of existing facilities by Recreation Park Manager.
- Continue mandatory boat inspection for aquatic invasive species and continue to provide boat decontamination.
- Provide improvements to campgrounds including RV pad modifications and cabin development.
- Provide improved access and facilities at Keetley Campground.
- Drill well to develop additional water for landscape irrigation. Water for landscaping may be obtained from a surface water source instead of from a well.
- Create internal trail system between facilities at Hailstone.
- Redesign and reconstruct the entrance station to accommodate visitors at a quicker rate and reduce traffic congestion.
- Extend Perimeter Trail from Hailstone to Crandall Point.
- Maintain the existing wakeless use areas for beaches, fishing and non-motorized watercraft use, e.g., sailing and wind surfing.

- Enlarge existing dry storage facility for non-motorized watercraft including laser sailboats.
- Create educational opportunities.
- Increase parking for day users.
- Recreation Park Manager to continue land management activities necessary to protect against the spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety, and to promote the growth of native species within the defined recreation area.
- Consult with USFWS, Mitigation Commission, and UDWR regarding the development of new project facilities and land use plans to protect wildlife values envisioned in the 1987 FS to M&I System FES.
- Consult with UDWQ and CUWCD about water quality impacts of any new projects.

Additional Alternative B Improvements

- Create additional public/private dry boat storage facilities.
- Pave internal trail in specified locations.
- Potential list of park amenities: trailhead including parking lot, interpretive areas, ice-fishing (non-motorized access only).
- Potential list of additional concessions: cross country ski trails and rentals, snowshoeing, wake tow cable park, and /or winter tubing.

2.4.2 Crandall Point

Alternative B implements the improvements identified under Alternative A and develops a public day-use area. The area would remain a primitive area as defined by no power, water, or sewer facilities. Development in this area was not analyzed in the 1987 FS to M&I System FES. The following are included in Alternative B.

Alternative A Improvements

- Develop trailhead including: gravel parking lot, self-pay fee station, vault toilet restrooms, and Perimeter Trail access.
- Extend Perimeter Trail from Hailstone to Crandall Point.
- Allow connection to Perimeter Trail from other trail systems.
- Install additional trails for pedestrian and fisherman access to reservoir.
- Pursue access for parking lot.
- Recreation Park Manager to continue land management activities necessary to protect against the spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety, and to promote the growth of native species within the defined recreation area.

- Consult with USFWS, Mitigation Commission, and UDWR regarding the development of new project facilities and land use plans to protect wildlife values envisioned in the 1987 FS to M&I System FES. Mitigate for areas lost to recreational development and use.
- Consult with UDWQ and CUWCD about water quality impacts of any new projects.

Additional Alternative B Improvements

- Develop public day-use area including: beach area and access, lakeside boat access (no formal launch facilities), no wake zone, picnic pavilions, and enlarged parking lot.

2.4.3 Northwest Shore

Alternative B implements the improvements identified under Alternative A and provides for a private developer to design and construct public facilities, which may include a golf course and/or cross-country ski facility operated and maintained by a private concessionaire. This area would include power, water, and sewer. Development in this area was not analyzed in the 1987 FS to M&I System FES. The following are included in Alternative B.

Alternative A Improvements

- Continue maintenance of existing Perimeter Trail by the Recreation Park Manager.
- Develop unique shoreline day-use areas, accessible by boat or by Perimeter Trail to be managed by the Recreation Park Manager. Primitive Area: no power, water, or sewer.
- Allow access to Perimeter Trail from other trail systems.
- Respond to private concessionaire requests to develop, operate, and maintain new public facilities.
- Recreation Park Manager to protect against introduction and spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety, and to promote the growth of native species within the defined recreation area.
- Consult with USFWS, Mitigation Commission, and UDWR regarding the development of new project facilities and land use plans to protect wildlife values envisioned in the 1987 FS to M&I System FES. Mitigate for areas lost to recreational development and use.
- Consult with UDWQ and CUWCD about water quality impacts of any new projects.

Additional Alternative B Improvements

- Design and construct public golf course and/or cross country ski facility. During winter, golf course and adjacent Perimeter Trail used for cross-country skiing. Moderate Use Area including power, water, and sewer.
- Private concessionaire to operate and maintain facilities.

2.4.4 Ross Creek Recreation Area

Alternative B implements improvements identified under Alternative A and provides for additional recreational facilities, including a public day-use area, playing fields, and non-motorized boat rentals and docks. Development in this area was not analyzed in the 1987 FS to M&I System FES. However, existing facilities were addressed in a site-specific categorical exclusion. The following are included in Alternative B.

Alternative A Improvements

- Continue maintenance of existing facilities by the Recreation Park Manager including: parking lot, self-pay fee station, vault toilet restrooms, hitching posts, and access to Perimeter Trail.
- Install access trails to reservoir.
- Provide infrastructure improvements.
- Pursue improved access from SR 248.
- Designate the existing wakeless use areas for beaches and non-motorized watercraft use.
- Allow access to Perimeter Trail from other trail systems.
- Pursue concession opportunities, e.g., bike, non-motorized boat, and/or horse rental.
- Respond to private concessionaire requests to develop, operate, and maintain new public facilities.
- Recreation Park Manager to continue land management activities necessary to protect against the spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety, and to promote the growth of native species within the defined recreation area.
- Consult with USFWS, Mitigation Commission and UDWR regarding the development of new project facilities and land use plans to protect wildlife values envisioned in the 1987 FS to M&I System FES. Mitigate for areas lost to recreational development and use.
- Consult with UDWQ and CUWCD about water quality impacts of any new projects.

Additional Alternative B Improvements

- Develop public day-use area including: lakeside boat access (no formal launch facilities), picnic pavilions, access to the reservoir/shoreline, and

manned fee station. Recreation opportunities may include: fishing, windsurfing, horseshoe pits, wildlife viewing, ice-fishing, interpretive programs.

- Allow development by private entities for public use within the Project Management Boundary including: soccer field, sand volleyball court, day-use facilities, and non-motorized boat dock.

2.4.5 Rock Cliff Recreation Area

Alternative B is the maximum resource development and increases the area to be accessible by drive-in camping including RV's, enlarged boat ramps for use by larger motorized boats, and day-use facilities. The following are included in Alternative B.

Alternative A Improvements

- Continue maintenance of existing facilities by the Recreation Park Manager including: parking lot, fee station, access to Perimeter Trail, small boat ramp, and Nature Center.
- Consider alternative camping methods (e.g., yurts, cabins).
- Add pavilions as needed.
- Maintain Nature Center and pursue other opportunities or uses to maintain and create additional education facilities.
- Maintain current boat ramp for small watercraft (motorized and non-motorized).
- Maintain the existing wakeless use areas for beaches and non-motorized watercraft use.
- Require mandatory boat inspection for aquatic invasive species and provide boat decontamination station and trained technician.
- Allow access to Perimeter Trail from other trail systems.
- Continue stream stabilization activities as necessary to protect existing facilities, while respecting river character.
- Remove utilities from the bridge and relocate to stabilize as appropriate. Directional drilling could be used to put utilities under the river or utilities could be placed in the access road and highway to avoid crossing the river in the park.
- Evaluate flood plain to determine the liability to facilities. Make improvements as necessary.
- Pursue improved access from State Route 32.
- Pursue opportunities to improve facilities.
- Provide electrical hookups for camp host.
- Recreation Park Manager to continue land management activities necessary to protect against the spread of noxious weeds and other pests

detrimental to natural values, agriculture, or public health and safety , and to promote the growth of native species within the defined recreation area.

- Consult with USFWS, Mitigation Commission and UDWR regarding the development of new project facilities and land use plans to protect wildlife values envisioned in the 1987 FS to M&I System FES. Mitigate for areas lost to recreational development and use.
- Consult with UDWQ and CUWCD about water quality impacts of any new projects.

Additional Alternative B Improvements

- Provide improvements to campgrounds including: RV access with drive-to campsites and utility connections for RV sites.
- Enlarge boat ramp to accommodate large watercraft.
- Add day-use facilities.
- Improve trail for biking in specified locations.

2.4.6 Primitive Shoreline

Alternative B is the same as Alternative A, but also provides for extending the Perimeter Trail along the south shore of the east arm. Development in this area was not analyzed in the 1987 FS to M&I System FES. Alternative B may include the following.

Alternative A Improvements

- Continue management to maintain wildlife values envisioned in the 1987 FS to M&I System FES.
- Continue maintenance of existing Perimeter Trail by the Recreation Park Manager.
- Recreation Park Manager to protect against introduction and spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety.

Additional Alternative B Improvements

- Extend Perimeter Trail along the south shore of the east arm.

2.4.7 Primary Jurisdiction Zone

Alternative B is the same as Alternative A and provides for continued maintenance of the existing facilities by CUWCD under direction of Reclamation. Access must continue to be restricted in the Primary Jurisdiction Zone. This is facilitated by maintaining a permanent row of buoys 500 feet from the face of Jordanelle Dam. The Recreation Park Manager will assist with security monitoring along the buoys to keep people away from the dam. CUWCD and Reclamation will protect against introduction and spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety.

2.4.8 West Hills Wildlife Management Area

Alternative B is the same as Alternative A, which would include a reevaluation of the mission and accomplishments of the West Hills WMA and make any adjustments to ensure fulfillment of the 1987 wildlife mitigation requirements and evaluate potential alternative mitigation sites for required wildlife mitigation, if needed. UDWR is to protect against the introduction and spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety.

2.5 Alternatives Considered but Eliminated from Further Study

No additional alternatives, other than the ones provided in this chapter, were considered during the planning process. Most of the actions recommended by the public and involved agencies were included in one or more of the action alternatives. In addition, many of the actions contemplated in the existing evaluations were also included in one or more alternatives. However, there were some elements that were reviewed, discussed, and analyzed but were eliminated from future consideration because of potential costs, lack of demand, and unnecessary impacts to natural and recreational resources.

2.6 Preferred Alternative (Alternative A)

Reclamation has selected Alternative A as the preferred alternative, which is consistent and meets the project purposes. Refer to Section 2.3 for details of the alternative. A scoping process was used to select the preferred alternative based on several factors including demonstrated need and the extent, type, and intensity of likely environmental and socioeconomic effects. It was also chosen based on a management decision that not all recreation areas would provide every opportunity. By focusing certain activities at the various recreation areas, the complexity associated with managing for a wide array of opportunities at one site is decreased and the effectiveness of management and enforcement is increased. The selection process also considered the ability to secure funding as well as past management history and likely effectiveness of the action(s). Alternative A reflects this management decision and actions.

Inclusion of these actions does not ensure funding, staff, or equipment will be available to implement these actions nor does it obligate Reclamation to implement actions in the future. As described above, Reclamation does not have direct authority to undertake certain recreation improvements without the assistance of a managing partner.

The preferred management actions for Jordanelle Reservoir were selected by Reclamation. The goal is to achieve recreational development demand while

protecting, and where possible enhancing, other resources within the Project Management Boundary. A detailed description of the preferred management strategy and how it was formulated is found in Chapter 4 of the RMP.

2.7 Summary of Alternatives

By incorporating and evaluating the above listed factors, a series of alternative management actions have been identified. Based on the type and extent of the action considered, these management actions were combined into no-action, moderate-level, and maximum-level development categories. The combined actions, identified by recreation and land areas at Jordanelle Reservoir, provide a broad range of choices in guiding the management and near-term development or redevelopment of Jordanelle Reservoir facilities. Table 2-1 provides a summary of each alternative by specific recreation and/or management area. Figures 2-1 through 2-4 provide a visual reference for each management location.

Management actions are considered reasonable and appropriate actions that can be pursued for effective management of these lands over the next 10 years. Inclusion of these actions does not ensure that funding, staff, or equipment will be available to implement these actions, nor does it obligate Reclamation or the managing partner(s) to implement actions in the future. As previously mentioned, Reclamation does not have direct authority to undertake certain recreation improvements without the assistance of a managing partner.

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Table 2-1: Summary of Alternatives

Location¹	No Action Alternative²	Alternative A Multi-Purpose Emphasis (Moderate Resource Development)	Alternative B Recreation Emphasis (Maximum Resource Development)
Hailstone Recreation Area	<ul style="list-style-type: none">• Minor upgrades as necessary to maintain current values.• Enlarge boat ramp to include 9 total lanes.• Create additional day-use parking.• Continue mandatory boat inspection for aquatic invasive species and continue to provide boat decontamination.• Continue management to maintain wildlife values envisioned in the 1987 FS to M&I System FES.	<ul style="list-style-type: none">• Continued maintenance of existing facilities by Recreation Park Manager.• Continue mandatory boat inspection for aquatic invasive species and continue to provide boat decontamination.• Provide improvements to campgrounds including RV pad modifications and cabin development.• Provide improved access and facilities at Keetley Campground.• Drill well to develop additional water for landscape irrigation. Water for landscaping may be obtained from a surface water source instead of from a well.• Create internal trail system between facilities at Hailstone.• Redesign and reconstruct the entrance station to accommodate visitors at a quicker rate and reduce traffic congestion.• Extend Perimeter Trail from Hailstone to Crandall Point.• Maintain the existing wakeless use areas for beaches, fishing and non-motorized watercraft use, e.g., sailing and wind surfing.• Enlarge existing dry storage facility for non-motorized watercraft including laser sailboats.• Create educational opportunities.• Increase parking for day-users.• Recreation Park Manager to continue land management activities necessary to protect against the spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety, and to promote the growth of native species within the defined recreation area.• Consult with USFWS, Mitigation Commission, and UDWR regarding the development of new project facilities and land use plans to protect wildlife values envisioned in the 1987 FS to M&I System FES.• Consult with UDWQ and CUWCD about water quality impacts of any new projects.	<ul style="list-style-type: none">• Implement improvements identified under Alternative A.• Create additional public/private dry boat storage facilities.• Pave trail in specified locations.• Potential list of park amenities: trailhead including parking lot, interpretive areas, ice-fishing (non-motorized access only).• Potential list of additional concessions: cross country ski trails and rentals, snowshoeing, wake tow cable park, and/or winter tubing.

Table 2-1: Summary of Alternatives

Location ¹	No Action Alternative ²	Alternative A Multi-Purpose Emphasis (Moderate Resource Development)	Alternative B Recreation Emphasis (Maximum Resource Development)
Crandall Point	<ul style="list-style-type: none">Continue management to maintain wildlife values envisioned in the 1987 FS to M&I System FES.	<ul style="list-style-type: none">Develop trailhead including: gravel parking lot, self-pay fee station, vault toilet restrooms, and Perimeter Trail access.Extend Perimeter Trail from Hailstone to Crandall Point.Allow connection to Perimeter Trail from other trail systems.Install additional trails for pedestrian and fisherman access to reservoir.Pursue access for parking lot.Recreation Park Manager to continue land management activities necessary to protect against the spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety, and to promote the growth of native species within the defined recreation area.Consult with USFWS, Mitigation Commission, and UDWR regarding the development of new project facilities and land use plans to protect wildlife values envisioned in the 1987 FS to M&I System FES. Mitigate for areas lost to recreational development and use.Consult with UDWQ and CUWCD about water quality impacts of any new projects.	<ul style="list-style-type: none">Implement improvements identified under Alternative A.Develop public day-use area including: beach area and access, lakeside boat access (no formal launch facilities), no wake zone, picnic pavilions, and enlarged parking lot.
Northwest Shore	<ul style="list-style-type: none">Continue management to maintain wildlife values envisioned in the 1987 FS to M&I System FES.Continue maintenance of existing Perimeter Trail by the Recreation Park Manager.	<ul style="list-style-type: none">Continue maintenance of existing Perimeter Trail by the Recreation Park Manager.Develop unique shoreline day-use areas, accessible by boat or by Perimeter Trail to be managed by Recreation Park Manager. Primitive Area: no power, water, or sewer.Allow access to Perimeter Trail from other trail systems.Respond to private concessionaire requests to develop, operate, and maintain new public facilities.Recreation Park Manager to protect against introduction and spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety, and to promote the growth of native species within the defined recreation area.Consult with USFWS, Mitigation Commission, and UDWR regarding the development of new project facilities and land use plans to protect wildlife values envisioned in the 1987 FS to M&I System FES. Mitigate for areas lost to recreational development and use.Consult with UDWQ and CUWCD about water quality impacts of any new projects.	<ul style="list-style-type: none">Implement improvements identified under Alternative A.Design and construct public golf course and/or cross country ski facility. During winter, golf course and adjacent Perimeter Trail used for cross country skiing. Moderate Use Area including power, water, and sewer.Private concessionaire to operate and maintain facilities.

Table 2-1: Summary of Alternatives

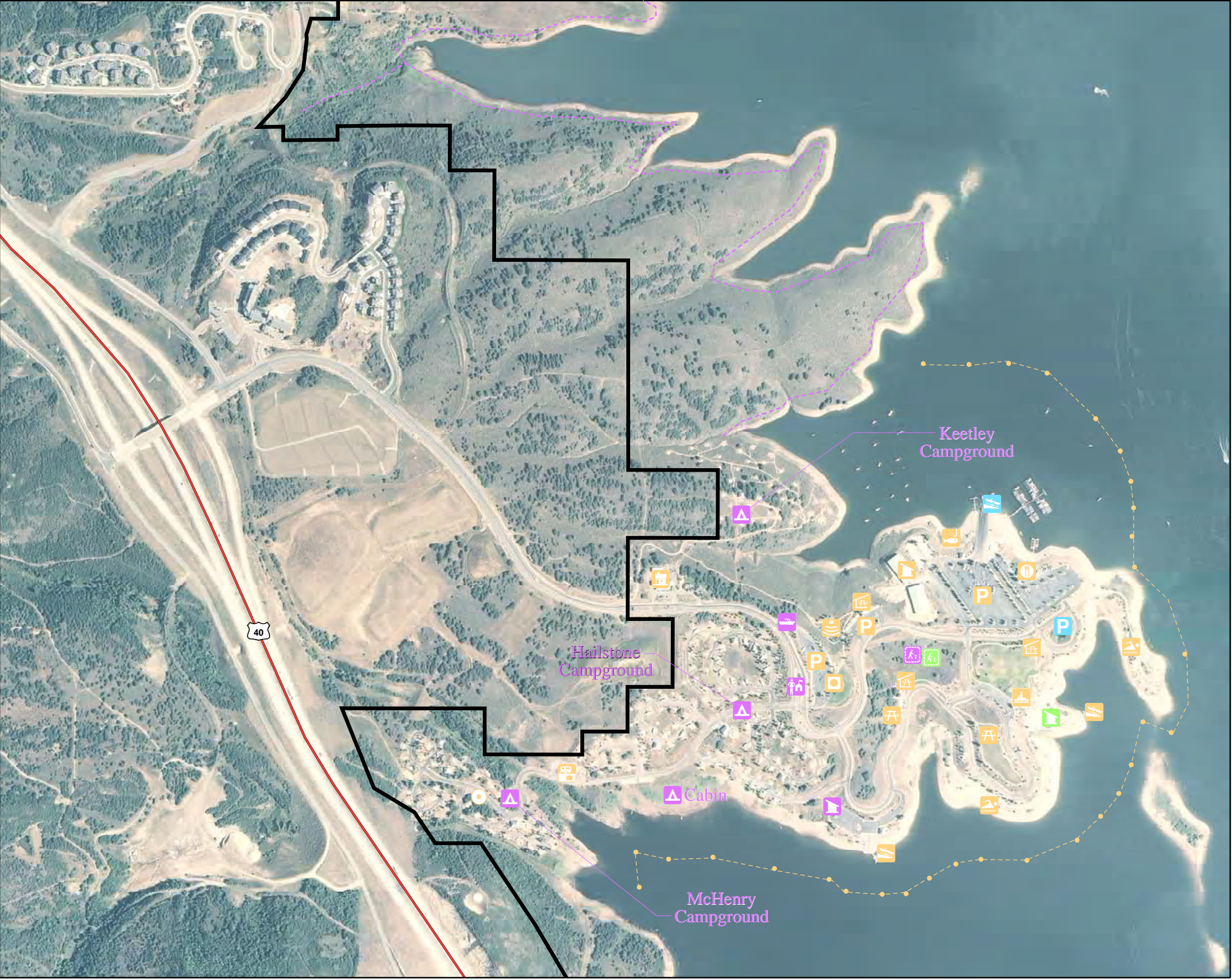
Location¹	No Action Alternative²	Alternative A Multi-Purpose Emphasis (Moderate Resource Development)	Alternative B Recreation Emphasis (Maximum Resource Development)
Ross Creek Recreation Area	<ul style="list-style-type: none"> Continue maintenance of existing facilities by the Recreation Park Manager including: parking lot, self-pay fee station, vault toilet restrooms, hitching posts, and access to Perimeter Trail. Continue management to maintain wildlife values envisioned in the 1987 FS to M&I System FES. 	<ul style="list-style-type: none"> Continue maintenance of existing facilities by the Recreation Park Manager including: parking lot, self-pay fee station, vault toilet restrooms, hitching posts, and access to Perimeter Trail. Install access trails to reservoir. Provide infrastructure improvements. Pursue improved access from SR 248. Designate the existing wakeless use areas for beaches and non-motorized watercraft use. Allow access to Perimeter Trail from other trail systems. Pursue concession opportunities, e.g., bike, non-motorized boat, and/or horse rental. Respond to private concessionaire requests to develop, operate, and maintain new public facilities. Recreation Park Manager to continue land management activities necessary to protect against the spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety, and to promote the growth of native species within the defined recreation area. Consult with USFWS, Mitigation Commission and UDWR regarding the development of new project facilities and land use plans to protect wildlife values envisioned in the 1987 FS to M&I System FES. Mitigate for areas lost to recreational development and use. Consult with UDWQ and CUWCD about water quality impacts of any new projects. 	<ul style="list-style-type: none"> Implement improvements identified under Alternative A. Develop public day-use area including: lakeside boat access (no formal launch facilities), picnic pavilions, access to the reservoir/shoreline, and manned fee station. Recreation opportunities may include: fishing, windsurfing, horseshoe pits, wildlife viewing, ice-fishing, interpretive programs. Allow development by private entities for public use within the Project Management Boundary including: soccer field, sand volleyball court, day-use facilities, and non-motorized boat dock.
Rock Cliff Recreation Area	<ul style="list-style-type: none"> Continue maintenance of existing facilities by the Recreation Park Manager including: parking lot, fee station, access to Perimeter Trail, small boat ramp, Nature Center and walk-in campground. Flood-prone environment is susceptible to damage. No further repairs. Continue management to maintain wildlife values envisioned in the 1987 FS to M&I System FES. 	<ul style="list-style-type: none"> Continue maintenance of existing facilities by the Recreation Park Manager including: parking lot, fee station, access to Perimeter Trail, small boat ramp, and Nature Center. Consider alternative camping methods (e.g., yurts, cabins). Add pavilions as needed. Maintain Nature Center and pursue other opportunities or uses to maintain and create additional education facilities. Maintain current boat ramp for small watercraft (motorized and non-motorized). Maintain the existing wakeless use areas for beaches and non-motorized watercraft use. Require mandatory boat inspection for aquatic invasive species and provide boat decontamination station and trained technician. Allow access to Perimeter Trail from other trail systems. Continue stream stabilization activities as necessary to protect existing facilities, while respecting river character. 	<ul style="list-style-type: none"> Implement improvements identified under Alternative A (except maintain current boat ramp for small watercraft). Provide improvements to campgrounds including: RV access with drive-to campsites and utility connections for RV sites. Enlarge boat ramp to accommodate large watercraft. Add day-use facilities. Improve trail for biking in specified locations.

Table 2-1: Summary of Alternatives

Location ¹	No Action Alternative ²	Alternative A Multi-Purpose Emphasis (Moderate Resource Development)	Alternative B Recreation Emphasis (Maximum Resource Development)
Rock Cliff Recreation Area		<ul style="list-style-type: none">Remove utilities from the bridge and relocate to stabilize as appropriate. Directional drilling could be used to put utilities under the river or utilities could be placed in the access road and highway to avoid crossing the river in the park.Evaluate flood plain to determine the liability to facilities. Make improvements as necessary.Pursue improved access from SR 32.Pursue opportunities to improve facilities.Provide electrical hookups for camp host.Recreation Park Manager to continue land management activities necessary to protect against the spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety, and to promote the growth of native species within the defined recreation area.Consult with USFWS, Mitigation Commission, and UDWR regarding the development of new project facilities and land use plans to protect wildlife values envisioned in the 1987 FS to M&I System FES. Mitigate for areas lost to recreational development and use.Consult with UDWQ and CUWCD about water quality impacts of any new projects.	
Primitive Shoreline	<ul style="list-style-type: none">Continue management to maintain wildlife values envisioned in the 1987 FS to M&I System FES.Continue maintenance of existing Perimeter Trail by the Recreation Park Manager.	<ul style="list-style-type: none">Implement improvements identified under No Action.Recreation Park Manager to protect against introduction and spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety.	<ul style="list-style-type: none">Implement improvements identified under Alternative A.Extend Perimeter Trail along the south shore of east arm.
Primary Jurisdiction Zone (PJZ)	<ul style="list-style-type: none">Continue maintenance of existing facilities by CUWCD under direction of Reclamation.Maintain a permanent row of buoys 500 feet from the face of Jordanelle Dam.Restrict access within the Primary Jurisdiction Zone.CUWCD and Reclamation to protect against introduction and spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety.	<ul style="list-style-type: none">Continue conducting actions identified under the No Action Alternative.Recreation Park Manager will assist with security monitoring along the buoys to keep people away from the dam.	<ul style="list-style-type: none">Implement improvements identified under Alternative A.
West Hills WMA	<ul style="list-style-type: none">Continue management by UDWR to implement the 1987 Wildlife Mitigation Plan.UDWR to protect against introduction and spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety.	<ul style="list-style-type: none">Reevaluate mission and accomplishments of West Hills Wildlife Management Plan and adjust to ensure fulfillment of 1987 wildlife mitigation requirements.Evaluate potential alternative mitigation sites for required wildlife mitigation, if needed.	<ul style="list-style-type: none">Implement improvements identified under Alternative A.

¹ See Figures 2-1 to 2-4

² Defined as a continuation of current practices (e.g., maintenance, replacement and repair of existing facilities)



Legend

Highway/State Route

Project Management Boundary

No Action

Enlarge boat ramp to include 9 total lanes.

Create additional day-use parking.

Alternative A

Continue mandatory boat inspection for aquatic invasive species & continue to provide boat decontamination.

Enlarge existing dry storage facility for non-motorized watercraft including laser sail boats.

Provide improvements to campgrounds including RV pad modifications and cabin development; Provide improved access & facilities at Keetley Campground.

Create internal trail system between facilities at Hailstone. (Locations TBD)

Redesign & reconstruct the entrance station to accomodate visitors at a quicker rate & reduce traffic congestion.

Extend perimeter trail from Hailstone to Crandall Point.

Alternative B

Create additional public/private dry boat storage facilities.

Pave trail in specified locations.

Icons shown are for alternatives that correspond to a physical location. Refer to Table 2-1 for complete list of alternatives.

Yellow Icons are existing facilities that will not be changed in any alternative. Existing facilities are labeled in Figure 1-5.

Figure 2-1:
Proposed Hailstone Recreation Area
Alternatives

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Legend

- Highway/State Route
- Perimeter Trail
- Project Management Boundary

- Alternative A**
 Crandall Point:
 Develop trailhead including: gravel parking lot, self-pay fee station, vault toilet restrooms, & Perimeter Trail access.
- P T TR
- Extend Perimeter Trail from Hailstone to Crandall Point; Allow connection to Perimeter Trail from other trail systems; Install additional trails for pedestrian and fisherman access to reservoir.
- T
- Northwest Shore:
 Develop unique shoreline day-use areas, accessible by boat or by trail to be managed by Recreation Park Manager.
Primitive Area: no power, water, or sewer (Approximate Locations).
- Alternative B**
 Crandall Point:
 Develop public day-use area including: beach area & access, lakeside boat access (no formal launch facilities), no-wake zone, picnic pavilions & enlarged parking lot.
- T
- Northwest Shore:
 Design & construct public golf course and/or cross country ski facility.
Moderate Use Area: power, water, & sewer.
- G

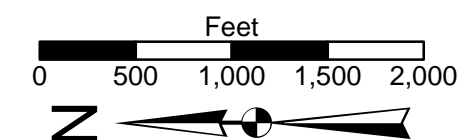


Figure 2-2:
 Proposed Crandall Point &
 Northwest Shore Alternatives

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Legend

- Highway/State Route
- Perimeter Trail
- Project Management Boundary
- Alternative A**
Install access trails to reservoir; Allow access to Perimeter Trail from other trail systems.
- Pursue improved access from State Route 248.
- Designate the existing wakeless use area for beaches & non-motorized watercraft use.
- Pursue concession opportunities, e.g., bike,non-motorized boat, and/or horse rental.
- Alternative B**
Develop public day-use area including: lakeside boat access (no formal launch facilities), picnic pavilions, access to the reservoir/shoreline, & manned fee station.
Recreation opportunities may include: fishing, windsurfing, horseshoe pits, wildlife viewing, ice-fishing, interpretive programs.
- Allow development by private entities for public use within the Project Management Boundary including: soccer field, sand volleyball court, day-use facilities, & non-motorized boat dock.

Yellow Icons are existing facilities that will not be changed in any proposed alternatives. Existing facilities labeled in Figure 1-6.

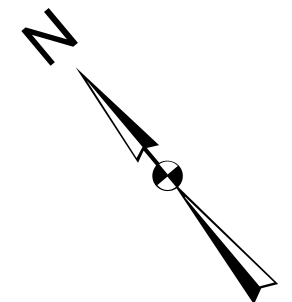
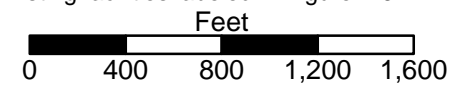
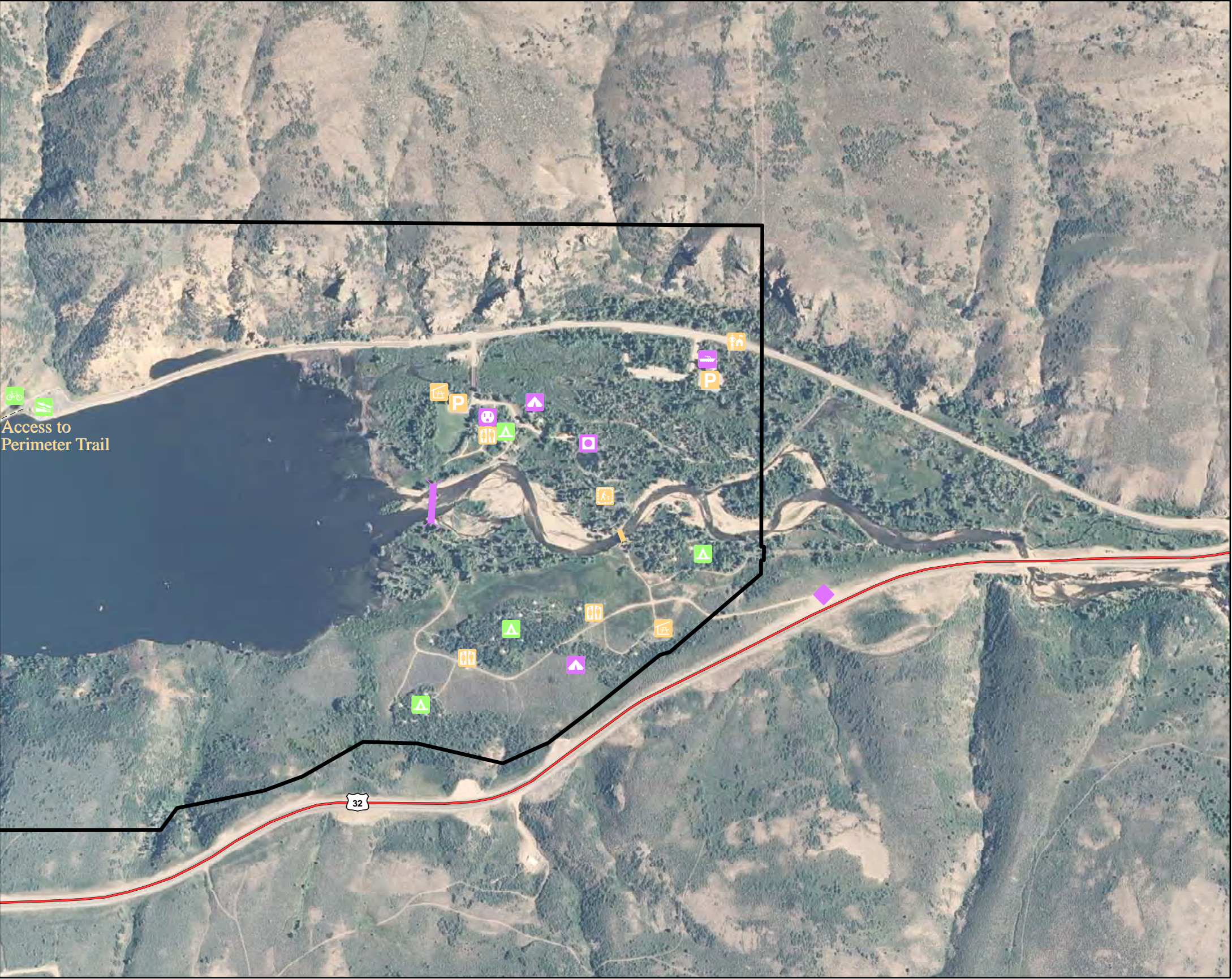


Figure 2-3:
Proposed Ross Creek Recreation Area
Alternatives

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Legend

— Highway/State Route

- - - Perimeter Trail

Project Management Boundary

▲

Alternative A
Consider alternative camping methods (e.g., yurts, cabins). Add pavilions as needed. (Location TBD)

◻

Maintain Nature Center & pursue other opportunities or uses to maintain & create additional education facilities.

🚤

Require mandatory boat inspection for aquatic invasive species & provide boat decontamination station.

✂

Remove existing utilities from the bridge & relocate as appropriate.

🔌

Provide electrical hookups for camp host.

◆

Pursue improved access from State Route 32.

▲

Alternative B
Provide improvements to campground including: RV access with drive-to campsites & utility connections for RV sites. Add day-use facilities.

🚤

Enlarge boat ramp to accommodate large watercraft.

🚲

Improve trail for biking in specified locations.

Icons shown are for alternatives that correspond to a physical location. Refer to Table 2-1 for complete list of alternatives.

Yellow Icons are existing facilities that will not be changed in any alternative. Existing facilities are labeled in Figure 1-7.

Feet

03006009001,200

N

Figure 2-4:
Proposed Rock Cliff Recreation Area
Alternatives

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Chapter 3: Affected Environment

3.1 Geology, Soils and Mineral Resources

Geologic and soil resources within the Project Management Area can be affected by weather, natural erosion, wind, and physical alterations. This section discusses the geologic and mineral resources and soil conditions in the project vicinity.

3.1.1 Geology

Jordanelle Reservoir is in an area of fairly complex geology. A geologic map of the project vicinity can be seen on Figure 3-1. The majority of the north arm of the reservoir is Quaternary alluvium. The majority of the alluvium was deposited during the Pleistocene and is composed of gravel, silty gravel, and sandy silt deposited approximately 730,000 years ago in alluvial fans (USDA, 1976). In and adjacent to existing channels, alluvium has been deposited during the Holocene in the channels and flood plains. These Holocene deposits are no more than three meters thick and can be composed of boulders to pebble gravel, sand, silt, and clay.

The alluvial deposits in the east arm of the reservoir were deposited during the Holocene and are associated with the Provo River and its flood plain. The east arm of the reservoir is defined by steeply sloped Tertiary materials associated with volcanic activity, primarily flow breccia and tuff. Areas of intrusive rock and breccia are found in areas of the extrusive flow breccia and tuff. The dam abutments are composed of these intrusive rock and breccia.

Faulting in the project vicinity is limited to a couple of concealed normal faults west of the reservoir. The location of these concealed faults can be seen on Figure 3-1. The faults have been concealed by the accumulation of alluvial material in the valley. Extensive faulting and folding is present in the mountains west of the reservoir (Bryant, 1990).

3.1.2 Mineral Resources

The area in the vicinity of Jordanelle Reservoir has a history of mining activity. Gold, silver, copper, lead, and zinc have been produced in local mines. The Mayflower Mine (Park Galena Mine) was the largest mine in the immediate area. This mine was operated until 1972. Another mine in the area was the Olson/Neihart Mine. Other small mines and prospects are located in or adjacent to the Project Management Area. These mines processed ore and produced tailings which were left in the project vicinity. The tailings are discussed in more detail in Sections 3.3 and 3.14.

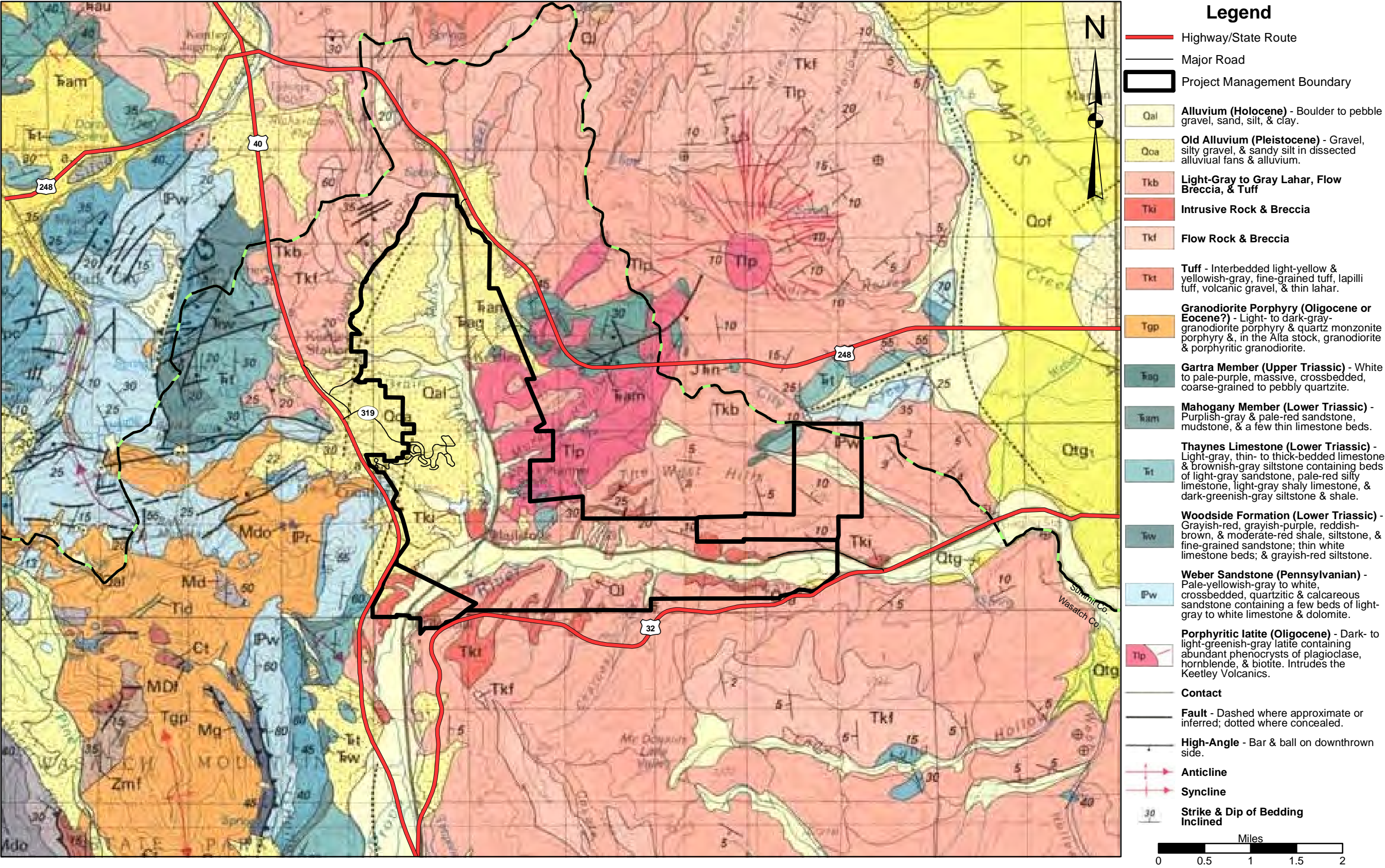
Active mining in the vicinity is currently not occurring and is unlikely. The land associated with mining is more likely to be developed for recreational opportunities rather than mineral resources. When Reclamation acquired the land for Jordanelle Reservoir, an effort was made to acquire the mineral rights as well. However, some mineral rights are still held by individuals or corporations. Although there seems to be little chance of mineral rights being developed, there is the possibility that it could occur. Mineral rights held by Reclamation will not be utilized. Based on no known ore reserves in the project vicinity, no future development of mineral resources is expected to occur within the Project Management Boundary.

Based on visual observation and review of aerial photographs, no sand and gravel pits or quarries are located within the Project Management Boundary. There is little chance of sand and gravel being developed in the project vicinity due to the high fines content in the soils. It is unlikely that a quarry will be developed due to permitting difficulties associated with its proximity to high value property and visual impacts (USDA, 1976).

3.1.3 Soils

The soils adjacent to the Jordanelle Reservoir have been derived from generally two types of rocks. The soils on the west side of the reservoir have generally been derived from mixed sedimentary rocks with influence by andesitic materials. Soils east of the reservoir, including areas adjacent to the east arm of the reservoir, were derived from Andesite. Andesite is an extrusive (formed on the surface) volcanic rock. The soil types found around Jordanelle Reservoir can be seen on Figure 3-2. The area around Jordanelle Reservoir has an extensive history of volcanic activity. Areas west of the reservoir were not extensively covered by andesitic material but may have had thin layers of andesitic material that have weathered away and/or layers of ash from the volcanic activity. In this way soils derived primarily from mixed sedimentary rocks on the west side of the reservoir show an influence from andesitic materials. The alluvial soils associated with the Provo River and Ross Creek are derived from the rock types found in the river or creek's watershed. The alluvial soils associated with the north arm of the reservoir are derived primarily from mixed sedimentary soils because most of the watershed is west of the reservoir in an area of mixed sedimentary rocks. Alluvial soils adjacent to the Provo River or in the east arm of the reservoir were derived mostly from Andesite rocks (USDA, 1976/Bryant, 1990).

The Soil Survey of Heber Valley Area identifies seven soils series within the Project Management Boundary with the soil series being further delineated into mapping units (USDA, 1976). Seventeen soil-mapping units can be found within the Project Management Boundary. The soil series and mapping units are identified on Figure 3-2. Soil limitations for soil types within the Project Management Area can be seen on Table 3-1, which identifies soil limitations for activities that currently, or may, occur within the Project Management Boundary such as suitability for trails, septic tanks, roads, etc.



Adapted: Bryant, Bruce, 1990. Geologic Map of the Salt Lake City 30'x60' Quadrangle North Central Utah and Uinta County Wyoming. USGS Map I-1944

Figure 3-1: Geologic Map

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Table 3-1: Soil Limitations

Soil Symbol	Soil Type	Soil Limitations For:						
		Camp/Picnic Areas	Trails	Sand and Gravel	Septic Systems	Roads	Excavations	Depth of Soils
BTC	Broadhead Soils, 6 to 15% Slopes	Moderate: slope	Slight	Unsuitable: excessive fines	Severe: slow permeability	Severe: high shrink swell and slope	Severe: steep, high coarse mat.	>60
BTD	Broadhead Soils, 15 to 25% Slopes	Severe: slope	Moderate: slope	Unsuitable: excessive fines	Severe: slow permeability	Severe: high shrink swell and slope	Severe: steep, high coarse mat.	>60
BPD	Broadhead-Little Pole Association, Hilly	Severe: slope and cobbles	Moderate: slope and cobbles	Unsuitable: excessive fines	Severe: slow permeability	Severe: high shrink swell and slope	Severe: steep, high coarse mat.	>60
BPC	Broadhead-Little Pole Association, Mod. Steep	Severe: slope and cobbles	Severe: slope and cobbles	Unsuitable: excessive fines	Severe: slow permeability	Severe: high shrink swell and slope	Severe: steep, high coarse mat.	>60
BPE	Broadhead-Little Pole Association, Steep	Severe: slope and cobbles	Severe: slope and cobbles	Unsuitable: excessive fines	Severe: slow permeability	Severe: high shrink swell and slope	Severe: steep, high coarse mat.	>60
BPF	Broadhead-Little Pole Association, Very Steep	Severe: slope and cobbles	Severe: slope and cobbles	Unsuitable: excessive fines	Severe: slow permeability	Severe: high shrink swell and slope	Severe: steep, high coarse mat.	>60
FA	Fluventic Haploborolls	Severe: shallow water table	Severe: shallow water table	NA, Material too variable	NA, Material too variable	NA, Material too variable	NA, Material too variable	NA
HJC	Henefer Soils, 6 to 10% Slope	Moderate	Slight	Unsuitable	Severe: slow permeability	Severe: high shrink swell and slope	Severe: clayey	>60
HJD	Henefer Soils, 10 to 25% Slope	Severe: slope	Moderate: slope	Unsuitable	Severe: slow permeability	Severe: high shrink swell and slope	Severe: clayey	>60
HJE	Henefer Soils, 25 to 50% Slope	Severe: slope	Severe: slope	Unsuitable	Severe: slow permeability	Severe: high shrink swell and slope	Severe: clayey	>60
HHF	Henefer-Wallsburg Association, Very Steep	Severe: slope	Severe: slope	Unsuitable	Severe: slow permeability	Severe: high shrink swell and slope	Severe: clayey	>60
HWC	Horrocks-Broadhead Association Mod. Steep	Moderate: slope	Slight	Unsuitable	Moderate	Moderate	Severe: high coarse mat.	>40
HWE	Horrocks-Broadhead Association, Steep	Severe: slope	Severe: slope	Unsuitable	Severe: slope	Severe: slope	Severe: high coarse mat. and slope	>40
Kc	Kovich Loam	Severe: shallow water table	Severe: shallow water table	Unsuitable	Severe: high water table	Severe: high water table	Severe: high water table	>60
LPD	Little Pole Very Cobbly Sandy Clay Loam, 6 to 25% Slopes	Severe: cobbles	Severe: cobbles	Unsuitable	Severe: shallow bedrock	Severe: shallow bedrock	Severe: shallow bedrock	12-24
LPF	Little Pole Very Cobbly Sandy Clay Loam, 40 to 60% Slopes	Severe: slope and cobbles	Severe: slope and cobbles	Unsuitable	Severe: shallow bedrock	Severe: shallow bedrock	Severe: shallow bedrock	12-24
RCC	Rasband Coarse Sandy Loam, 6 to 15% Slopes	Slight	Slight	Unsuitable to Poor	Slight	Moderate	Severe	>60

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The vast majority of land within the Project Management Area has been classified by the Utah Geologic Survey as having a low or moderate landslide potential. The landslide potential is determined by the type of soil and inclination of the slope. Nearly all of the shoreline on the north arm of the reservoir has a low landslide hazard due to shallow slopes. Limited areas with steeper slopes have a moderate landslide potential. Most areas along the east arm of the reservoir have a moderate landslide potential due to steeper slopes. The areas with a high landslide potential occurs downstream of the dam and along the east arm of the reservoir. The landslide potential at the dam site is low to moderate. Some very small areas of high landslide hazard have also been identified near Crandall Point. The largest area of high landslide hazard occurs downstream of the dam in the Primary Jurisdiction Zone. Hailstone, Ross Creek and Rock Cliff Recreation Areas are all in areas with a low landslide hazard. However, slopes adjacent to the Rock Cliff Recreation Area have moderate and high landslide potential.

Soil types specific to areas of potential future development are Henefer soils 10 to 25% slopes in the Hailstone Recreation Area, Henefer Soils 25 to 50% slopes in the Hailstone Recreation Area and Crandall Point. The Horrocks-Broadhead moderately steep and steep are the dominant soil types at Crandall Point and in the Ross Creek Recreation Area. Finally, the alluvial Fluventic Haploborolls is the dominant soil type in the Rock Cliff Recreation Area. The soils in the Hailstone Recreation Area provide the best soil conditions for camping/picnic areas, and trails. However, the soil conditions for septic systems, roads, and structures are poor. Considerable effort in design and construction is needed to accommodate the poor soil conditions. The soils at Crandall Point and the Ross Creek Recreation Area have difficult soil conditions for most types of improvements. Most common challenges are associated with the steep slopes. The soils are also clayey with slow permeability and high shrink swell potential. Thus, any improvements will require careful design and construction, taking into account the difficult soil conditions. The soils in the Rock Cliff Recreation Area are extremely variable due to the meandering nature of the Provo River. Thus, no specific soil characteristics are provided in the Soil Survey of the Heber Valley Area. However, it can be stated with confidence that the soil conditions will present many challenges for any development. The water table is high and the nature in which the soils were deposited means there could be significant organic matter in the soils. Whenever there is organic matter in soils, the potential for differential settlement is high. The fact that the Provo River meanders through this area presents constantly changing conditions in not only soils but also in hydrology and vegetation (USDA, 1976).

3.2 Water Resources

This section describes the historic and current water supply, water demand, and reservoir operations of Jordanelle Reservoir.

3.2.1 Water Supply

Water Rights

Storage of Provo River water in Jordanelle Reservoir is made possible by the development of Colorado River water in the Uintah Basin. The Bonneville Unit, through construction of the enlarged Strawberry Reservoir and other reservoirs and conveyance facilities, develops water in the Uinta Mountains in northeast Utah for trans-basin diversion to Utah Lake in the Bonneville Basin. Provo River water that would otherwise have been stored in Utah Lake is then stored in Jordanelle Reservoir and replaced in Utah Lake by the Colorado River water released from Strawberry Reservoir. The project also has surplus rights on the Provo River that are stored without need for replacement in Utah Lake. The surplus flows are stored under criteria in the State Engineer's Utah Lake Distribution Plan.

Water rights associated with Jordanelle Reservoir are summarized in Table 3-2. In addition to the water rights shown in Table 3-2, the Deer Creek/Jordanelle Reservoirs Operating Agreement (DJOA) allows Jordanelle Reservoir rights to be stored on a space-available basis in Deer Creek Reservoir for later exchange upstream to Jordanelle Reservoir. The DJOA is described in greater detail in Section 3.2.3 below.

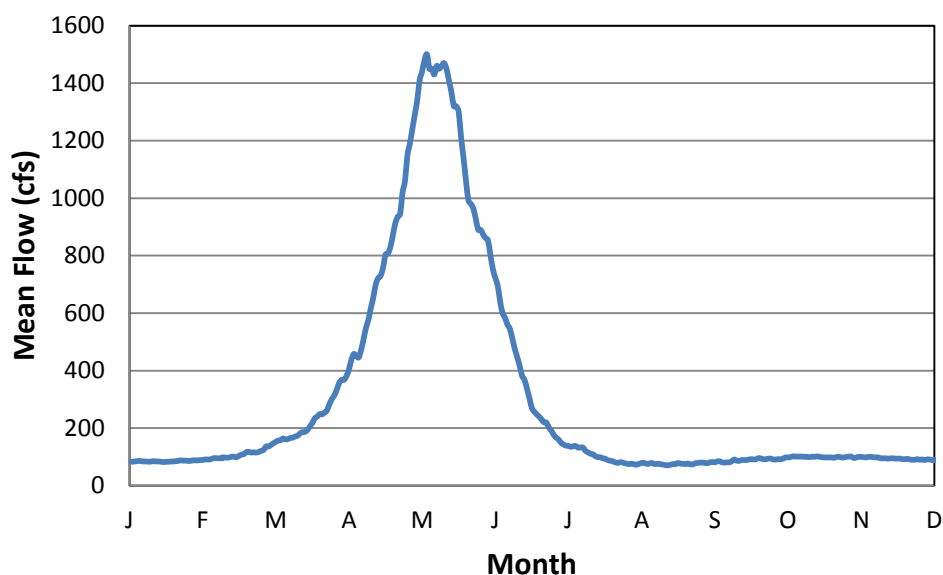
Table 3-2: Water Rights Associated with Jordanelle Reservoir

Water Right No.	Purpose
A40523 (55-4494)	Appropriates up to 300,000 ac-ft/yr of surplus flows in the Provo River Basin
A40524 (55-4495)	Appropriates 400 cfs of surplus flows of the Provo River to be diverted directly or by exchange to serve the project requirements.
E398 (55-8506)	Exchanges water from Strawberry Reservoir to Jordanelle Reservoir via Utah Lake and the Provo River
E400 (55-8505)	Exchanges Jordanelle Water to upstream points of diversion
A36639 (43-3822)	Allows water in Strawberry Reservoir to be delivered to Utah Lake and exchanged to Jordanelle Reservoir.
Change a17707 (various water right's)	Moves various water rights to Jordanelle Reservoir for the wetlands below the dam
Change a17787 (55-8712)	Covers the wildlife observation pond in the Rock Cliff State Park
Water Right Nos. 55-11108, 55-11111 through 11120, and 55-11558.	Change applications have been filed on all the water rights associated with the Upper Provo River reservoirs that Reclamation stabilized.
Water Right No's 55-11100 and 55-73	These Olmsted Power water rights, by contract, can be diverted and stored in either Deer Creek or Jordanelle Reservoir for the benefit of CUP.

Source: Record, 2011

Stream Flow Records

Jordanelle Reservoir Inflow The majority of water stored in Jordanelle Reservoir comes from the Provo River, either through direct storage of surplus flows or storage by exchange, with a smaller amount from McHenry Creek, Ross Creek, and other minor surface and groundwater sources. Flows from the Provo River fluctuate widely based on climatic conditions. Figure 3-3 shows Provo River annual flow variations based on daily averages measured at the Provo River Hailstone Gage immediately upstream of Jordanelle Reservoir for the last 30 years. Figure 3-4 shows annual variations over a long-term period from 1980 to 2010.



**Figure 3-3: Provo River Inflow to Jordanelle Reservoir (Hailstone Gage),
30-year Average Daily Flows (USGS, 2011)**

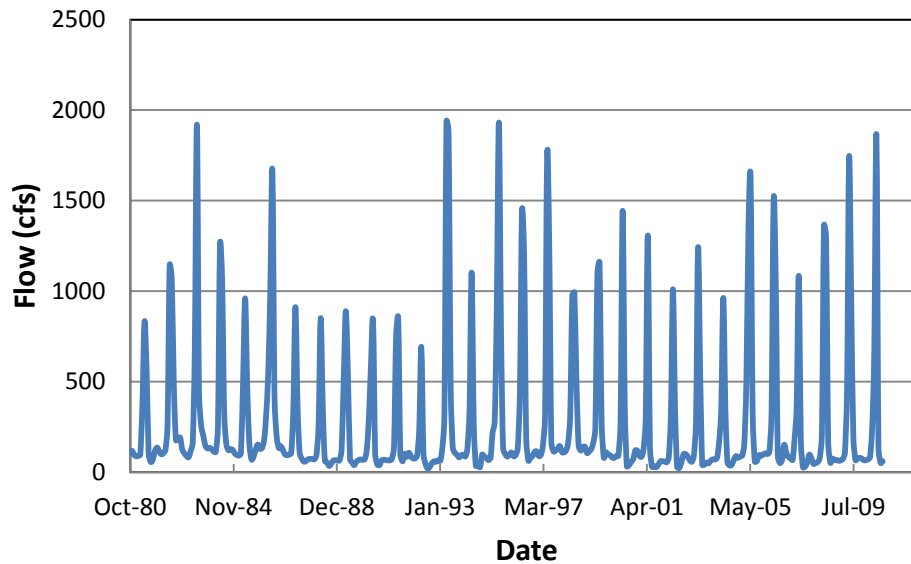


Figure 3-4: Provo River Inflow to Jordanelle Reservoir (Hailstone Gage), Annual Variations based on Mean Monthly Flows (USGS, 2011)

Jordanelle Reservoir Outflow Currently, all water stored in Jordanelle Reservoir is released through the reservoir outlet works and/or the power plant to the Provo River. Historic releases from Jordanelle Reservoir from 1993 to 2010 are shown in Figure 3-5.

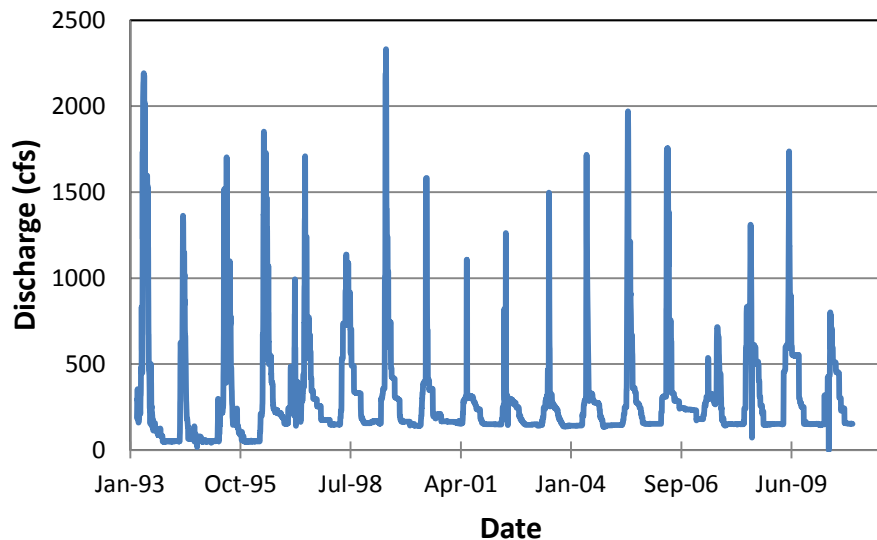


Figure 3-5: Releases from Jordanelle Reservoir, 1993 to 2010 (Reclamation, 2011)

Groundwater

The only groundwater utilized by the project is for culinary and irrigation use in the Hailstone Recreation Area. Water for the Rock Cliff Recreation Area is provided by the town of Francis. Water right number A20140 (55-11158) allows pumping up to 79.0 ac-ft/yr from two wells for use at two homes, irrigation of up to 12.1 acres, and other miscellaneous recreational uses in the Hailstone Recreation Area. The water right also includes a 1.2 ac-ft storage right. Two wells were drilled but only one is currently used, as the first well failed. During summer months, the well operates continuously and is unable to meet the peak summer culinary and irrigation needs. Total water use for calendar years 2009 and 2010 was 44.7 ac-ft and 47.6 ac-ft, respectively. Based on this historic use, an additional 31.4 ac-ft/yr (79.0 ac-ft less 47.6 ac-ft) of water could be developed to meet the current water shortages within the Hailstone Recreation Area (Record, 2011).

3.2.2 Water Demand

Jordanelle Reservoir develops 107,500 ac-ft of water per year for municipal, industrial, and agricultural purposes. The majority of this water (92,400 ac-ft/yr) has been allocated for M&I use in Wasatch, Utah, and Salt Lake counties and the remainder (15,100 ac-ft/yr) for agricultural use in Wasatch and Summit counties. Some shifts in water use from agriculture to M&I are anticipated as the demand for M&I water increases in the future due to population growth in Wasatch and Summit counties. (CUWCD, 2004).

The Central Utah Project also provides water for minimum stream flows in the Provo River for stream fishery purposes. A 10 cfs minimum flow is maintained in the Provo River below the Washington/South Kamas Canal diversion (above Jordanelle Reservoir), 125 cfs below Jordanelle Dam, 100 cfs below the confluence of the Provo Deer Creek and Provo River below Deer Creek Dam, and 25 cfs below the Olmsted Diversion Dam during the non-irrigation season.

3.2.3 Jordanelle Reservoir Operation

Operation Overview

Water stored in Jordanelle Reservoir consists of 1) Provo River water that is surplus to all prior rights on the Provo River (including Utah Lake) and 2) Provo River water that is stored by utilizing either the Utah Lake/Jordanelle exchange or the Deer Creek/Jordanelle exchange. Operation of the Provo River is managed by the Utah State Engineer's office in conjunction with CUWCD and the Provo River Water Users Association (PRWUA) consistent with the November 1, 1992 "Water Distribution Plan for the Utah Lake Drainage Basin" and terms of the November 1, 1994 "Deer Creek/Jordanelle Reservoirs Operating Agreement."

Utah Lake Distribution Plan The Utah Lake/Jordanelle exchange allows Provo River water that otherwise would be stored in Utah Lake and used by Utah Lake

users to be stored in Jordanelle Reservoir for the benefit of CUWCD, conditioned on a like amount of water being replaced in Utah Lake. The water would be replaced to Utah Lake from other CUWCD sources including but not limited to a releases from Strawberry Reservoir and CUWCD water rights in Utah Lake.

Deer Creek/Jordanelle Reservoirs Operating Agreement (DJOA) The Deer Creek/Jordanelle exchange allows CUWCD water to be stored in Deer Creek Reservoir on a space available basis for later exchange upstream to Jordanelle Reservoir. The exchange upstream is made primarily during the spring runoff months (May-July) by storing Deer Creek water (primarily import water from the Duchesne and Weber Rivers) in Jordanelle Reservoir.

Jordanelle Reservoir is operated in conjunction with Deer Creek Reservoir. On November 1, 1994, DJOA was signed by the United States, PRWUA, and CUWCD. This agreement, among other things, allows CUP water to be stored in Deer Creek Reservoir on a space available basis for the benefit of CUP petitioners to effect the Deer Creek/Jordanelle Exchange” described above. The coordinated operation of these two reservoirs is essential to meeting the water demands of the Jordanelle Project including the need to maintain the CUP-required minimum instream flows at the various locations along the Provo River.

Reservoir Storage Capacity

The storage capacity of Jordanelle Reservoir is allocated as shown in Table 3-3. As shown in the table, the total reservoir capacity is 363,354 ac-ft, the live capacity is 360,328 ac-ft (active conservation, joint use, and exclusive flood control), and the active capacity is 310,980 ac-ft (active conservation and joint use). Jordanelle Reservoir is considered full when it reaches elevation 6,166.4 feet. The active capacity (top of joint to top of inactive) is used for water supply storage to meet project water demands. The Joint Use capacity is used for both water supply (part of active capacity) and for flood control. Exclusive Flood Control capacity, as the name implies, is used exclusively for flood control.

Table 3-3: Jordanelle Reservoir Capacity Allocation

Level	Elevation (feet)	
Crest of Dam	6,185.0	
	3.0 feet	Freeboard
Maximum Water Surface	6,182.0	
	0 ac-ft	Surcharge
Top of Exclusive Flood Control	6,182.0	
	49,348 ac-ft	Exclusive Flood Control
Top of Joint Use	6,166.4	
	98,323 ac-ft	Joint Use
Top of Active Conservation	6,130.0	
	212,657 ac-ft	Active Conservation
Top of Inactive	5,902.0	
	0 ac-ft	Inactive
Top of Dead	5,902.0	
	3,026 ac-ft	Dead
Streambed	5,886.0	
	363,354 ac-ft	Total

Source: Jordanelle Reservoir Capacity Allocations Table originally prepared on December 18, 1992 and revised on December 9, 2010. Provided by Reclamation, April 2011.

Water Level Fluctuations

The surface elevation of Jordanelle Reservoir fluctuates from year to year in response to the hydrologic water year and reservoir releases to meet project demands. Since large amounts of water are required to meet dry (low inflow) water year demands, the reservoir can be drawn down significantly and fairly rapidly, especially during extended drought periods.

The water level can also fluctuate above the normal water elevation of 6166.4 feet when the exclusive flood control portion of the reservoir capacity is utilized. Under flood control conditions, the water level could reach 6182 feet, at which point State Parks facilities could be inundated.

Since it is difficult to predict long-range climatic conditions, Reclamation projected backwards over a 44-year period, calculating reservoir levels that would have occurred had the reservoir been in existence. These theoretical reservoir levels are shown in Figure 3-6. This data shows that the reservoir would have been near empty once (water year 1934) during the 44-year period of study. Actual historic reservoir elevations from February 1993 to March 2011 are shown in Figure 3-7.



Figure 3-6: Theoretical Reservoir Elevations (Reclamation, 2011)

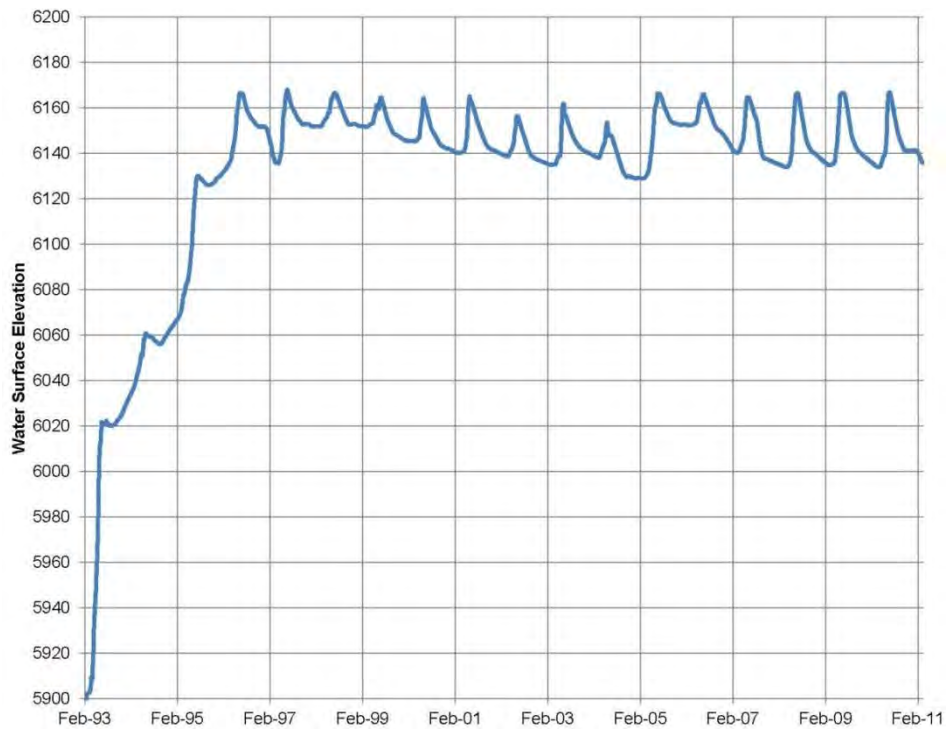


Figure 3-7: Historical Reservoir Elevations (Reclamation, 2011)

3.3 Water Quality

3.3.1 Overall Health of Reservoir

The quality of water in Jordanelle Reservoir is rather healthy overall. It's Trophic State Index has been consistently in the middle of the mesotrophic zone (around 45) for the past five years. This has occurred even though the flows into Jordanelle have been quite different over the five-year period.

Jordanelle Reservoir is classified by the Utah Department of Environmental Quality (and protected) for the following beneficial uses, as given in section R317-2-6. Use Designations:

- Class 1C – Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water.
- Class 2A – Protected for frequent primary contact recreation where there is a high likelihood of ingestion of water or a high degree of bodily contact with the water. Examples include, but are not limited to, swimming, rafting, kayaking, diving, and water skiing.
- Class 3A – Protected for cold-water species of game fish and other cold-water aquatic life, including the necessary aquatic organisms in their food chain.
- Class 4 – Protected for agricultural uses including irrigation of crops and stock watering.

The Provo River upstream and downstream of Jordanelle Reservoir is classified the same as Jordanelle Reservoir, except it is classified as Class 2B instead of Class 2A, for body contact and likelihood of ingestion.

- Class 2B – Protected for infrequent primary contact recreation. Also protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing.

Even though Jordanelle is a healthy reservoir, there are still algae blooms that occur in the late spring and early summer. The algae bloom in May 2008 corresponded to elevated phosphorus levels at the surface of the reservoir.

Surface water temperatures in Jordanelle Reservoir also rise during the summer months. Temperatures in July and August of 2008 were above the State's Water Quality Standard for a cold-water fishery (Wasatch County Council, 2009).

3.3.2 Mine Tailings

When Reclamation was conducting the comprehensive studies for the Bonneville Unit M&I System FES in the late 1970's, studies were conducted on the quality of the water in the Provo River above and below the proposed Jordanelle Dam

Site. The water quality in the two small tributaries that flowed into the Provo River just above the proposed dam site was also looked at, since both the Ontario Drain Tunnel No. 2 (then a tributary to Ross Creek) and McHenry Creek received acid mine drainage water. The Ontario Drain Tunnel No. 2 discharged about 12-15 cfs into Ross Creek, and the Mayflower Mine discharged less than ½ cfs into Big Dutch Pete Hollow, a tributary to McHenry Creek (see Figure 3-8). These four small streams now flow separately into Jordanelle Reservoir. Both mines have been abandoned since the early 1970's. Both mine discharges currently contain elevated levels of various trace elements including cadmium, copper, and zinc. The entire flow from the Ontario Drain Tunnel is currently treated by JSSD under a UPDES permit for metals prior to discharge to Jordanelle Reservoir or for drinking water delivery. Traces of mercury are also present in the north arm due to little inflow and limited mixing with the main part of the reservoir (Provo River arm).

Because of the acid mine discharges and the mine tailings that had been spilled and scattered along McHenry Creek and deposited into a small irrigation reservoir just above the proposed Jordanelle dam site, Reclamation indicated in the Bonneville Unit M&I System FES there was a potential for elevated heavy metals concentration, particularly in the Ross Creek (north) arm of Jordanelle Reservoir. During the construction of Jordanelle Dam, Reclamation spent over ten million dollars to clean up the mine tailings that had been slurried into the small irrigation reservoir and the mine tailings spilled in the McHenry Creek drainage. The mine tailings were handled as a hazardous waste under EPA guidelines, and were encapsulated and stabilized in a clay lined and clay capped impermeable envelope, in a location just east of Highway 40, significantly above Jordanelle Reservoir. Reclamation is required by the DEQ, Division of Water Quality to have a Groundwater Discharge Permit. Under this permit, Reclamation monitors the site twice a year for any signs of surface erosion, and collects water quality samples from the one up-gradient and the three down-gradient monitoring wells. Reclamation then submits the water quality data, groundwater levels, and other pertinent information in an official monitoring report and informs the State of Utah of any violations of the Permit conditions.



Figure 3-8: Drainages into West Side of Jordanelle Reservoir

3.3.3 Technical Advisory Committee

Due to the above mentioned potential water quality issues, when Reclamation submitted the draft Bonneville Unit M&I System Environmental Statement to EPA for approval, the EPA considered opposing the project and submitting a negative determination to the Council on Environmental Quality. Reclamation (Regional Director N. W. Plummer) met with the State of Utah in July 1979, and the Governor (Scott M. Matheson) agreed to take the lead in establishing an interagency technical advisory committee to develop a Water Quality Management Plan for the Deer Creek and Jordanelle Reservoirs.

This group was named the Jordanelle Technical Advisory Committee (JTAC) and includes federal, state and local agencies, water districts, and municipalities. They completed the initial Water Quality Management Plan in 1984. They have met quarterly since that time, and each year they conduct comprehensive water quality studies on the Provo River and on the Deer Creek and Jordanelle reservoirs, and prepare an annual Water Quality Management Plan and Implementation Report. The area included in the annual analysis and report has been expanded to include essentially the entire Provo River system from the Upper Provo to Utah Lake. The name of the group has been changed to the Provo River Watershed Council to reflect the entire watershed approach.

Each year the Provo River Watershed Council monitors water quality at numerous stations on the Provo River and on Deer Creek and Jordanelle Reservoirs. The main parameters include flow, total phosphorus, dissolved total phosphorus, TMDL phosphorus loads, total suspended solids, chlorophyll, Secchi Disk depths, stream temperature, temperature profiles in the reservoirs, dissolved oxygen profiles in the reservoirs, dissolved nitrates and dissolved total phosphorus in groundwater, trace elements, and recently (2008) pharmaceuticals. Two pharmaceuticals, diazepam and ibuprofen were found in measurable quantities in the Provo River at River Road and downstream around Deer Creek Reservoir and below.

The 2009 Water Quality Implementation Report also indicates that cadmium and zinc in Big Dutch Pete Hollow below the Mayflower Mine above Jordanelle Reservoir are a concern. The cadmium concentration exceeded the state standard 50% of the time and the average concentration is also above the cadmium standard of 2 ug/L. The zinc concentration exceeded the 3A aquatic wildlife standard of 120 ug/L all of the time. This is drainage from mines in the vicinity. The flow is relatively small and is greatly diluted as it flows into McHenry Creek and on into Jordanelle Reservoir, so the overall effect is minor.

In July 2009, the UDWR issued a New Fish Consumption Advisories notice for the state, along with a map showing the mercury sampling sites and consumption advisories. It includes a Fish Consumption Advisory for mercury in brown trout and smallmouth bass in Jordanelle Reservoir. For more information, visit the Utah Fish Advisories website: <http://www.fishadvisories.utah.gov/>.

3.4 Air Quality, Climate, Noise

Air quality within the Project Management Area can be affected by weather patterns, natural airborne pollutant emission sources such as dust or smoke, and emissions from both stationary and mobile manmade sources. This section discusses the existing climatic conditions, air quality, and sources of emissions in the project vicinity, as well as describes laws and regulations that may be applicable to the RMP.

In addition, this section considers the existing noise environment within the Project Management Area from the noise sources and the effects of noise on sensitive receptors.

3.4.1 Climate

The climate of the project vicinity is continental. It features low humidity, abundant sunshine all year except in winter and early spring, relatively light precipitation and wide ranges in annual temperature.

Summer temperatures are cool and pleasant. In the summertime, many valley residents of the Wasatch Front visit the reservoir to escape high temperatures. The Project Management Area is usually 11 °F cooler than Salt Lake City, as it lies mostly above 6,000 feet above sea level, while Salt Lake City is situated at an altitude of about 4,000 feet.

During the warmest month (July), maximum temperatures are generally in the middle eighties and the minimum in the middle forties. Winter temperatures are very cold. The January average minimum is only 6 °F and the maximum is in the middle thirties (Wasatch County Planning Commission, 2010).

The bulk of the precipitation is received during the period of October to May, when low-pressure storms from the Pacific Ocean frequent the region. On an average, the heaviest amounts occur during December and January, but there is a secondary maximum in August when summer thunderstorms occur. Snow averages at 76 inches per year and rain averages at 16 inches per year (Key to the City, 2009).

Winds are generally light to moderate during all seasons of the year, but they become quite strong during storms.

3.4.2 Regional and Local Air Quality

Air quality in the Project Management Area presently meets the standards established by the EPA for all criteria pollutants.

The Clean Air Act identifies six common air pollutants that are found all over the United States and can injure health, harm the environment or cause property damage. These pollutants include:

- Carbon Monoxide
- Lead
- Nitrogen Dioxide
- Particulate Matter (PM₁₀) and (PM_{2.5})
- Ozone
- Sulfur Oxides

The EPA has established National Ambient Air Quality Standards (NAAQS) for each of these pollutants. If the air quality in a geographic area meets NAAQS, it is called an attainment area. Areas that do not meet the NAAQS are called nonattainment areas and must develop a comprehensive state plan to reduce pollutant concentrations to a safe level.

These nonattainment areas are centered primarily on high population areas. The Project Management Area currently does not reside in a nonattainment area. Therefore, being in an attainment area, the pollutant concentrations are at a safe level. The goal is to stay at a safe level of air quality.

3.4.3 Air Quality Regulations

Under the Clean Air Act of 1970, the EPA developed primary and secondary NAAQS for each of the seven criteria pollutants: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, fine particulate matter, and sulfur dioxide. These standards establish pollution levels in the United States that cannot legally be exceeded during a specified time period.

Jordanelle air quality is also protected by standards described in the State of Utah's State Implementation Plan (SIP) which was originally submitted to the EPA in 1972 and has since been revised to attain and maintain the NAAQS in attainment and nonattainment areas.

In addition, the State of Utah developed rules and revised the SIP to implement the Prevention of Significant Deterioration (PSD) program. The EPA approved Utah's PSD program on February 12, 1982. All attainment and unclassifiable areas in the state must be designated as Class I, Class II or Class III under the PSD. The classification differs in the amount of development allowable within the area. In Utah, the only areas designated as Class I areas (the most restrictive limits on development) are the five state National Parks. The nearest Class I area is Capitol Reef National Park, which is approximately 150 miles south of Jordanelle Reservoir. All other areas in the state are currently classified as Class II areas, which mean that industrial growth is allowed in these areas, but in many

parts of the state where the air is exceptionally clean, the air quality will not be allowed to degrade to the level of the NAAQS.

3.4.4 Noise

Noise can be defined as the intensity, duration, and character of sounds from any and all sources. Although subjective, sound generated from natural sources such as flowing water, wind, or wildlife is often considered welcome as a beneficial quality of the surrounding environments. Conversely, human-induced noise sources such as vehicle traffic, motorized watercraft operation, and gasoline-powered equipment (e.g., generators and maintenance equipment) are often considered annoying.

The effects of noise can be experienced by both human and wildlife receptors, and, in certain circumstances, sound-wave vibrations can affect physical structures through shaking. Of primary consideration are the effects of noise on humans within the Project Management Boundary. Effects of noise on wildlife species are discussed, as relevant, in Section 3.6 (Fish and Wildlife Resources).

The discussion herein provides a means of considering the existing noise environment within the Project Management Boundary and effects of the RMP alternatives on existing noise levels. Measurements of actual noise levels within the Project Management Boundary have not been collected, and the discussion and assessment provided here is based on observation and qualitative consideration of noise characteristics within the Project Management Boundary. Because the RMP alternatives under consideration would not result in substantial changes to the types of noise-generating activities occurring within the Project Management Area, this qualitative consideration has been deemed appropriate for this assessment.

Noise Sources

In general, ambient noise levels at Jordanelle Reservoir are consistent with rural, open space areas. Background noise levels are relatively low in most areas, with exception of areas adjacent to roadways, including US Highway 40 on the western side of the reservoir, State Route 32 on the south shoreline, and State Route 248 on the northeastern side of the reservoir (see Section 3.10, Transportation and Access, for more detail on the transportation network in the project vicinity).

US 40 experiences moderate volumes of truck and passenger vehicle traffic, which creates a relatively continuous noise source. SR 248 and SR 32 experience much lower traffic volumes and vehicle speeds are lower, resulting in lower and less consistent noise levels. However, SR 248, although a minor arterial road, is considered the “back door” to Park City and is becoming an increasingly popular road to Park City commuters.

Other notable noise sources that contribute to the noise environment in the project vicinity vary depending upon time of day, weather, and season, and include those associated with motorized recreational activities on and adjacent to Jordanelle Reservoir, visitor activities at day-use and overnight campground areas, vehicular noise on area access roads, and snowmobile operation during the wintertime.

Of all the noise sources within the Project Management Area, motorized recreational vehicles may be the most prevalent. Noise from personal watercraft (PWC) and motorized boats is reflected off the water and, depending upon weather conditions, can be heard at locations far from the source. In addition, because sound levels from PWCs and other motorized boats are highly variable as a result of engine revving (as opposed to more constant sounds from a source such as pump or airplane), the noise tends to be more noticeable.

Sensitive Receptors

The effects of noise on human receptors, is dependent upon factors, including the presence of receptors and the sensitivity of such receptors. Participants in noise-generating activities are considered less sensitive to noise. Conversely, visitors or residents not participating in activities, which create significant noise levels, may be seeking solitude, and are therefore more affected by the presence of continuous or variable noise. It should be noted, that individual recreationists within the Project Management Area, may be considered as sensitive or less sensitive, depending upon time of day and the activities in which they are participating at any given time.

Evening, nighttime, and early morning hours are the times of day that most area visitors and residents are most sensitive to noise. Traffic volumes on US 40 and other area roadways are lighter, and the general solitude offered by decreased recreational activities during these times of day result in a greater prominence of any particular noise event that may occur. Thus, sensitive receptors are primarily considered to be visitors and residents present within the Project Management Boundary overnight, as well as users of day-use and fishing access areas.

Sensitive receptor locations within the Project Management Boundary include the current campgrounds and day-use areas within the Hailstone Recreation Area and the Rock Cliff Recreation Area. These areas are considered to be areas that may be sensitive to noise associated with reservoir recreation activities.

3.5 Vegetation, Wetlands, Noxious Weeds

This section discusses the existing vegetation conditions of the upland, riparian and wetland habitats that occur in the Project Management Area. It also identifies the noxious weed species that may be found in the Project Management Area, and discusses the management programs that are in place to control the introduction and spread of noxious weeds in the Project Management Area.

3.5.1 Vegetation Types

A general habitat map showing the various land cover and vegetation types within the Project Management Area was created using mapping data from the Southwestern Regional GAP Analysis Project (NBII 2011). The mapping data is based on Landsat satellite imagery that was acquired between 1999 and 2001 (Lowry, et. al., 2005). The Utah portion of the mapping was completed by the Remote Sensing/GIS Laboratory at Utah State University. The mapping data identified a total of 19 land cover types in the Project Management Area, which were grouped into 11 general habitat types for the purpose of the vegetation analysis (Table 3-4; Figure 3-9). General descriptions of the vegetation associated with the 11 habitat types are discussed below in the order listed in Table 3-4.

Table 3-4: General Habitat Types in the Project Management Area

Vegetation/Habitat Type	Acreage	Percent Total
Sparsely Vegetated Cliffs and Canyon Walls	61	0.9
Deciduous Forested Woodland	87	1.3
Coniferous Forested Woodland	15	0.2
Pinyon-Juniper Woodland	101	1.5
Mixed Gambel Oak Shrubland	695	10.4
Sagebrush Shrubland	2112	31.5
Grassland/Upland Meadows	101	1.5
Riparian Woodland and Shrubland	282	4.2
Wet Meadow	13	0.2
Open Water	3,024	45.1
Developed Land	213	3.2
Total	6,704	100

Source: Lowry, et al., 2005

Sparsely Vegetated Cliffs and Canyon Walls

Sparsely Vegetated Cliffs and Canyon Walls includes steep cliff faces, narrow canyon walls, talus slopes and smaller rock outcrops that typically have <10% vegetative cover. There may be small patches of dense vegetation, but it typically includes scattered trees and/or shrubs with little herbaceous cover. Plant species may include: aspen, ponderosa pine, juniper, sumac, alderleaf, juneberry, wild currant, wild rose, and Oregon grape. This habitat mainly occurs on the steep terrain bordering the Provo River stream corridor in the southeast portion of the Project Management Area.

Deciduous Forested Woodland

Deciduous Forested Woodland is comprised chiefly of aspen and bigtooth maple without a significant conifer component. The understory may be complex with multiple shrub and herbaceous layers, or simple with just an herbaceous layer. Understory species may include: common juniper, alderleaf, juneberry,

snowberry, wild currant, thimbleberry and Oregon grape. This habitat mainly occurs in the side drainages bordering the Provo River stream corridor in the southeast portion of the Project Management Area.

Coniferous Forested Woodland

Coniferous Forested Woodland is comprised chiefly of Douglas fir, white fir and ponderosa pine. Engelmann spruce and blue spruce may also be present. Small patches of aspen or bigtooth maple may be intermingled. The understory composition can be highly variable according to shading and moisture and may include: common juniper, Gamble oak, snowberry, alderleaf, juneberry and Oregon grape. This habitat mainly occurs in the side drainages bordering the Provo River stream corridor near the Rock Cliff Recreation Area.

Pinyon-Juniper Woodland

Pinyon-Juniper Woodland occurs in scattered patches on the dry foothills surrounding the Reservoir and is dominated by pinyon pine and/or Utah juniper. Rocky mountain juniper may be co-dominant. The understory may contain sagebrush and other drought tolerant forbs and grasses.

Mixed Gamble Oak Shrubland

Mixed Gamble Oak Shrubland is a dominant habitat found throughout the Project Management Area on the dry foothills surrounding the reservoir and is often situated above the pinyon-juniper woodland. It is comprised of dense, shrubby stands of Gamble oak.

Sagebrush Shrubland

Sagebrush Shrubland is the most abundant habitat type in the Project Management Area. It is found on the dry foothills surrounding the reservoir. It is dominated by mountain sagebrush and usually has a grassy understory that includes Idaho fescue, wild rye, wheatgrass, and brome grass.

Grassland/Upland Meadows

Grassland/Upland Meadows is dominated by perennial grass species, such as bunch wheatgrass, Idaho fescue, sheep fescue, and Kentucky bluegrass. Cheatgrass, thistle, prickly lettuce and other weedy forbs may be present in disturbed areas. This habitat type is scattered throughout the Project Management Area and occurs on rolling hills or flat well-drained surfaces.

Riparian Woodland and Shrubland

Riparian Woodland and Shrubland is mainly found along the Provo River corridor in the southeastern portion of the Project Management Area. It occurs on the river floodplain and reservoir shoreline and is adapted to a hydrologic regime of annual to episodic flooding. Dominant trees may include narrow leaf cottonwood, Fremont cottonwood, and box elder maple. Understory vegetation can be variable depending on the hydrologic regime, but typically include various species of willow, red-osier dogwood, choke cherry, alder, and water birch.

Generally, the upland vegetation surrounding this riparian habitat type is distinctly different due to a sudden gradation in moisture content.

Wet Meadow

Wet Meadow is mainly found along the Provo River floodplain in the Rock Cliff Recreational Area. This is an herbaceous wetland type that is comprised of various sedges and rushes, spike rush, and riparian grass species.

Open Water

Open Water consists of the lacustrine habitat of the reservoir inundation zone and the riverine habitat of the Provo River. Vegetation may become temporarily established on exposed shorelines and riverbanks, but is typically short-lived due to subsequent inundation or scouring and is typically <10% cover. When full, the reservoir has approximately 3,024 surface acres of open water.

Developed Land

Developed Land consists primarily of the various access roads, parking areas, lawns, playing fields, playgrounds, boat launches, visitor buildings, administrative buildings, and other appurtenant facilities that have been developed inside the Project Management Area. Nearly all of the developed land is associated with the various State Park facilities.

3.5.2 Riparian Vegetation and Wetlands

Riparian vegetation and wetlands in the Project Management Area consists of riparian woodland, shrubland, and wet meadow habitat types. Both of these habitats types contain wetland plant communities. The plant species composition for these habitats is discussed in Section 3.5.1. Of the 6,704 acres within the Project Management Area, the GAP mapping data identifies approximately 282 acres of riparian woodland and shrubland (4.2%) and 13 acres of wet meadow (0.2%) (Table 3-4). Both of these habitats are found mainly along the Provo River floodplain where it drains into the reservoir, and in the Rock Cliff Recreation Area (Figure 3-9).

The Project Management Area is situated in a semi-arid environment. The main water sources for riparian and wetland habitats are the shallow alluvial aquifer (groundwater), seeps, and springs on the river floodplain, seasonal overbank flooding, and areas wetted by the reservoir impoundment. The riparian woodland and shrubland habitat is associated with flood prone areas along the riverbanks, whereas the wet meadow habitat is associated with seeps and springs on the floodplain and side drainages. These areas typically have a consistent and predictable source of water and substrate conditions suitable for maintaining riparian and wetland habitats.

Shoreline geomorphology generally restricts the extent of riparian and wetland coverage along the shoreline and littoral zone of Jordanelle Reservoir. The majority of the reservoir shoreline lacks suitable hydrologic and substrate

conditions for riparian and wetland habitats because the shoreline is typically steep sloped; it has a rocky composition; and it is typically subjected to wide fluctuations in water levels during the summer. Fluctuations in water levels during the summer growing season can result in the dewatering of the shoreline and littoral zone and the erosion of exposed shoreline substrates, which limits the establishment of riparian and wetland coverage. Additionally, there is a lack of tributary streams around the perimeter of the reservoir shoreline that would provide perennial sources water and depositional substrates suitable for the establishment of riparian and wetland coverage. Subsequently, the majority of the reservoir shoreline is bordered by sparsely vegetated rocky cliffs, exposed substrates, sagebrush, and other vegetation adapted to a semi-arid environment.

The existing riparian woodland and shrubland vegetation helps to anchor and stabilize the substrates on the Provo River floodplain and buffer upland runoff draining into the river and reservoir. This helps to protect water quality in the river and reservoir by minimizing the potential for soil erosion and sediment transport. Additionally, the dual canopy structure of riparian trees and shrubs provides important habitat for a diversity of migratory bird species that is not found elsewhere in the Project Management Area.

The wet meadow is a rare habitat type within the Project Management Area. Its coverage is probably too small to provide substantial water quality benefits for the reservoir relative to soil stabilization and buffering of upland runoff. However, its association with springs and wetlands provides important habitat for amphibians that is not found elsewhere in the Project Management Area, and contributes to both the plant and animal biodiversity of the Project Management Area.

3.5.3 Noxious Weeds

Noxious weeds can be a serious environmental problem to natural resources. Noxious weeds can displace native plant communities, alter wildlife habitat, reduce forage for wildlife and livestock, increase erosion and lower biodiversity. Executive Order 13112 requires that each federal agency develop a management program with adequate funding to control undesirable plants on lands under its jurisdiction. It also requires that the agencies implement cooperative agreements with state agencies to coordinate management of undesirable plants.

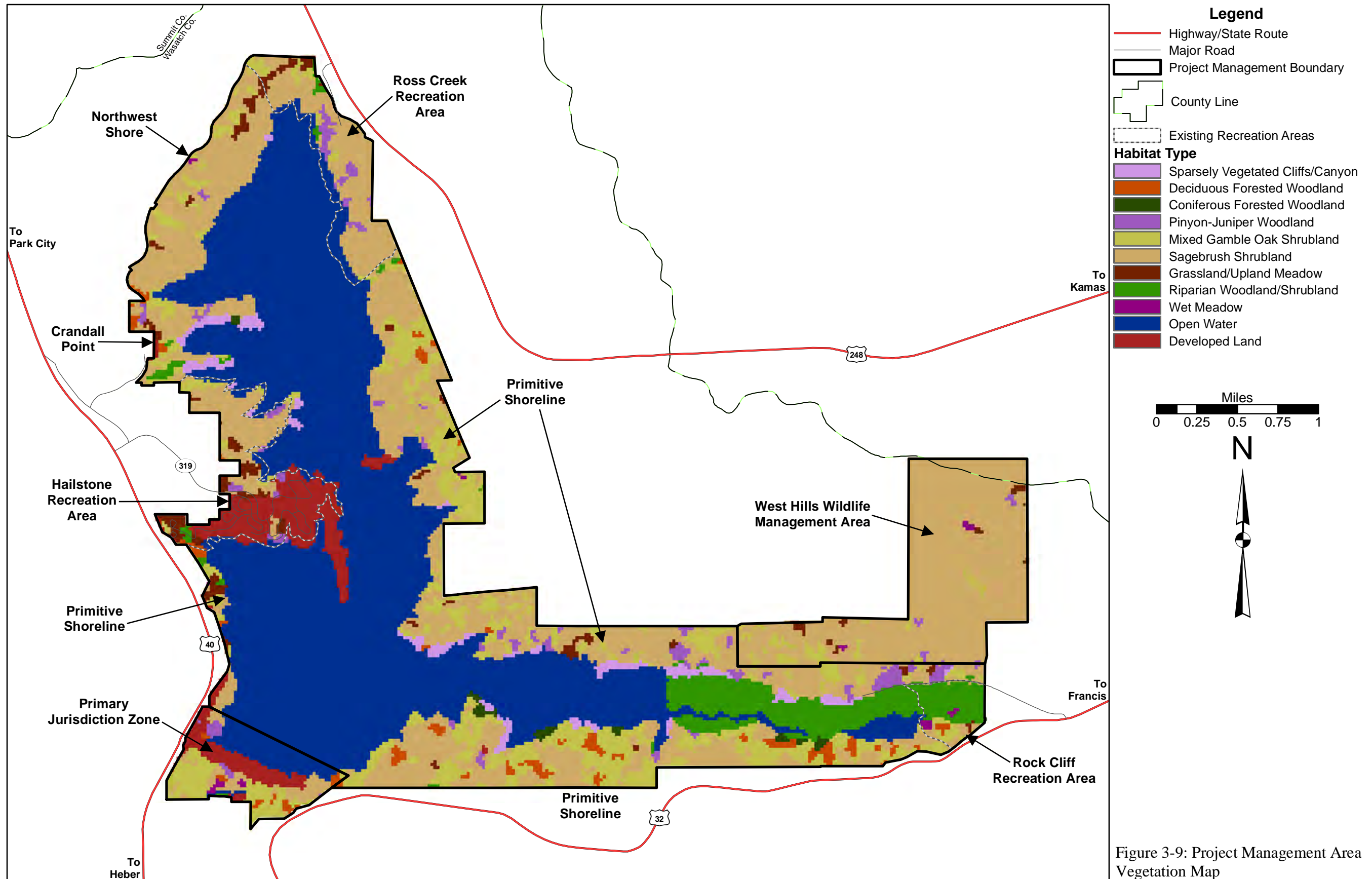


Figure 3-9: Project Management Area Vegetation Map

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In Utah, there are three classifications for noxious weeds, Class A, B, and C. The classifications are discussed in sub-section Noxious Weed Management. A total of fourteen Class A, 10 Class B and 5 Class C noxious weed species are listed for Wasatch County, and could potentially occur in the Project Management Area (Table 3-5). A brief description of the each species is provided below in the order listed in Table 3-5. Plant descriptions were obtained from the Noxious Weed Field Guide for Utah (Belliston, et al., 2009).

Table 3-5: Noxious Weed List for Wasatch County, Utah

Common Name	Scientific Name
Class A Noxious Weeds	
Black henbane	<i>Hyoscyamus niger</i>
Diffuse knapweed	<i>Centaurea diffusa</i>
Leafy spurge	<i>Euphorbia esula</i>
Medusahead	<i>Taeniatherum caput-medusae</i>
Oxeye daisy	<i>Chrysanthemum leucanthemum</i> L.
Johnsongrass	<i>Sorghum halepense</i>
Purple loosestrife	<i>Lythrum salicaria</i>
Spotted knapweed	<i>Centaurea maculosa</i>
St. Johnswort	<i>Hypericum perforatum</i>
Sulfur cinquefoil	<i>Potentilla recta</i> L.
Yellow starthistle	<i>Centaurea solstitialis</i>
Yellow toadflax	<i>Linaria vulgaris</i>
Class B Noxious Weeds	
Bermudagrass	<i>Cynodon dactylon</i>
Broad-leaved peppergrass	<i>Lepidium latifolium</i>
Dalmatian toadflax	<i>Linaria dalmatica</i>
Dyer's woad	<i>Isatis tinctoria</i>
Hoary cress	<i>Cardaria</i> spp.
Musk thistle	<i>Carduus nutan</i>
Poison hemlock	<i>Conium maculatum</i>
Russian knapweed	<i>Centaurea repens</i>
Scotch thistle	<i>Onopordium acanthium</i>
Squarrose knapweed	<i>Centaurea virgata</i>
Class C Noxious Weeds	
Field bindweed	<i>Convolvulus</i> spp.
Canada thistle	<i>Cirsium arvense</i>
Houndstongue	<i>Cynoglossum officinale</i>
Saltcedar	<i>Tamarix ramosissima</i>
Quackgrass	<i>Agropyron repens</i>

Class A Noxious Weeds

Black henbane is a native of Europe that is commonly found in waste areas, pastures, along rights-of-way and fence lines. It can be either annual or biennial. It grows to one to three feet tall. The leaves have pointed lobes and prominent veins. Off-white flowers with purple centers and veins are one to two inches wide. It blooms in late spring. Herbicides and digging are methods used to control black henbane.

Diffuse knapweed is a native of Eurasia that is commonly found in dry rangeland, roadsides, field edges, and waste areas. It is an annual or a short-live perennial. It averages one to two feet tall. Leaves have finely divided lobes. Flowers are white to rose in color. It blooms throughout the summer. Biocontrol, herbicides, and tillage are all methods used to control diffuse knapweed.

Leafy spurge is a native of Eurasia that is an aggressive invader of pastures, rangeland, stream banks, and waste areas. It is a perennial plant that grows up to 3 feet tall, leaves are narrow and are one to four inches long. In late spring, yellow-green flower bracts appear. The stems exude a milky fluid when damaged. It has an extensive root system that can grow up to feet long and more than 14 feet deep. Biocontrol and herbicides are methods used to control leafy spurge.

Medusahead is an introduced species from Eurasia. It is extremely competitive and can completely displace other grass species. It is an annual that grows from six inches to two feet high. The awns of the seedhead are long and become twisted as the seed matures, given the plant its common name. Using a combination of burning, herbicide, and reseeding is the technique recommended for control of medusahead.

Oxeye daisy is a native of Europe that can survive in a variety of environments. It is often found in meadows, roadsides, waste areas, grasslands, or overgrazed pastures. It is a perennial, rhizomatous herb that grows one to three feet tall. The flowers range in diameter from one to 2.2 inches and blossoms usually appear from June to August. Cultivation, maintaining a dense crop canopy, and herbicides are all methods used to control oxeye daisy.

Johnsongrass is native to the Mediterranean region and was introduced to the U.S. as a forage grass. It is a perennial grass that has erect stems from two to eight feet tall. It has a wide distribution by using large, fleshy rhizomes. Leaf blades are flat, up to 1 inch wide, with a prominent light midvein. Stems are stout with prominent nodes. Herbicides are the method used to control johnsongrass.

Purple loosestrife is native to Europe and is found in shallow marshy wetland areas and ditches. It can impede water flow and replace beneficial plants. It is a semi-aquatic perennial that grows six to eight feet tall. It has rose-purple flowers

that appear in columns along the upper end of stems. Biocontrol and herbicides are methods used to control purple loosestrife.

Spotted knapweed is originally found in Eurasia and infests rangeland, pastures, roadsides, or any disturbed soils. It is a short-lived perennial that grows to one to three feet tall. The stems are moderately leaves and the flowers are typically pink with spots. It blooms in early summer. Biocontrol and herbicides are methods used to control spotted knapweed.

St. Johnswort is an introduced species from Europe. It prefers sandy or gravelly soils. It is a perennial that grows one to three feet tall. Stems are rust colored and woody at the base. Leaves have prominent veins and transparent dots. The flowers are bright yellow with five petals. Biocontrol and herbicides are methods used to control St. Johnswort.

Sulfur cinquefoil is native to Eurasia and is found in pastures, shrub dominated areas, rights-of-way, and waste areas. It can out-compete native vegetation. It is a perennial that grows from one to three feet tall and branches near the top. Single or multiple stems sprout from a woody crown. It flowers from May to June and the flowers are pale yellow and contain five heart-shaped petals. Cultivation of annual crops, hand pulling or digging, and herbicides are methods used to control sulfur cinquefoil.

Yellow starthistle is an introduced species from Europe that is found on dry sites in rangeland, roadsides, and waste areas. It is an annual that grows from two to three feet tall and has blue-green coloration. Rosette leaves are deeply lobed and can be confused with dandelion. Stems are sparsely leaved and heavily ridged. Flowers are yellow. It has cream-colored thorns that range from $\frac{1}{4}$ to $\frac{3}{4}$ inch long and protrude from the flowering heads. Biocontrol, herbicides, and tillage are all methods used to control yellow starthistle.

Yellow toadflax is native to Eurasia and aggressively invades rangeland, roadsides, field edges, and waste areas. It has an extensive root system. It is a perennial weed that grows up to two feet tall. It has narrow, pointed leaves. Flowers are approximately 1 inch long, yellow with an orange throat and have long tails. They bloom in late spring into summer. Biocontrol and herbicides are methods used to control yellow toadflax.

Class B Noxious Weeds

Bermudagrass is a low-growing and sod-forming perennial grass that probably came from Africa. It has stolons that creep along the ground and upright stems that are about 12 inches tall. Herbicides are the recommended method to control bermudagrass.

Broad-leaved peppergrass is native to southern Europe and western Asia and is commonly found in wet drainage areas of waste areas, ditches, roadsides, and croplands. It is perennial and grows from one to six feet tall. The rootstocks spread laterally. The leaves have smooth to lightly toothed margins and are waxy. White flowers form dense clusters at the end of the branches as it flowers from summer into fall. Herbicides are the recommended method to control broad-leaved peppergrass.

Dalmatian toadflax is an introduced species from Europe that is found on rangeland and roadside habitat with sandy soils. It is an aggressive perennial weed that grows from two to four feet tall. Multiple stems may come from the base. Blue-green leaves line the stem in alternate fashion. Leaves are wedge shaped, have a thick waxy cuticle and partially clasp the stem. Flowers are yellow and may have white highlights and have long tails. It is difficult to eradicate because of its deep root system. Biocontrol and herbicides are the methods used to control dalmatian toadflax.

Dyer's woad is an introduced species from Europe for the production of textile dyes. It is found in waste areas, gravel pits, roadsides, pastures, field edges, and disturbed soils. It may be a winter annual, biennial, or a short-lived perennial. Common height ranges from one to four feet tall. It has a thick taproot that can penetrate down to five feet deep. Leaves are blue-green with whitish midrib and the bright yellow flowers bloom in late spring. Biocontrol, herbicides, and digging are all recommended methods used to control dyer's woad.

Hoary cress, also known as whitetop, is native to Europe and is commonly found along roadways, field edges, excavation sites, grain fields, cultivated fields, and meadows. It thrives in somewhat saline soils. It is a perennial plant that commonly grows one to two feet tall. It has creeping rootstocks. Leaves are finely toothed and the upper leaves clasp the stem. It blooms with clusters of white flowers in late spring. Biocontrol and herbicides are the methods used to control hoary cress.

Musk thistle is native to southern Europe and western Asia and is found in pastures, rangelands, waste areas, stream banks, and roadsides. It is biennial or a winter annual that commonly grows from four to six feet tall. It has deeply lobed leaves that have a dark green blade with a light green midrib. The flowers may be violet, purple, or rose colored and they typically are bent over. Biocontrol, herbicides, and mechanical treatment are all methods used to control musk thistle.

Poison hemlock is native to Europe and is commonly found along waterways, roadsides, and field edges. All parts of this plant are toxic. It is biennial and grows from six to ten feet tall. It has a large taproot. The stems have purple spots. The leaves are finely divided and have a fern-like appearance. The flowers are umbrella-shaped clusters on the ends of individual stalks when it blooms in

late spring and into early summer. Biocontrol and herbicides are the methods used to control poison hemlock.

Russian knapweed is native to Eurasia and is found on rangelands, field edges, pastures, roadsides, and other disturbed soils. It is perennial and grows from two to three feet tall. The roots may go 8 feet deep or more. It has basal leaves that are lobed and are two to four inches in length. It has pinkish flowers that bloom in early summer though late summer. Biocontrol and herbicides are the methods used to control Russian knapweed.

Scotch thistle is native to Europe and eastern Asia and is found in waste areas, pastures, rangeland, and along canal and stream banks. It is biennial that commonly grows three to eight feet tall, but it may grow as high as twelve feet. It has large, spiny leaves that grow up to two feet long and one foot wide and are covered with dense hair. The flowers are violet to reddish with spine tipped bracts that bloom in mid-summer. Herbicides are the recommended method used to control scotch thistle.

Squarrose knapweed is native to the eastern Mediterranean area and is very competitive on rangelands. It is a long-lived perennial that grows from 12 to 18 inches tall. The rosette and stems have deeply-lobed leaves. The flowers are rose to pink in color and bloom in early to mid-summer. It is similar to diffuse knapweed. Biocontrol and herbicides are the methods used to control squarrose knapweed.

Class C Noxious Weeds

Field bindweed is native to Europe and is found in fields, pastures, gardens, roadsides, and many other areas up to 10,000 feet in elevation. Its seeds can remain viable for up to 50 years. It is perennial that has stems that can grow prostrate or up nearby vegetation and can be up to six feet long. The root system may grow to a depth of 10 feet or more. It has arrow-shaped leaves that are up to two inches long. It has funnel shaped flowers that are white to pink in color and up to one inch wide that bloom from June to September. Herbicides are the recommended method used to control field bindweed.

Canada thistle is native to southeastern Eurasia and is adaptable to a diverse range of habitats. It can be found in sparse to extremely dense colonies. It is a perennial plant that commonly grows from one to four feet tall. The leaves have spiny tipped lobes. The flowerheads are softly spined, light pink to purple in color, and are typically $\frac{3}{4}$ inch in diameter. It blooms in July and August. Biocontrol and herbicides are the methods used to control Canada thistle.

Houndstongue is native to Europe and if found in disturbed soils along roadsides, trails, pastures, and rangelands. It has a bur-like seed that attaches to clothing or animal fur to spread widely. It is biennial that grows from one to four feet tall.

The basal leaves are approximately three inches wide and hairy. The upper leaves are approximately one inch wide and curl with them clasping the stem. It has small reddish purple flowers that bloom in early summer. Herbicides and digging early are the methods used to control houndstongue.

Saltecedar is an introduced species from Eurasia and is commonly found infesting lakes, stream banks, pastures, and rangeland. A single plant can transpire 200 gallons of water per day. It is a perennial that grows five to 20 feet tall. It has reddish-brown stems, small and scale-like leaves, and long, slender branches. The flowers are white to pink and are borne in finger-like clusters. The root system is extensive. Biocontrol is being researched. Physical removal and herbicides are currently the recommended methods for controlling saltecedar.

Quackgrass is originally found in the Mediterranean area and is found in cropland, rangeland, pastures, and lawns. It is a perennial grass that typically grows from one to three feet tall. It has rhizomes that can penetrate hardened soils and even roots of other plants. The leaf blades are up to a half-inch wide. The seedheads are three to four inches long and narrow. Herbicides are the recommended method used to control quackgrass.

Noxious Weed Management

Executive Order 13112 was enacted in 1999 to “prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts”. Federal agencies were directed to: 1) prevent introduction of invasive species, 2) detect and respond to control such species in a cost-effective and environmentally sound manner, 3) monitor invasive species population accurately and reliably, 4) provide for restoration of native species and habitats, 5) conduct research on invasive species and develop prevention and control techniques, and 6) promote public education on invasive species. Furthermore, they were directed to not authorize, fund or carry out actions that are likely to cause or promote invasive species. Federal agencies are also required to pursue these duties in cooperation with stakeholders.

The Utah Noxious Weed Act, R98-9 of 2008 was established to protect Utah from destructive noxious weeds. This act identifies three classes of noxious weeds and sets criteria for the control and management of each class of noxious weeds in Utah. Class A represents species that require Early Detection Rapid Response (EDRR). Class A includes invasive, non-native species that pose a serious threat to the state and should be considered as a very high priority for control (prevention, suppression, containment, and eradication). Class B includes invasive, non-native species that pose a threat to the state and should be considered a high priority for control. Class C includes those invasive, non-native species that pose a threat to state agricultural and should be managed for suppression and containment. The act requires state agencies to evaluate their actions with respect to the control of noxious weeds.

Wasatch County has established a Weed Department to coordinate and enforce weed management in the County. The County weed management plan has three main components: 1) a public awareness program to identify the problem and need for noxious weed control, 2) a public education program for disseminating information on noxious weed control, and 3) a public training program for specific management strategies and techniques to control noxious weeds. Within the Project Management Area, State Parks and UDWR routinely coordinate their state-mandated noxious weed control efforts with the Wasatch County Weed Department.

3.6 Fish and Wildlife Resources

This section discusses the existing fish and wildlife species and habitat conditions that are known to occur in the Project Management Area, and existing fish and wildlife management plans. It also identifies invasive aquatic species that are at risk of being introduced into the reservoir, and discusses the management programs that are in place to control the introduction and spread of invasive aquatic species the Project Management Area.

3.6.1 Fish

The Project Management Area contains a diversity of aquatic habitats for fish and other aquatic organisms, including the lacustrine (lake) habitat of the reservoir and the riverine (stream) habitat of the Provo River.

Sport Fishery

These habitats support an excellent sport fishery that is managed by the UDWR. The UDWR stocks the reservoir regularly because the Project Management Area is located within an hour driving time for about 70% of Utah's population and has good fisherman access. Each year the UDWR stocks the reservoir with thousands of triploid rainbow trout. Triploid rainbow trout is an infertile hybrid that is propagated and stocked in order to prevent cross-breeding (hybridization) with other trout species.

Other trout species found in the Project Management Area include brown trout, brook trout, tiger trout and Bonneville cutthroat trout. Brown trout is a non-native European species, brook trout is an eastern U.S. species that is non-native to Utah, and tiger trout is a non-native hybrid cross between brown trout and brook trout. These non-native trout were introduced in Utah for sport fishing. As described in Section 3.7 Threatened, Endangered and other Special Status Species, Bonneville cutthroat trout is a native species that used to be wide-spread in the Bonneville Basin. It receives special management under a multi-agency Conservation Agreement to protect the integrity of the species, and to preclude its listing as a protected species under the federal Endangered Species Act. However, the Bonneville cutthroat trout in the Project Management Area are not a pure strain

population, and the reservoir is not managed for the intended purpose of sustaining a pure strain population of Bonneville cutthroat trout (Slater, 2011).

Other sport fish include yellow perch and smallmouth bass. Both of these fish species are native to the eastern U.S. and were introduced to Utah reservoirs for sport fishing because of their cold-water tolerance. The non-sport species are mainly Utah chub and Utah sucker (Slater, 2011). Both of these fish species are native to Utah and are prey species for the sport fish. In 2010, the UDWR reported that the Utah chub has been the most abundant fish species in the reservoir since the late 1990's (UDWR, 2010).

Invasive Aquatic Species

Zebra mussel and quagga mussel are invasive, non-native mollusk species. The primary spreading vector for these invasive mollusks is attachment to boat hulls and propellers. Though these invasive mollusks have not yet been identified in Jordanelle Reservoir, they have been found recently in other Utah reservoirs (UDWR, 2009a). In 2010, Reclamation adopted a prevention and rapid response plan for the Upper Colorado Region to control the spread of these invasive species (Reclamation, 2010). In compliance with Executive Order 13112, actions taken under the Upper Colorado Region Prevention and Rapid Response Plan for Dreissenid Mussels are designed to minimize the economic, ecological, and human health impacts of these invasive, non-native mollusk species. The plan specifies guidelines for coordinated actions with other federal and state agencies, including: 1) Prevention, 2) Early Detection, 3) Rapid Assessment, and 4) Rapid Response or Control of the Invasive Species. The plan is a working document and will be updated as new information becomes available and plan implementation progresses.

The UDWR (2009a) has adopted a management plan to control a broader range of invasive aquatic species, including zebra and quagga mussels. The Utah Aquatic Invasive Species Management Plan was prepared in cooperation with the Utah Aquatic Invasive Species Task Force. Task force members include: UDWR, State Parks, Utah Department of Agriculture and Food, Utah Division of Water Resources, Utah Angler's Association, CUWCD, Washington County Water Conservancy District, Ute Indian Tribe, Reclamation, USFWS, USDA Forest Service, and DOI National Park Service. State Parks routinely implements plan guidelines during the boating season to interdict the introduction of zebra mussels and quagga mussels into the Project Management Area.

3.6.2 Wildlife

The vegetation and habitat types found in the Project Management Area are discussed in Section 3.5 Vegetation, Wetlands, Noxious Weeds, and are shown on Figure 3-9. The majority of the 6,704-acre Project Management Area consists of open water habitat (3,024 acres (45.1%)) associated with the reservoir water impoundment area and the Provo River. According to the Jordanelle State Park

Bird Checklist, more than 190 species of birds have been documented in the Project Management Area. The checklist identifies a wide range of migratory bird species that would use the open water habitat, including: various ducks, geese and swans; loons, grebes, American white pelican and double-crested cormorant; various shorebirds, wading birds, gulls and terns; belted kingfisher, osprey and wintering bald eagle.

The majority of the terrestrial habitats consists of semi-arid rangeland dominated by sagebrush shrubland (2112 acres (31.5%)) and mixed Gambel oak shrubland (695 acres (10.4%)), with lesser amounts of pinyon-juniper woodland (101 acres (1.5%)) and grassland/upland meadow (101 acres (1.5%)). These semi-arid habitats may be used and inhabited by a variety of wildlife, including: various small mammals, ground squirrels, rabbits, marmot, passerine birds, raptors, sage-grouse, weasel, coyote, fox, striped skunk, mule deer, elk and occasionally moose.

The riparian woodland and shrubland (282 acres (4.2%)) and wet meadow (13 acres (0.2%)) habitats represent a small but important habitat component. These habitats mainly occur in the southeastern portion of the Project Management Area where the Provo River floodplain drains into the reservoir, including the Rock Cliff Recreation Area. In June 2010, the Jordanelle State Park hosted a one-day biological survey of the Rock Cliff Recreation Area that focused on the riparian and wetland habitats (State Parks, 2010a). The survey recorded approximately 88 taxa of macro-invertebrates and 59 species of waterfowl, shorebirds, raptors and various other migratory birds. The survey also recorded three reptiles species (garter snake, rubber boa and western rattlesnake) and three amphibian species (western chorus frog, Columbia spotted frog, and tiger salamander). In addition, three bat species were recorded (little brown bat, western small-footed myotis, and silver-haired bat). Other mammals that know to use the riparian and wetland habitats in the general vicinity include: moose, elk, mule deer, cougar, bobcat, coyote, fox, badger, black bear, rabbit, porcupine, muskrat, beaver, raccoon and mink (State Parks, 2010a).

The deciduous forested woodland (87 acres (1.3%)) and coniferous forested woodland (15 acres (0.2%)) are minor habitat components but provide additional habitat diversity for wildlife. These forested habitats are used by a variety of passerine birds, raptors, wild turkey, squirrels, chipmunks, mule deer, and elk. The ledges on the sparsely vegetated cliffs and canyon walls (61 acres (0.9%)) may have potential nesting sites for golden eagle. The developed land (213 acres (3.2%)) is mostly associated with the access roads, parking areas, playgrounds, boat launches, visitor and administrative buildings associated with the Jordanelle State Park. The developed land may provide a limited amount of habitat for urban wildlife, such as: mice, robin, magpie, pigeons, and starlings.

According to the 1979 M&I System FES, the habitats within the fenced Project Management Boundary would have value for wildlife because private development would be prohibited and livestock grazing would be curtailed.

However, grazing may be used as a habitat management tool within the West Hills WMA. The overall land acquisition and land use for the Jordanelle Reservoir project was intended to provide partial compensation for deer and sage-grouse habitat loss and partially offset habitat losses for other wildlife as well. Land uses inside the Project Management Boundary were to curtail construction and recreation activities during critical breeding and nesting seasons, and during winter on crucial deer winter range. Current UDWR habitat designation identify the land on the north shore of the Rock Cliff Recreation Area as crucial winter deer habitat, and the land around the Ross Creek Recreation Area as crucial winter/spring deer habitat.

According to the wildlife mitigation plan in the 1987 FS to M&I System FES, Reclamation would consult with USFWS concerning future land use and development within the Project Management Boundary, and would manage the area in a manner that would be conducive to wildlife, which would help reduce the need for wildlife mitigation.

The 743-acre West Hills WMA was acquired by Reclamation for off-site mitigation in accordance with the wildlife mitigation plan adopted in the 1987 FS to M&I System FES. The land was acquired by Reclamation as part of Reclamation's mitigation responsibilities for the development of the M&I System. The West Hills WMA is predominantly sagebrush habitat. Prior to the development of the dam and reservoir, the project area was regionally important to deer, elk and moose as a migration route and winter use area. The area was also important breeding, brood rearing, and wintering habitat for sage-grouse. UDWR (1992) management goals for the West Hills WMA include, but are not limited to:

- Habitat management for mule deer, elk and sage-grouse;
- Protection for golden eagle breeding and nesting habitat;
- Installation of a boundary fence and other fencing needed for wildlife management;
- Development of public access to include parking areas and fence crossing stiles;
- Information signage; and
- Various terrestrial habitat improvements including control of noxious weeds.

The region surrounding the Project Management Area has experienced rapid residential and resort development since the operating agreement for West Hills WMA was established between Reclamation and UDWR in 1992. Nearly all of this development has occurred on privately owned land located outside the Project Management Boundary. This has resulted in the loss and fragmentation of large tracts of habitat and created barriers for big game migratory routes that were once contiguous with the project area. Three major roadways encircle the Project

Management Area: U.S. Highway 40, State Road 248, and State Road 32. The concurrent increase of vehicular traffic on these roadways has also created barriers and obstructed big game migratory routes to and from the Project Management Area. The cumulative result is that the West Hills WMA has become an isolated block of undeveloped habitat that may be too small and too separated from neighboring habitats to sustain its original wildlife management goals for mule deer, elk, and sage-grouse. Reclamation transferred the ownership of the West Hills WMA to the State of Utah in 2001, and the area is currently managed by UDWR.

3.7 Threatened, Endangered, and Other Special Status Species

This section identifies the threatened, endangered and special status species that may be present in or adjacent to the Project Management Area. Threatened and endangered species are listed for protection under the federal Endangered Species Act (ESA) (16 U.S.C. 1531 et seq.). Candidate and petitioned species are those species that are currently being evaluated for protective ESA listing. Conservation agreement species are at risk species with special interagency management and conservation plans in place as a cooperative effort to prevent the ESA listing of the species.

3.7.1 Federally Listed Threatened, Endangered, and Candidate Species

The current list of threatened, endangered, candidate and petitioned species for Wasatch County, Utah was acquired from the USFWS's website, and is listed on Table 3-6. The current listing was last updated February 24, 2011 and includes two threatened species, four endangered species, three candidate species, and one petitioned species for Wasatch County. There are two conservation agreement species that are known to occur in proximity to the Project Management Area. The general habitat requirements for each species are discussed below in the order listed in Table 3-6.

Table 3-6: Federally Listed Threatened, Endangered, and Candidate Species that Could Occur in the Vicinity of the Project Management Area

Common Name	Scientific Name	Status
Mammals		
Canada Lynx	<i>Lynx canadensis</i>	Threatened
Birds		
Greater sage-grouse	<i>Centrocercus urophasianus</i>	Candidate ¹
Yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	Candidate ¹
Fish		
Bonytail chub	<i>Gilia elegans</i>	Endangered
Colorado pikeminnow	<i>Ptychocheilus lucius</i>	Endangered
Humpback chub	<i>Gila cypha</i>	Endangered
Razorback sucker	<i>Xyrauchen texanus</i>	Endangered
Least chub	<i>Notichthys phlegethontis</i>	Candidate ¹
Bonneville cutthroat trout	<i>Oncorhynchus clarki utah</i>	Conservation Agreement ²
June sucker	<i>Chasmistes liorus</i>	Endangered ³
Southern leatherside	<i>Lepidomeda aliciae</i>	Conservation Agreement ²
Amphibians		
Northern leopard frog	<i>Rana pipiens</i>	Petitioned ¹
Columbia spotted frog	<i>Rana luteiventris</i>	Conservation Agreement ²
Plants		
Ute ladies'-tresses	<i>Spiranthes diluvialis</i>	Threatened

¹ Candidate and petitioned species have no legal protection under the ESA. However, these species are under active consideration by the USFWS for addition to the federal list of endangered and threatened species and may be proposed or listed during the development of the proposed action.

² Species has no legal protection under the ESA, but is receiving special management under a Conservation Agreement in order to preclude the need for ESA listing.

³ Species is not present in Wasatch County, but inhabits portions of the lower Provo River and Utah Lake downstream of the Jordanelle Dam and Reservoir.

(Source: USFWS, 2011d)

Mammals

Canada lynx is a medium-sized, mainly nocturnal cat species. It inhabits cold, montane and boreal, mixed-age, coniferous forests between 7,730 and 9,413 feet in elevation that have thick undergrowth. The main food source for Canada lynx is snowshoe hare. Other prey species include small mammals, fish, and grouse (Ruediger, et al., 2000). Standing snags and hollow trees are important for den sites (Clark, 2000). Habitat alteration from logging and road construction is believed to be the leading factors contributing to the decline of the Canada lynx (UDWR 2011). There are no critical habitat designations for Canada lynx in Utah (Laverty, 2008). However, GAP analysis mapping from the Utah Conservation

Data Center shows predicted habitat for the Canada lynx in the montane forests of the Uinta and Wasatch mountain ranges.

The Project Management Area is not situated in mountain setting and does not contain any montane habitat. The majority of the Project Management Area is situated on lower elevation foothills that are predominantly semi-arid rangeland and shrubland consisting of sagebrush and Gambel oak. The Project Management Area contains some isolated patches of coniferous forest. The patches are less than 4.5 acres in size and are located along the southeast, rocky shoreline of the reservoir at an elevation of approximately 6,200 to 6,400 feet, which is below the montane elevation. There are no known occurrences of Canada lynx in the Project Management Area, which does not contain any suitable habitat for Canada lynx due to the lack of montane, mixed-age, coniferous forests.

Birds

Greater sage-grouse is the largest grouse species in North America. It is considered both a local migratory and a non-migratory bird across the Great Basin. If the greater sage-grouse does migrate, it is typically a short distance (<62 miles) between winter, summer and breeding habitats (NatureServe, 2011). Habitat needs vary during the year but are always closely associated with sagebrush-dominated communities. Lekks are usually found in open areas surrounded by sagebrush, or they may be found in low-density stands of sagebrush. Breeding habitat has 15-25% canopy cover of sagebrush with a robust grass and forb understory. Summer habitat has succulent forbs and insects and is typically located in riparian areas adjacent to sagebrush communities. Winter habitat consists of relatively large areas with 10-25% canopy cover of sagebrush (NatureServe, 2011). The majority of greater sage-grouse nests are constructed beneath sagebrush, though nests may be built beneath other shrub species (UDWR, 2009b). Sagebrush leaves form the basis of the greater sage-grouse diet (UDWR, 2011). Threats to greater sage-grouse have included the loss and fragmentation of habitat, predation, and hunting.

The Project Management Area is situated within the known distribution of greater sage-grouse in Wasatch County. Greater sage-grouse is known to occur in the West Hills WMA. The UDWR (2009b) has identified the general locale around the West Hills WMA as important brood-rearing and winter habitat, and as a core breeding area.

Yellow-billed cuckoo is an obligate riparian bird species. This migratory bird species spends the winter in South America and the summer in the low-elevation riparian forests and river floodplains of western North America. Historically, yellow-billed cuckoo was probably a common to uncommon summer resident in Utah and across the Great Basin. The current distribution of yellow-billed cuckoo in Utah is poorly understood, though it appears to be an extremely rare breeder in lowland riparian habitats statewide (UDWR, 2011).

Yellow-billed cuckoo nests in large blocks of dense, dual-canopy, lowland riparian forest usually 25-100 acres in size and within 333 feet of water. The overstory may be either large gallery-forming trees 33-90 feet tall, or developing trees 10-33 feet tall, usually cottonwoods. The understory is typically a dense sub-canopy of regenerating trees or a scrub/shrub layer dominated by willows. Riparian habitat is critical for breeding, migration stopovers, and as corridors for juvenile dispersal. Yellow-billed cuckoo also require upland habitat where it can forage on katydids, sphinx moth larvae, tent caterpillars, and other insects. Habitat losses from agricultural, water, road, and urban development are the major contributors to the decline of the yellow-billed cuckoo across its range.

The majority of the Project Management Area consists of semi-arid rangeland and shrubland dominated by sagebrush and Gambel oak. The majority of the reservoir shoreline lacks riparian-forested habitat except in the southeast corner of the Project Management Area where the Provo River drains into Jordanelle Reservoir. There are no known breeding pairs of yellow-billed cuckoo in the Project Management Area. However, this riparian area contains forested riparian habitat that could potentially be suitable for yellow-billed cuckoo as breeding, juvenile dispersal or migratory stopover habitat.

Fish

Bonytail is a native fish species endemic to the Colorado River system. It is a large minnow that inhabits eddies, pools, and backwaters of large, fast flowing, warm-water rivers. The bonytail is an opportunistic feeder, eating insects, zooplankton, algae, and higher plant matter. Threats to bonytail include the presence of dams and other obstructions, competition from exotic fish species (NatureServe, 2011), and habitat loss/alteration (USFWS, 2011a).

Historically, bonytail was most abundant in the Colorado River and its largest tributaries, including the Green River in eastern Utah and the Yampa River in western Colorado. It is believed that the bonytail has been extirpated from much of the historic range, and the current bonytail population exists only in portions of the Colorado River system (NatureServe, 2011). These portions of the Colorado River system have been designated as critical habitat. There are no critical habitat designations located outside of the Colorado River system (USFWS, 2011b).

Bonytail is listed in Wasatch County because an eastern portion of the County drains into the Colorado River system. The Project Management Area does not contain suitable habitat for bonytail. Additionally, the Project Management Area is situated in the Provo River system and Great Salt Lake watershed, and does not have any tributary connections to the Colorado River system.

Colorado pikeminnow is the largest minnow in North America. It can grow up to six-feet long and weigh as much as 80 pounds, although such growth is

considered rare. The Colorado pikeminnow feeds on aquatic invertebrates and other fishes (NatureServe, 2011). Threats to the Colorado pikeminnow include dams and other obstructions, habitat loss and the introduction of exotic fish species (USFWS, 2011a).

Colorado pikeminnow is endemic to the Colorado River and some of its major tributaries, including the Dolores, San Juan, Green, White, and Duchesne Rivers (USFWS, 2011a). The current distribution is limited to the Upper Colorado River Basin. It inhabits medium to large rivers and uses backwaters, eddies, fast-moving deep water, and flooded bottoms during various times of year and during different stages in its life cycle. Spawning takes place during the spring in river segments that have alternating deep pools and shallow riffles (NatureServe, 2011).

Colorado Pikeminnow is listed in Wasatch County because an eastern portion of the County drains into the Colorado River system. The Project Management Area does not contain any suitable habitat for Colorado pikeminnow. Additionally, the Project Management Area is situated in the Provo River system and Great Salt Lake watershed, and does not have any tributary connections to the Colorado River system.

Humpback chub is a rare minnow species that is endemic to the Colorado River system. It can grow up to 15 inches long, and large individuals develop a hump behind the head. The humpback chub diet consists of planktonic crustaceans, algae, and may also include insects. Threats to the humpback chub include the loss or alteration of habitat, dams, and obstructions on fast-moving sections of the Colorado River or its tributaries, and competition from exotic fish species (NatureServe, 2011).

Humpback chub inhabit segments of the Colorado River and its large tributaries that have low to moderate gradients. Adults use various habitats, including deep turbulent currents, riffles, eddies, shaded canyon pools, and areas under shaded ledges in moderate currents (NatureServe, 2011). Young humpback chubs use shallow, turbid backwaters until they are able to navigate fast-moving water. Spawning occurs during the spring in shallow backwater areas with cobble substrates (USFWS, 2011a).

Humpback chub is listed in Wasatch County because an eastern portion of the County drains into the Colorado River system. The Project Management Area does not contain any suitable habitat for humpback chub. Additionally, the Project Management Area is situated in the Provo River system and Great Salt Lake watershed, and does not have any tributary connections to the Colorado River system.

Razorback sucker is a native fish species endemic to the Colorado River system. Individuals may grow up to 24 inches long and live for 40 years or more. It is a

benthic feeder with a diet consisting of planktonic crustaceans, diatoms, filamentous algae, and detritus (USFWS, 2011a). Threats include competition from exotic fish species, loss, and/or alterations to historic habitat and impoundments that have limited fish movement and altered water temperature regimes (NatureServe, 2011/USFWS, 2011a).

Historically, the razorback sucker was widespread throughout most of the Colorado River Basin from Wyoming to Mexico. In the upper Colorado River Basin, they are now found only in segments of the Green, Colorado, and San Juan Rivers in Utah, and the Yampa River in Colorado. Razorback suckers inhabit slow, backwater areas and impoundments in the winter months, and shallow swift waters of mid-channel sandbars in summer months. Spawning occurs from late April to mid-June over mixed substrates that range from silt to cobble (USFWS, 2011a).

Razorback sucker is listed in Wasatch County because an eastern portion of the County drains into the Colorado River system. The Project Management Area does not contain any suitable habitat for razorback sucker. Additionally, the Project Management Area is situated in the Provo River system and Great Salt Lake watershed, and does not have any tributary connections to the Colorado River system.

Least chub is a small minnow species that only grows up to 2.5 inches. It inhabits small streams and ponds and feeds primarily on algae and small invertebrates, including mosquito larvae. The least chub is a schooling species and prefers dense vegetation and slow-moving water. Spawning occurs in late spring and early summer when the eggs are fertilized in the water and sink until they attach to vegetation or the substrate (UDWR, 2011a).

The least chub is native to the Bonneville Basin. Threats to the least chub include habitat degradation from suburban sprawl, livestock impacts (e.g., trampling and organic pollution), predation by and competition and hybridization with several species of introduced fishes, and predation by introduced bullfrogs (NatureServe, 2011). Wild native populations have been reduced to five areas located in western Utah and a functionally extirpated site exists at Mona Springs in Juab County, which is located in the Utah Lake watershed. Other drainages around Utah Lake are thought to be within the historic habitat range for least chub.

Least chub is not present in Wasatch County (USFWS, 2011c). It is listed in Wasatch County because part of the County is situated within the Utah Lake watershed, and the USFWS believes that any water depletions to Utah Lake has the possibility of affecting potential habitat for least chub. Jordanelle Reservoir is situated on the Provo River, which drains into Utah Lake. However, the Project Management Area does not contain any suitable habitat for the least chub, and there are no known populations of least chub in the Project Management Area.

Bonneville cutthroat trout is the only trout species native to the Bonneville basin. It was commonly found throughout Utah, Wyoming, Nevada, and Idaho. Historically, it was abundant in Utah Lake and many of its tributaries, including the Provo River drainage. It is now found in less than 5 percent of its original habitat. The Bonneville cutthroat trout suffered catastrophic declines during the late 19th and early 20th centuries as a result of massive introductions of nonnative trout (due to hybridization and/or competition) and the alteration and degradation of its habitat by water development projects, livestock grazing, mining, and timber harvest. A conservation agreement was agreed among various federal, state and local governmental agencies in 1997 as a measure to implement certain management goals and objectives in order to preclude the ESA listing of the species. Reclamation, USFWS, Bureau of Land Management, USDA Forest Service, Utah Department of Natural Resources, Mitigation Commission, CUWCD and the Confederated Tribes of the Goshute Reservation are signatory to the conservation agreement (UDWR, 1997).

Bonneville cutthroat trout is found in the reservoir. However, the reservoir does not contain a pure strain population, and is not managed for the intended purpose of sustaining a pure strain population of Bonneville cutthroat trout. Additionally, no pure strains of Bonneville cutthroat trout are known to exist in the project vicinity. The UDWR currently has no plans to introduce pure strain Bonneville cutthroat trout into the reservoir fishery (Slater, 2011).

June sucker is endemic to Utah Lake, located in the Utah Valley near Provo, Utah (USFWS, 2011). Throughout the year the fish occurs in Utah Lake and then migrates to Provo River in June for spawning. Prior to settlement of Utah Valley, several large tributaries (e.g., the Spanish Fork River, Hobbie Creek, and the Provo River) provided suitable spawning habitat, entering Utah Lake through large deltas which provided braided, slow, meandering channels. The only habitat known to be currently used by spawning June sucker is the last 4.9 miles of the Provo River before it enters Utah Lake, the lowest reaches of Hobbie Creek since it was restored in 2009, and in American Fork Creek where a small group of June Suckers were observed spawning in 2010. June sucker is not present in Jordanelle Reservoir, and there are no known occurrences of June sucker in Wasatch County (USFWS, 2011).

Southern leatherside is a chub species native to the Utah Lake and Sevier River drainages in Utah. Southern leatherside inhabit desert streams; it requires flowing water and cannot persist in lakes or reservoirs. The species has suffered population declines due to conversion, degradation, fragmentation and loss of habitat from various water development projects, and due to the introduction of non-native fish predators. A conservation agreement was agreed among various federal, state and local governmental agencies in 2010 as a measure to implement certain management goals and objectives in order to preclude the ESA listing of the species. Reclamation, USFWS, Bureau of Land Management, USDA Forest Service, Utah Department of Natural Resources, Mitigation Commission,

CUWCD, and Trout Unlimited are signatory to the conservation agreement (UDWR, 2010b).

The reservoir is unsuitable habitat for southern leatherside. Southern leatherside occur in streams with a broad range of temperatures and have habitat requirements of healthy riparian vegetation and intact streambanks. Historically, southern leatherside are known to have inhabited the Provo River. Within the Project Management Area, it is possible that the Provo River could contain stream habitat that would be suitable for southern leatherside. However, trout predation would likely be a factor limiting the presence of southern leatherside.

Amphibians

Northern Leopard Frog is a medium-sized frog species that requires wetland and aquatic habitats. Historically, it was commonly found throughout the northern United States and Canada. It inhabits wet meadows and fields bordering springs, slow streams, marshes, bogs, ponds, canals, floodplains, reservoirs, lakes, and is usually found near permanent water with rooted aquatic vegetation. It has been petitioned for federal listing because of a perceived drop in populations (NatureServe, 2011).

The UDWR (2011) has identified the riparian and wetland vegetation along the shoreline of the reservoir and the Provo River as potentially valuable habitat for the northern leopard frog. Within the Project Management Area, the wet meadows bordering the Provo River in the Rock Creek Recreational Area would be a likely area to find northern leopard frog.

Columbia spotted frog is a conservation agreement species that is known to occur in the project vicinity. The species ranges from southeast Alaska through Alberta, Canada, and into Washington, Idaho, Wyoming, Montana, and disjunct areas of Nevada and Utah. In Utah, isolated Columbia spotted frog populations exist in the West Desert and along the Wasatch Front. Degradation and loss of habitat have led to declines in many of these populations, especially those along the Wasatch Front. A conservation agreement was agreed among various federal, Utah State and local governmental agencies in 1998 as a measure to implement certain management goals and objectives in order to preclude the ESA listing of the species. Reclamation, USFWS, Bureau of Land Management, Utah Department of Natural Resources, Mitigation Commission, CUWCD and the Confederated Tribes of the Goshute Reservation are signatory to the conservation agreement (UDWR, 1998).

Columbia spotted frog requires aquatic and wetland habitats. It is often associated with beaver ponds and wetlands with isolated springs and seeps that have a permanent water source. Preferred habitat usually contains emergent herbaceous, floating, and submerged vegetation. Deep silt or muck bottoms are needed for winter hibernation and torpor (USFWS, 2002). Columbia spotted frog

is not capable of making long overland movements, although individuals are known to move overland in the spring and summer after breeding.

The Heber Valley population represents the largest population of Columbia spotted frogs in Utah. Columbia spotted frogs are known to inhabit the ponds and wetlands bordering the Provo River downstream of the Jordanelle Dam and Reservoir, and are also found along the approximately 10-mile segment of the Provo River stream corridor between the Jordanelle Dam and Deer Creek Reservoir (USFWS, 2002). Within the Project Management Area, Columbia spotted frog has been found in the wet meadow wetlands bordering the Provo River in the Rock Cliff Recreational Area. Columbia spotted frog may be present elsewhere in the Project Management Area where suitable wetland and aquatic habitats are present.

Plants

Ute ladies'-tresses is a small white-flowered terrestrial orchid primarily inhabiting wet meadows associated with perennial stream terraces, floodplains, and oxbows at elevations between 4,300 and 6,850 feet. Surveys since 1992 have expanded the number of vegetation and hydrology types occupied by Ute ladies'-tresses to include seasonally flooded river terraces, sub-irrigated or spring-fed abandoned stream channels and valleys, and lakeshores. Additionally, 26 populations have been discovered along irrigation canals, berms, levees, irrigated meadows, excavated gravel pits, roadside borrow pits, reservoirs, and other human-modified wetlands (Fertig, et al., 2005). Threats to this species include habitat destruction and modification by urbanization and agriculture over grazing, exotic plants and low population and reproductive rates (England, 1992/USFWS, 1995). Most surviving populations are small and appear to be relict in nature.

Ute Ladies'-tresses has been documented in Wasatch County on the Middle Provo River in two separate locations. These sites are in the Heber Valley, which is located downstream of the Jordanelle Reservoir Dam and above Deer Creek Reservoir. The elevations of the sites range from 5580 feet to 5760 feet above mean sea level (Fertig, et al., 2005).

Much of the shoreline of the reservoir is typically rocky and steep-sided and lacks suitable habitat conditions for Ute ladies'-tresses. The Rock Cliff Recreation Area contains wet meadows, oxbows and gravel bars that could be suitable habitat for Ute ladies'-tresses where the Provo River and its floodplain drain into Jordanelle Reservoir. To date, no populations of Ute ladies'-tresses have been identified in the Rock Cliff Recreation Area, and there are no known occurrences of Ute Ladies'-tresses at any other locations within the Project Management Area.

3.8 Visual Resources

The purpose of this section is to provide a general overview of the visual setting of the Project Management Area. Visual resources include undisturbed and more natural appearing areas, as well as both temporary and permanent man-made features. Visual quality is subjective, and it is recognized that certain visible features that may be considered appealing or valuable to one set of viewers may be considered distracting or displeasing to others. Although, in general, natural resources are considered less visually intrusive or adverse, man-made features can also be considered to have a beneficial visual quality depending on their design and form, and whether they are consistent or contrast with the setting in which they are located.

Utah is one of the most beautiful and diverse states in the union, particularly when it comes to outdoor recreation landscapes. The Jordanelle area is a great reflection of Utah's image with its beautiful water and surrounding mountainous scenery. Its scenic resources and the general visual environment are recognized as an important component for recreational enjoyment of visitors and travelers passing through the area. The character of the Project Management Area's visual environment should continue to be preserved as its natural aesthetics are recognized as an important component for recreational enjoyment. Although there are manmade features present and noise sources audible from the recreation areas, the reservoir still affords visitors a general sense of solitude. This is due in part because when Reclamation acquired land for the reservoir, it also acquired a buffer zone of land area above the high water level. This adjacent land area protects the reservoir area from the impacts of adjacent development. In addition, the area mitigates adverse impacts to wildlife and stream fisheries.

3.8.1 Description of Project Management Area

Located in Wasatch County, Utah, and at an elevation of about 6100 feet, the Project Management Area is in the northern end of the Heber Valley on the east side of the Wasatch Mountain Range. Visitors to the area enjoy the picturesque mountain setting as the reservoir is surrounded by rolling hills and mountain peaks.

When Reclamation acquired land for the reservoir, it also acquired a buffer zone of land area above the high water level. There are approximately 3,680 acres of adjacent land within the Project Management Boundary (including the 743-acre West Hills WMA) that protect the reservoir from the impacts of adjacent development. In addition, the Project Management Area mitigates adverse impacts to wildlife and stream fisheries, provides flood control, enhances water quality, and provides recreation.

Jordanelle Reservoir is located in two intersecting valleys that form an “L” shape. The north arm of the reservoir is about 4.5 miles long and the East arm is about 5 miles long.

On the west side of the reservoir, the gently rolling terrain creates fingers, or peninsulas. The northern portion of the Hailstone Recreation Area and Crandall Point are located on these peninsular forms. The vegetation of this area is primarily sagebrush, with aspens, maples, and scrub oak.

At the north end of the reservoir (Ross Creek Recreation Area), the valley flattens out dramatically, creating a broad, flat, gently sloping shoreline. The east shore of the North Arm is steeper than the west shore and more deeply etched by the streams that flow into the reservoir in most areas. The vegetation of the east shore is predominantly scrub oak and it is an important wildlife habitat.

The north shore of the east arm is known as the West Hills, which is comprised of broad, rolling, south-facing terrain with sagebrush and pockets of scrub oak. West Hills is an especially important wildlife habitat as it is a critical winter range for mule deer. The north side of the east arm also contains eagle-nesting sites.

The east end of the east arm is a broad, flat river bottomland and is known as the Rock Cliff Recreation Area. It has numerous groves of tall cottonwoods and willows interspersed in riparian grassland meadows. The Provo River flows through the area and is a popular fishing spot.

The south shore of the east arm is a high, rolling plateau, elevated above the reservoir by steep cliffs. As a result, the upper area is virtually inaccessible from the reservoir itself (DOI, Reclamation, State Parks, 1989).

3.8.2 Topography and Flood Plains

Jordanelle Reservoir is an impoundment of the Provo River. The river has a long narrow watershed, from the Trial Lake area in the extreme western Uinta Mountains down into the southern end of Kamas (Rhodes) Valley, then down upper Provo Canyon into Jordanelle Reservoir. The area is vegetated with sage-grass, oak, and mahogany, with aspen and evergreen forests on the mountains to the west of the reservoir. Below Jordanelle Reservoir, the river enters the Heber Valley, a wide flat alluvial valley that receives runoff from the Wasatch Mountains on the west and the Uinta National Forest on the east.

3.8.3 Jordanelle Dam

Jordanelle Dam was constructed on the Provo River by Reclamation. Construction of the dam began in June 1987 and was complete in April 1993. Its construction required the relocation of US Highway 40, and resulted in the flooding of two towns, Hailstone and Keetley. The dam is a rolled earthfill structure with a fuse plug emergency spillway and outlet works. The rolled earth

embankment section of the dam has a structural height above the streambed of 299 feet and a crest length of 3,700 feet at elevation 6185 feet. The reservoir first filled in 1996.

Construction of the 13 MW Jordanelle Dam Hydropower Plant was completed in 2008. Located at the base of Jordanelle dam, the plant produces enough energy to power 9,000 homes annually. The powerhouse is a reinforced concrete structure constructed adjacent to the existing outlet works control structure.

The Jordanelle Dam is owned by the United States. It is administered by Reclamation and operated by the CUWCD.

3.8.4 Jordanelle Reservoir

Jordanelle Reservoir is one of the newest reservoirs in Utah. The reservoir was opened for recreational use in 1995. The reservoir's benefits include water for irrigation, municipal, and industrial use, public recreation, flood control, drought relief, fish and wildlife mitigation and enhancement, and supplemental irrigation water. The reservoir surface area covers approximately 3,024 surface acres with a depth of about 280 feet when at full pool.

Although man-made, the reservoir offers what can be considered a somewhat natural appearance of a mountain lake, visible from surrounding shoreline areas and travelers on the roads.

State Parks, under an agreement with Reclamation, manages the reservoir's recreation and public use. Although Jordanelle Reservoir plays a critical role in the area's water storage and delivery, it is also an immensely popular recreational destination, as described in Section 3.9.

3.8.5 Land Use

Reclamation has management authority and jurisdiction over the land within the Project Management Boundary, as shown in Figure 1–3. This section describes current land uses within the Project Management Area.

Recreational use of the reservoir is managed by State Parks. Land set aside and designated for recreational purposes currently includes three recreation areas. The two most visited are the Hailstone Recreation Area and the Rock Cliff Recreation Area. The third, Ross Creek Recreation Area, is the least used.

Hailstone has become one of the most heavily visited recreational areas in the state due to its location and facilities. It functions as the park's headquarters and major recreational complex. Hailstone's land facilities include three separate camping areas with a total of 186 campsites (RV and tent), children's play areas, two boat ramps (one ramp for personal watercraft), three group-use pavilions, 41 day-use cabanas, a beach house, marina store and restaurant, fish cleaning

stations, pump-out facilities, dry storage units, hot showers, laundry facilities, an event center, boat decontamination station, and an outdoor amphitheater. Visitors can access Hailstone's webcam at <http://www.livelakeview.com/lakes/jordanelle/> to view the current conditions at the main boat ramp, dock, parking lot, and reservoir.

Where Hailstone offers visitors multiple recreational opportunities with modern conveniences, Rock Cliff offers visitors a more natural and unique opportunity to interact with this beautiful riparian environment. Day-use facilities include the Nature Center (which has the capacity to offer educational exhibits as well as day and evening programs), three modern restrooms, two group-use pavilions, and three walk-in campgrounds. Elevated boardwalks and well-maintained trails guide visitors through the upland sage and wetland areas, leading to a breathtaking view of the Provo River as it enters the Jordanelle Reservoir. Rock Cliff's protected habitat attracts abundant wildlife.

A minimally developed recreation area known as Ross Creek is another land area used for recreation. The trailhead at Ross Creek provides parking, trash receptacles, a vault toilet restroom, hitching posts, and non-motorized day-use access to the reservoir and the trail.

Another potential development area for reservoir and trail access is Crandall Point. Located adjacent to JSSD's facilities, a recent JSSD fence realignment provides a location for a future access road to Crandall Point.

Outside the recreational land use, very little development exists within the Project Management Boundary and much is undeveloped open space. The West Hills WMA, located adjacent to the Rock Cliff area, contains 743 acres of gently rolling foothills covered with sagebrush and oakbrush.

As development continues to occur around the reservoir, requests for private development for public use on Reclamation land have accelerated. The current policy does not allow private exclusive uses in order to protect water quality and natural resources, as well as to reduce management problems and to retain the public nature of the resources provided by the publicly-funded CUP.

3.9 Recreation

Recreation is a major component of the Jordanelle Project. Recreation facilities were constructed by Reclamation as part of the project and are managed by State Parks. Jordanelle State Park opened June 29, 1995 and offers an array of recreational opportunities, including: camping, picnicking, fishing, boating, water sports, swimming, hiking, and mountain biking. The park also offers or hosts interpretive programs, nature center activities, walks, triathlons, sailboat races, tours for schoolchildren, and other special events (State Parks, 2011).

Since 2003, the park has averaged 227,847 visitors annually. The peak annual visitation during the past 8 years (2003–2010) was 310,348 in 2007. The lowest annual visitation was 122,169 in 2003. Visitation gradually increased each year from 2003 to 2007 and has gradually declined each year since 2007. Visitation in 2010 was 265,208. Peak monthly visitation is in July with almost 90% of the annual total (203,658) occurring during the five months of May through September (State Parks, 2011).

For purposes of this analysis, recreation at Jordanelle Reservoir has been categorized under five headings; fishing, boating, reservoir access, recreation experience, and park management/operations. Each is described below.

3.9.1 Fishing

Jordanelle Reservoir provides fishing for rainbow trout, cutthroat trout, and smallmouth bass. The reservoir's reputation as a trophy bass fishery draws over 200,000 angler hours per year. A population of brown trout produced in the Provo River is also expanding into the reservoir. This mix of species provides a sport fishery at the reservoir.

Fisherman access to the reservoir is provided at each of the three recreation areas: Hailstone, Ross Creek, and Rock Cliff. A large majority of reservoir fishing is from boat. Boat launching facilities are available only at the Hailstone and Rock Cliff Recreation Areas. Trailheads to the Perimeter Trail, located at the Ross Creek and Rock Cliff Recreation Areas, provide access for bank fishing to much of the east and north shores of the reservoir.

3.9.2 Boating (motorized & non-motorized)

Jordanelle Reservoir's over 3,000 acres of open water provides an ideal setting for boating and other forms of water recreation. The reservoir has become a favorite for boaters, water-skiers, wave-runners, and laser sailboats. The reservoir's sandy beaches, day-use cabanas and children's play areas complete the experience.

Boat launching facilities are available at the Hailstone and Rock Cliff Recreation Areas. Facilities at Hailstone include a personal watercraft ramp with courtesy docks, an Americans with Disabilities dock, and the main 8-lane ramp with an 80-slip marina plus courtesy docks, with utility hookups, fuel dispensing, boat rentals, and a marina store and restaurant. The boat ramp at Rock Cliff provides launching facilities for smaller motorized boats.

The primary recreation activities at the recreation areas are boating and other related water sport activities. According to a visitation survey conducted by State Parks in June and July of 2010, approximately 32% of respondents stated boating as their primary reason for visiting the park with another 8% indicating water-sports, such as water skiing, wakeboarding, tubing, etc. Another approximately

5% indicated personal watercraft, such as sailboats. Sailboats typically use the reservoir surface area immediately south of the Hailstone Recreation Area. The Park City Sailing Association races Olympic Class Laser Sailboats weekly from the first Tuesday in June until the last Tuesday in September. Boating and related water sport activities cover virtually all surface areas of the reservoir, excluding the Primary Jurisdiction Zone restricted area adjacent to the dam.

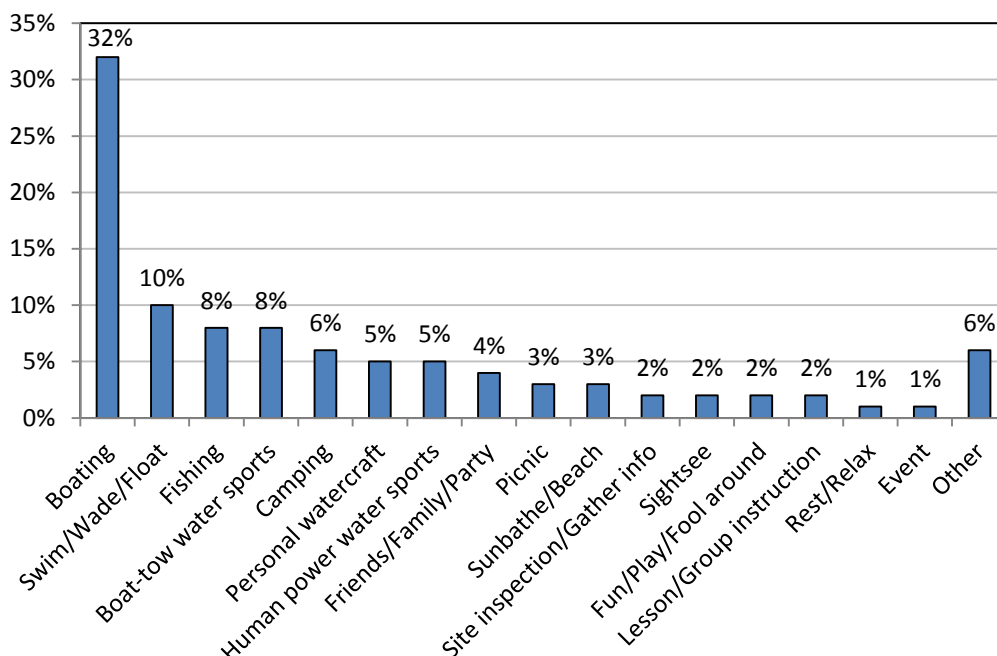


Figure 3-10: Primary Activity at Jordanelle State Park (State Parks, 2010a)

3.9.3 Reservoir Access

All Jordanelle lands and facilities are accessible to the public except those within the Primary Jurisdiction Zone area. Reclamation and CUWCD have exclusive access to the Primary Jurisdiction Zone for purposes of operation, maintenance, and security of Jordanelle Project facilities.

Public access to the reservoir is provided at all recreation areas. The 13-mile unpaved, non-motorized Perimeter Trail provides access to much of the reservoir shoreline. The trail begins just north of Crandall Point on the west side of the reservoir and continues north along the west side of the reservoir to the Ross Creek Recreation Area and then south along the east side of the reservoir to the Rock Cliff Recreation Area. The trail is used by hikers, mountain bikers, horse-riders, and cross-country skiers. Access to the Perimeter Trail is provided at both Ross Creek and Rock Cliff, but not at Crandall Point.

Current Reclamation contracts and policy prohibit exclusive access and use of Jordanelle lands and recreation facilities.

- Reclamation Manual Directives and Standards for Recreation Program Management (LND 01-02) under Section 18 Private Exclusive Recreational or Residential Use states: “New private recreation and residential exclusive use, as defined in 43 CFR 429.2, is prohibited on Reclamation lands.”
- Section 18 of the September 2001 Memorandum of Agreement (MOA) between the United States and State of Utah for the administration, operation, maintenance and development of recreation at Jordanelle states: “New, renewed, or modified contracts, concession contracts and permits will include clauses that prohibit new exclusive use, and require existing exclusive use, if any, to be phased out in accordance with an established timetable.”

3.9.4 Recreation Experience

Recreation experience is defined as both the quality and variety of experiences a visitor to Jordanelle State Park would have. Jordanelle State Park has become a major recreation spot for residents along the populated Wasatch Front area. It is also becoming a popular vacation destination for out-of-state visitors. A primary goal of the park is to provide high quality recreational facilities and a wide variety of recreational opportunities for all visitors. Both in-state and out-of-state visitors are encouraged to spend multi-day vacations in the area.

A survey of park visitors completed in July 2010 indicates a very high satisfaction rate among visitors to the park.

3.9.5 Recreation Management/Operations

Recreation at Jordanelle Reservoir is managed by State Parks. Staff to manage the park has remained constant at about eight full-time-equivalents for the past several years. Due to recent budget constraints, however, funding to support this minimal level of staffing is decreasing to the point that future staff reductions are expected. The state legislature reduced State Parks overall budget by \$3 million in 2012, which is expected to result in reduced funding for the Jordanelle State Park. Further budget cuts are anticipated for future years. This financial reality mandates that State Parks implement measures to become as financially self-sufficient as possible in the future.

Jordanelle State Park expenditures and revenue over the past three years is shown in Table 3-7. As shown, budget expenditures have increased while revenues have stayed relatively constant, resulting in a significantly increasing shortfall.

Table 3-7: Jordanelle State Park Revenues and Expenditures (Backus, 2011)

Fiscal Year	Expenditures	Revenues	Shortfall
2008	\$ 793,500	\$ 731,567	\$ 61,933
2009	\$ 819,078	\$ 691,314	\$ 127,764
2010	\$ 845,884	\$ 693,625	\$ 152,259

3.10 Transportation and Access

Access to the Project Management Area is available to motorists traveling on Interstate-80 from Salt Lake to eastern Wyoming. Regional access to the reservoir and campgrounds is accessible to motorized vehicles via three different routes. US Highway 40 provides access to the western areas of the reservoir, which includes the Hailstone Recreation Area. State Route 32 provides access to the south shoreline including the Rock Cliff Recreation Area. In addition, State Route 248 provides access to the northeastern areas of Jordanelle Reservoir including the Ross Creek Recreation Area (see Figure 1-4).

3.10.1 US Highway 40

US Highway 40 is a four-lane, divided highway that runs north/south along the western shore of the reservoir, and provides through-traffic and local traffic movement within the region. The highway is accessible from Interstate-80 located north of the reservoir. Travel is maintained year-round and snow clearing is performed as needed during the winter season. According to Utah Department of Transportation, the annual average daily traffic was about 18,900 vehicles per day in 2009 (UDOT, 2010b).

Mayflower interchange (exit 8) off US Highway 40 provides access to Hailstone Recreation Area and campgrounds. Access from US Highway 40 is well signed and an off-ramp connects the highway to Deer Hollow Road (SR-319), which is a paved two-lane road that provides access to the recreational area. The Hailstone Recreation Area is the most developed and commercialized area on the shorelines of Jordanelle Reservoir. The park is open from 6 am to 10 pm during summer months and from 8 am to 5 pm during the winter season.

3.10.2 State Route 248

State Road 248 runs above the northeast shoreline of Jordanelle Reservoir. The road is the primary access to Park City from, Oakley, Kamas, and Francis. Travel is maintained year-round and snow clearing is performed as needed during the winter season. According to the Utah Department of Transportation, the annual average traffic was about 6,800 vehicles per day in 2009 (UDOT, 2010b).

Ross Creek Road provides access to the Ross Creek Recreation Area located on the northeast end of Jordanelle Reservoir. Ross Creek Road is unpaved and

provides access to a gravel parking area. The road is no longer maintained and is in poor to moderate condition. This recreation area does not provide access to the reservoir for boaters and its only purpose is to provide access to the Perimeter Trail that runs along the northeast shoreline of Jordanelle Reservoir. The access from SR 248 is not well signed, with hazardous ingress/egress issues.

3.10.3 State Route 32

State Road 32 is highway that runs east/west along the south shore of the reservoir. This highway connects US Highway 40 to the town of Francis, Utah. Rock Cliff Recreation Area is located about two miles west of Francis on the farthest eastern corner of Jordanelle Reservoir. The highway is open year-round and snow clearing is performed as needed during the winter season. According to the Utah Department of Transportation, the annual average traffic was about 2,000 vehicles per day in 2009 (UDOT, 2010b).

Rock Cliff Road off State Route 32 provides access to Rock Cliff Recreational Area. Rock Cliff Road is a paved road in moderate to good condition and is passable to passenger vehicles. The park is open from 6 am to 10 pm during summer months and from 8 am to 5 pm during the winter season. Access from State Route 32 is well signed and an additional shoulder lane exists to facilitate ingress and egress.

3.10.4 Recreation Facility Access Roads

As mentioned above, access to the recreation facilities at Jordanelle Reservoir is generally via US Highway 40, State Route 248, and State Route 32 from which individual access roads provide routes to each facility. Access roads vary from paved and well maintained to unpaved and poorly maintained. Access from State Route 248 is not well signed and has hazardous ingress/egress issues. With any proposed development in the Ross Creek Recreation Area, access from State Route 248 will need to be improved.

3.10.5 Planned Improvements

There are no current transportation improvements planned.

3.11 Cultural Resources

Cultural resources are defined as physical or other expressions of human activity or occupation. Such resources include culturally significant landscapes, prehistoric and historic archaeological sites as well as isolated artifacts or features, traditional cultural properties, Native American and other sacred places, and artifacts and documents of cultural and historic significance.

Section 106 of the National Historic Preservation Act (NHPA) of 1966 mandates that Reclamation take into account the potential effects of a proposed federal

undertaking (Federal Action in accordance with NEPA) on historic properties. Historic properties are defined as any prehistoric or historic district, site, building, structure or object included in, or eligible for, inclusion in the National Register of Historic Places (NRHP). Potential effects of the described alternatives on historic properties are the primary focus of this analysis.

The affected environment for cultural resources is identified as the APE (area of potential effects), in compliance with the regulations to Section 106 of the NHPA (36 CFR 800.16). The APE is defined as the geographic area within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties. The APE for the undertaking (proposed action) includes the entire Project Management Area.

3.11.1 Cultural History Overview

The Project Management Area lies in the Wasatch Hinterland Section of the Middle Rocky Mountains physiographic province. The Wasatch Hinterland lies directly east of the Wasatch Mountain Range and is comprised of mixed, moderately rugged topography (Stokes, 1986). Archaeological investigations in the Wasatch Hinterland remain rather sparse. Despite a lack of previous investigations, a general cultural history of the Project Management Area may still be given, based on the broader cultural chronological sequence of the eastern Great Basin.

Archaeological evidence of human occupation in the eastern Great Basin extends as far back as about 11,000 years before present (B.P.), the beginning of what is generally referred to as the Paleo-Indian Period (ca 12,000 B.P. – 9,000 B.P.). The Paleo-Indian Period is characterized by small mobile bands whose subsistence strategies depended primarily on the exploitation of various extinct and modern megafauna (Griffiths, 1998; Jennings, 1978; Madsen, 1982; McCarty, et al., 1987; Tipps, et al., 2003). In the eastern Great Basin, most Paleo-Indian sites have been found near late Pleistocene/early Holocene beaches, such as those discovered around Sevier Lake. According to Madsen (1982), the distribution of these sites suggests a dependence on lake-edge marsh environments during this period. Projectile points generally associated with the Paleo-Indian Period include fluted, stemmed/shouldered, and large lanceolate-types, such as Folsom and Clovis (Griffiths, 1998; Madsen, 1982). Although distinctive artifacts typically associated with the hunting of Pleistocene megafauna have been discovered in the eastern Great Basin, as surface finds, there remains a lack of stratified sites exhibiting evidence of human occupation dating to the Paleo-Indian Period.

The next period in the cultural chronological sequence of the eastern Great Basin is known as the Archaic Period (ca 8,500 B.P. – 2,000 B.P.). The Archaic Period is generally divided into the Early Archaic, Middle Archaic, and Late Archaic Periods. According to Jennings (1978), a shift to a “mobile hunting-collecting

way of life” marks the transition from the Paleo-Indian to the Early Archaic Period. Evidence of Early Archaic (ca 8,500 B.P. – 5,500 B.P.) human occupation in the eastern Great Basin is almost exclusively found at lake-edge sites, like those around the Great Salt Lake (Madsen, 1982). In contrast to Paleo-Indian Period peoples, the Early Archaic cultures were collecting and processing seeds, and using caves and rock shelters for food storage and habitation (Tipps, et al., 2003; Madsen, 1982). In addition, new projectile point types also appear during the Early Archaic Period (e.g., Pinto Series, Humboldt, Elko Series, and Northern Side-Notched). This change in projectile point production is seen by some as a reflection of the development of the atlatl for the pursuit of smaller, faster game (Holmer, 1986). Projectile point styles would change again as the Early Archaic Period transitioned into the Middle Archaic.

The production and use of Elko Series, Pinto, and Humboldt projectile points continued into the Middle Archaic Period (ca 5,500 B.P. – 3,500 B.P.), but Gypsum, Sudden Side-notched, Hawken Side-notched, Rocker Side-notched, McKean Lanceolate, San Rafael, and Gate Cliff Split-stem points also begin to appear (Griffiths, 1998). In addition, Middle Archaic Period populations began to increase their use of upland habitats in the Great Salt Lake area, although lake edge sites continued to be occupied. These upland areas appear to have been used primarily as hunting camps, although grasses were also collected (Madsen, 1982). At the end of the Middle Archaic Period, increased moisture led to rising lake levels, a major factor in the transition to the Late Archaic Period.

The increase in moisture and the resulting rise in lake levels led to a depletion of flora and fauna previously exploited in lake-edge marsh areas during the Middle Archaic Period. These environmental changes contributed to an increased settlement of upland cave and shelter areas during the Late Archaic Period (Griffiths, 1998). During the Late Archaic Period (ca 3,500 B.P. – 2,000 B.P.), subsistence activities shifted towards greater dependence on smaller game, such as rabbits. Atlatl darts were replaced with smaller bow-and-arrow projectile points such as the Rose Spring and Eastgate varieties. Few sites dating to the Archaic Period have been identified within or near the Project Management Area. According to Tipps et al. (2003), however, it is likely that the majority of open lithic scatters found in the area date to this period.

The Formative Period (ca 1,600 B.P. – 650 B.P.) and the “Fremont culture,” a term generally associated with Formative Stage cultures, followed the Late Archaic Period. Settlement patterns generally associated with the Formative Period in the eastern Great Basin include “villages located on alluvial fans in intermontane valleys adjacent to marsh or riverine ecosystems” and transient composites surrounding these villages (Madsen, 1982). Subsistence strategies were still based on the exploitation of various wild flora and fauna, but were now supplemented with horticulture, specifically corn agriculture. The Fremont culture was also more sedentary than cultures from the previous cultural chronological sequence. The use of horticulture and a more sedentary lifestyle

also led to the development of permanent housing, in the form of pithouses, and pottery (Tipps, et al., 2003; Griffiths, 1998). Projectile point types associated with Formative Stage cultures include Bear River Side-notched, Uinta Side-notched, Parowan Basal-notched, Nawthis Side-notched, and Bull Creek (Griffiths, 1998). By about 600 B.P., evidence of the Fremont culture in the eastern Great Basin is significantly depleted, giving way to what is commonly termed the Late Prehistoric or Protohistoric Period (ca 750 B.P. – A.D. 1800).

The reasons for the diminishing Fremont site record remains unclear. Some researchers postulate that climatic changes or the pressures of other cultural groups entering the region caused the Fremont culture abandonment (Jennings, 1978). Others believe that the Fremont culture did not actually abandon the region, but rather, that Fremont culture peoples coexisted with the new groups, such as the ancestral Ute and Shoshone. A sheer lack of archaeological data associated with the Protohistoric Period in the eastern Great Basin leaves many questions about the cultural continuity, or lack thereof, unanswered. Whatever the reasons, the evidence points to a lessening dependence on horticulture and the subsequent dominance of a more hunter-gatherer oriented subsistence strategy, traditionally referred to as Shoshonean or Numic. Formative Stage Fremont culture remains still turn up at some archaeological sites dating to the Protohistoric Period, however, unlike earlier Fremont sites, Desert Side-notched projectile points, brownware ceramics, and tipi-type tents are also part of the material culture (Tipps, et al., 2003). The introduction of the horse at the later end of the Protohistoric Period dramatically changed the dynamics of subsistence strategies for Protohistoric peoples. These groups became exceptionally mobile, exploiting floral and faunal resources all over Utah (Hampshire, et al., 1998). As influential as the introduction of the horse was on Protohistoric cultures, the arrival of Euro-American explorers, trappers, and settlers into the eastern Great Basin resulted in some of the most dramatic changes seen by Protohistoric peoples in the region.

The arrival of Euro-Americans into the eastern Great Basin is generally classified as the beginning of the Historic Period (ca A.D. 1800 – present). The first European explorers to enter the eastern Great Basin were likely members of the Dominguez-Escalante expedition in 1776 (Embry, 1996; Simms, 2008). According to descriptions by Dominguez, large stable populations of Protohistoric groups were living in the eastern Great Basin at the time of his arrival (Madsen, 1982). The purpose of the expedition was to find an overland trade route from New Mexico to California. Other Euro-American explorers and fur trappers followed, traveling throughout the eastern Great Basin during the early part of the 19th century.

As Euro-American incursions multiplied, many traditional Protohistoric lifeways were dramatically impacted. Many faunal resources, for instance, dwindled in numbers as many trappers developed a reputation for shooting everything they encountered (Hampshire, et al., 1998). Trees were cut down in large numbers for

firewood and livestock decimated local grasses. With the arrival of Mormon settlers in the mid-19th century, Protohistoric populations would face even more adversity, most notably in the form of forced relocation from traditional tribal lands.

Historic Period settlement of the eastern Great Basin began soon after the arrival of Mormon pioneers in 1847. Brigham Young instructed groups of colonists to settle valleys in the area and by the 1850s; Mormon pioneers had expanded and claimed most of the desirable land in the Salt Lake Valley (Embry, 1996; Hampshire, et al., 1998; Tipps, et al., 2003). Mormon settlements continued to expand out from the Salt Lake Valley, leading to numerous tribal land claim conflicts. Utes originally occupied approximately 23.5 million acres (about 45% of the total land area of Utah). By the 1880s, Ute peoples had been forcibly relocated to reservations in the Uintah Basin, their land holdings having been reduced to approximately 4 million acres (Callaway, et al., 1986).

By the beginning of the 20th century, historical accounts of life in the eastern Great Basin became increasingly extensive. As a result, a more specific overview of the historical events in the Project Management Area and the immediate vicinity can be presented. With populations in the Wasatch Front of northcentral Utah growing exponentially, the need for water storage became increasingly important. As early as 1905, ideas for a dam in the area were proposed as part of a larger plan to divert and store Colorado River water from the south side of the Uinta Mountains to the Wasatch Front by way of dams and tunnels (Embry, 1996). The Colorado River Compact of 1922 and the Upper Basin Compact of 1948 guaranteed Utah a portion of the water from the Colorado River. In order to deliver this water to the Wasatch Front, Utah officials and Reclamation engineers began planning the CUP in 1956. The largest unit of the Central Utah Project, the Bonneville Unit, included a proposed reservoir on the border of Wasatch and Summit counties on land belonging to the Jordan family. Based on the Jordan family's brand, Jordan L, the reservoir was to be known as Jordanelle Reservoir. Local concern involving the impacts of the proposed Jordanelle Reservoir on the local settlers led to decades of delays in the reservoir's construction. Finally, in 1987, construction of Jordanelle Reservoir began.

Construction of Jordanelle Dam was essentially completed in 1993. Jordanelle Reservoir brought increased numbers of summer tourists to the area. Local recreation also increased and developers initiated construction on several projects around the reservoir (Hampshire, et al., 1998). Although the area around Jordanelle Reservoir has seen relatively substantial growth since the 1990s, the area is still seen by many as an urban escape for people commuting to work in the Wasatch Front and Salt Lake City (Embry, 1996).

3.11.2 Cultural Resource Status

A Class I cultural resource literature search was conducted by Reclamation at the Division of State History, Utah State Historic Preservation Office (SHPO) on March 7, 2011 to identify any previously conducted cultural resource inventories and recorded cultural resource sites within or near the Project Management Area. Files at Reclamation and General Land Office maps for the area were also examined. The results of the literature search included 40 previous cultural resource inventories within approximately one mile of the Project Management Boundary. As a result of these inventories, 68 cultural resource sites have been identified.

The Jordanelle Reservoir RMP establishes only a conceptual framework for managing resources at Jordanelle Reservoir and does not implement any specific projects. As such, the scope of this RMP focuses on a broad scale of cultural resource impacts associated with the array of alternatives and their broad levels of proposed development within the Project Management Boundary. Site-specific cultural resource impacts will be addressed as part of separate NEPA and Section 106 compliance processes prior to the implementation of individual projects proposed as part of the selected RMP; those site-specific impacts are not addressed in this RMP.

3.12 Paleontological Resources

Paleontological resources are defined as any fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth.

Section 6302 of the Paleontological Resources Preservation Act (PRPA) of 2009 (Sections 6301-6312 of the Omnibus Land Management Act of 2009 [Public Law 111-11 123 Stat. 991-1456]) requires the Secretary of the Interior to manage and protect paleontological resources on federal land using scientific principles and expertise.

The affected environment for paleontological resources is represented by the same proposed action Project Management Area APE that corresponds to cultural resources as described in 3.11.

3.12.1 Paleontological Resource Status

A paleontological resource file search, covering the entire Project Management Area, was conducted by the Utah Geological Survey (UGS) at the request of Reclamation on March 7, 2011. Martha Hayden, Paleontological Assistant with the UGS, was consulted regarding the potential for encountering previously documented and presently unknown paleontological resources in the Project Management Area. The UGS reply, dated March 7, 2011, stated that there are no

previously documented paleontological localities within the Project Management Boundary. Quaternary and Recent alluvial deposits and Tertiary volcanic deposits that are exposed over most of the lands within the Project Management Boundary have a low potential for yielding significant fossil localities.

According to the UGS, there may be some exposures of the Triassic Ankareh Formation, however, located mainly in the northeast portion of the Project Management Area, that have the potential for containing vertebrate fossils and/or tracksites. Fossil wood has also been discovered in nearby Tertiary volcanic deposits (the Keetley Volcanics).

The Jordanelle Reservoir RMP will establish only a conceptual framework for managing resources at Jordanelle Reservoir and does not implement any specific projects. As such, the scope of this RMP focuses on a broad scale of paleontological resource impacts associated with the array of alternatives and their broad levels of proposed development within the Project Management Boundary. Site-specific paleontological resource impacts will be addressed as part of separate NEPA and PRPA compliance processes prior to the implementation of individual projects proposed as part of the selected RMP; those site-specific impacts are not addressed in this RMP.

3.13 Indian Trust Assets

Indian Trust Assets (ITAs) are legal interests in property held in trust by the United States for Indian tribes or individuals. The DOI's policy is to recognize and fulfill its legal obligations to identify, protect and conserve the trust resources of federally recognized Indian tribes and tribal members, and to consult with tribes on a government-to-government basis whenever plans or actions affect tribal trust resources, trust assets, or tribal safety (please refer to Departmental manual, 512 DM 2). Under this policy, as well as Reclamation's ITA policy, Reclamation is committed to carrying out its activities in a manner that avoids adverse impacts to ITAs when possible, and to mitigate or compensate for such impacts when it cannot. All impacts to ITAs, even those considered non-significant, must be discussed in the trust analyses in NEPA compliance documents and appropriate compensation or mitigation must be implemented.

Trust assets may include lands, minerals, hunting and fishing rights, traditional gathering grounds, and water rights. Impacts to ITAs are evaluated by assessing how the action affects the use and quality of ITAs. Any action that adversely affects the use, value, quality or enjoyment of an ITA is considered to have an adverse impact to the resources.

3.13.1 Indian Trust Asset Status

Reclamation contacted the Bureau of Indian Affairs (BIA) Uintah and Ouray Agency in Fort Duchesne, Utah and Fort Hall Agency in Fort Hall, Idaho regarding potential impacts to ITAs within or near the Jordanelle Reservoir RMP and EA Project Management Boundary. No ITAs were identified.

3.14 Hazardous Materials

The files of the Utah Department of Environmental Response and Remediation (DERR) were searched to identify hazardous materials used in the Project Management Area or areas within the Project Management Boundary that require environmental cleanup. The most prevalent hazardous material used within the Project Management Area is petroleum products, mainly gasoline used in vehicles and boats. The Utah State Parks facilities currently have three underground storage tanks registered with DERR. One of the tanks is located at the Hailstone Maintenance facility, which is currently used to store used oil. The tank is a double walled fiberglass reinforced plastic tank with no record of leaks. The second and third tanks are gasoline tanks located at the Hailstone Marina near the boat ramp. The larger tank is a 6,000 gallon double walled fiberglass reinforced plastic tank with no record of any leaks. The third tank is a 2,500 gallon double walled fiberglass reinforced plastic tank. It is listed as temporarily out of use due to a reported leak in 2005 associated with the piping. Remediation of the contaminated soil, groundwater, and tank has been completed. The tank is listed as being in compliance but is currently not in use. No new storage tanks will be permitted within the Project Management Boundary. Reclamation will work with State Parks to phase out the existing tanks.

A search of the DERR database for facilities currently using or producing hazardous materials identified none. However, two sets of tailings ponds associated with the historic mining were located. The tailings have the potential to leach heavy metals into the water and adjacent soils.

The Olson Neihart tailings ponds were located within the reservoir pool. Prior to the filling of the reservoir the tailings associated with these ponds were moved and put into an approved landfill identified as the Royal Street Landfill. The landfill is located immediately southeast of the exit from Highway 40 to Highway 319 that connects to the Hailstone Marina. The landfill is located just outside of the Project Management Boundary. There is potential for the tailings to contaminate groundwater that flows towards Jordanelle Reservoir but the landfill was built to modern standards with a clay liner, leachate collection system, and cap so contamination is unlikely. The landfill is also being monitored regularly by Reclamation to identify any leaks. No problems have been identified with regard to this landfill.

Adjacent to the landfill for the Olson Neihart tailings are the Mayflower Mountain Tailings Ponds. These ponds are also located just outside of the Project Management Boundary. These tailings ponds were once on the National Priorities List (Superfund) but have been removed. The Utah Department of Water Quality currently regulates the site. The site is being monitored. High TDS concentrations have been identified in the monitoring wells. The tailings contain heavy metals that could also contaminate soil and groundwater down-gradient of the ponds. The Project Management Area is down-gradient of the tailings ponds and could potentially be impacted. The owner of the ponds has indicated a desire to cleanup the site so it can be developed, but nothing has occurred yet.

The project vicinity has a history of mining activity. Mines in the area have produced gold, silver, copper, lead, and zinc. There are many mining shafts and tunnels within and adjacent to the Project Management Boundary which have potential to allow migration of heavy metals toward the Project Management Area. Tailings from the mining activities could be found throughout the Project Management Area. However, DERR records do not indicate any sites other than the tailings ponds mentioned above.

3.15 Socioeconomic Factors (Environmental Justice)

This section discusses the existing economic and social setting of the region within which the Jordanelle Reservoir is located.

3.15.1 Regional Setting

Jordanelle Reservoir is set in a valley east of the Wasatch Mountains residing in Wasatch County, which is located in the north-central part of Utah. The County is bordered on the north by Summit County, on the east by Duchesne County, on the south and southwest by Utah County, and the northwest by Salt Lake County. Wasatch County is one of the smaller counties in the state with a total surface area of 1,207 square miles.

Jordanelle Reservoir serves as a regional recreation resource for north central Utah. Visitors (day-use and overnight) are most likely to come from locations within a half hour to one hour's drive time of the reservoir. This is due to its close proximity to the major metropolitan area of Salt Lake City. With Jordanelle being the closest drive from the city, it has become a popular and well-known recreation area.

3.15.2 Economy

Wasatch County made a proactive economic move in June 2005 by forming the Wasatch Area Economic Development Agency. The organization is a cooperative effort between Wasatch County, Heber, Midway, and Jordanelle

Basin entities to pool resources and strengthen local communities through increased business development. In addition, the Wasatch Business Expansion and Retention program was implemented to support and enhance the economic impact of existing businesses.

To determine the overall economic health of the County, the latest information available was pulled from the Utah Department of Workforce Services and the Bureau of Economic Analysis.

Industries

In 2010, Wasatch County residents earned a total of \$44,692,570. This amount was less than 1 percent of the total for the entire State of Utah (Utah Department of Workforce Services, 2011). The largest industrial sectors of Wasatch County were government, construction, professional business services, and leisure/hospitality. In comparison, professional business services, manufacturing, and education/healthcare were the largest segments of the state's economy when measured by earnings.

Total employment in Wasatch County accounted for less than 1 percent of the total employment in the State of Utah in 2009. The largest sectors were government, leisure/hospitality, construction, and retail trade. These industries accounted for over 65 percent of all jobs in the county (Bureau of Labor Statistics, 2011).

Jordanelle Reservoir Contribution

Information on this subsection was pulled from a flyer that State Parks generated entitled "Jordanelle State Park Impacts on Wasatch County." This information sheds light on estimating the contribution that recreation at Jordanelle Reservoir adds to the Wasatch County economy.

In 2010, 265,208 individuals visited Jordanelle State Park. At the time, the 2010 Wasatch County population was 23,530 according to the Governor's Office of Planning and Budget population estimates. Therefore, in 2010, the park and its staff hosted a number of individuals that is more than 11 times the size of the population of Wasatch County (GOPB, 2009).

The following figure demonstrates the trend in the number of annual visitors to Jordanelle Reservoir.

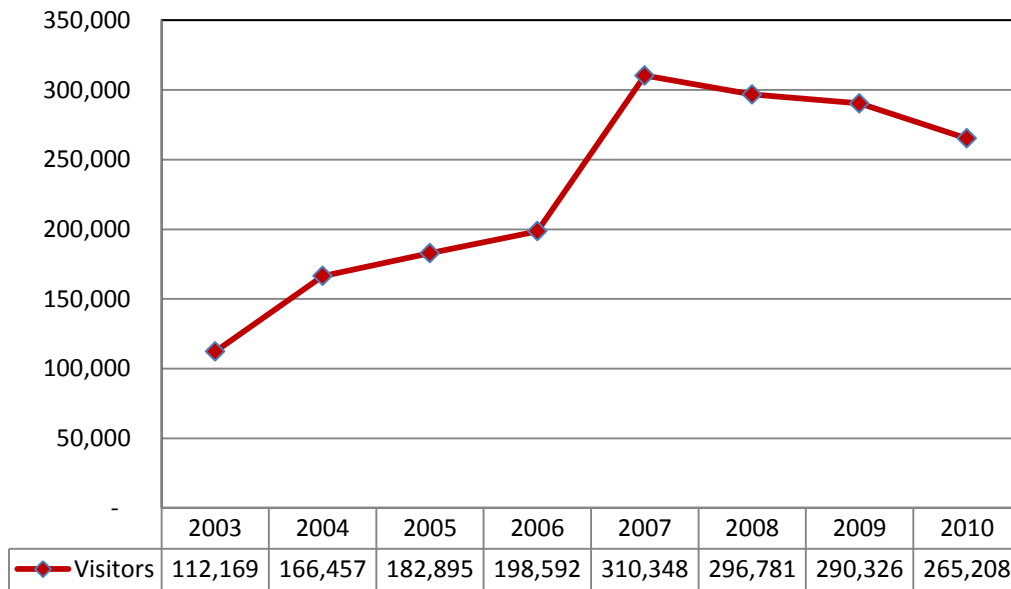


Figure 3-11: Annual Visitation to Jordanelle Reservoir (State Parks, 2011)

Since 2003, the park has averaged 227,847 visitors annually. The park's peak visitation occurs in the months of May through September.

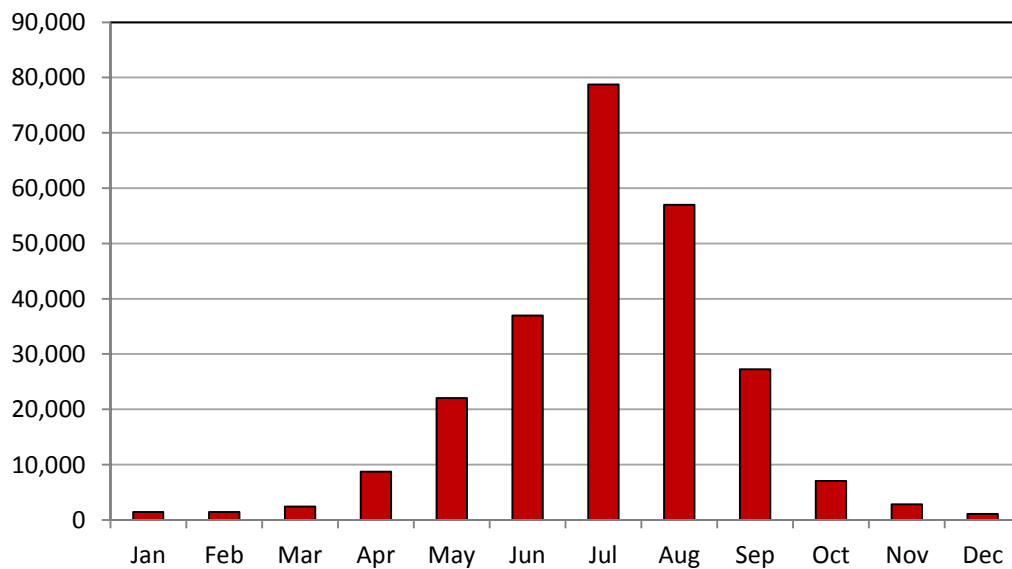


Figure 3-12: Average Monthly Visitation (State Parks, 2011)

While survey research has not been conducted at Jordanelle, data from other similar parks may shed information on Jordanelle visitor use preferences and patterns. A previous survey from nearby Rockport State Park suggests that the park was a primary destination for about 80 percent of survey participants. At

Rockport, about 90 percent of the park's visitors resided in areas outside of Summit County, the majority being Salt Lake County residents. Given its proximity to the Wasatch Front, it is likely that Jordanelle visitors have similar characteristics. Rockport Reservoir is a similar distance from Salt Lake City as Jordanelle Reservoir is and most of the trip to both reservoirs would be on Interstate 80.

Survey data shows that on average, visitors to parks similar to Jordanelle spend about \$141 per group within close proximity of local cities and towns during each boating trip to nearby lakes and reservoirs. Average group size at these reservoirs is about 7.4 individuals, and average length of stay is about 1 day. This translates into average expenditures of approximately \$19 per visit, per individual.

In 2009, division planners conducted research to estimate the impacts that visitor spending has on Wasatch County. It is likely that most spending occurring in Wasatch County is a result of overnight visitors and visitors travelling through Heber City during their park visit. On the high end of the analysis, it is estimated that the 290,326 visitors to Jordanelle in 2009 generated approximately \$2.6 million in local wages, earnings, rents, and tax revenues with the local area in 2009 (State Parks, 2009a). However, since most Jordanelle visitors are day-users coming from Salt Lake County, Summit County probably receives a larger portion of this impact.

In 2009, Wasatch County received \$33,724 in sales and use taxes from park operations (State Parks, 2009c). Along with Wasatch Mountain and Deer Creek, the park also contributed to the \$18,575 in transient room taxes receipts that these parks generated for Wasatch County.

In 2009, Wasatch County had five major boat dealers, two boat liveries (providing boat rentals) and three boating outfitters. Also in 2009, the Division's Boating Program authorized (or listed as current) six Captain/Guide licenses and boat crew permits within the county. The park and the division played key roles facilitating economic impacts to the county through the provision of boating opportunities.

In 2008, 2,341 off-road vehicles (OHVs) and 1,198 snowmobiles were registered in Wasatch County, providing the county with about \$97,323 in revenues (in the form of fees in-lieu of property taxes) (State Parks, 2008). Through its administration of statewide OHV and snowmobile programs, the Division facilitates the provision of numerous area OHV and snowmobile opportunities that undoubtedly bring even more economic impact to the county.

The recreation areas at Jordanelle Reservoir provide opportunities for private businesses. In 2010, a new concession contract was put in effect at the park providing retail items, boat rentals and other services. This privately-owned business has the potential to generate significant revenues (past operations have

generated more than \$600,000 per year). The concession fulfills a critical niche at the park in providing visitors with needed goods and services. It also provides the county and local residents with revenue, income, and employment opportunities.

3.15.3 Population

Wasatch County's population has steadily increased over the past four decades. From 1990 to 2010, the population of Wasatch County grew by 13,441 people, a 133% increase in population. See Figure 3-13.

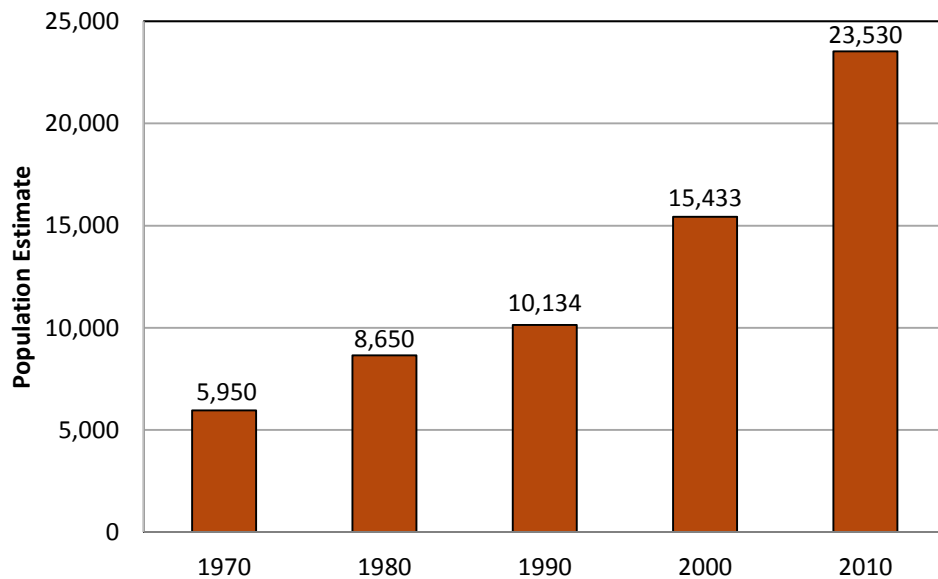


Figure 3-13: Wasatch County Population Trend (U.S. Census Bureau, 2010)

Regional Population

Census statistics were obtained for 2000 and 2010 for the counties within the region. Wasatch County is the fastest growing county in its local region (Table 3-8).

Table 3-8: Regional County Populations

County	2000 Population	2010 Population	Percent change
Wasatch	15,215	23,530	+54.7%
Salt Lake	898,387	1,029,655	+14.6%
Utah	368,536	516,564	+40.2%
Summit	29,736	36,324	+22.2%
Duchesne	14,371	18,607	+29.5%

Source: U.S. Census Bureau, 2010

Racial Characteristics

Executive Order 12898, Federal Actions to Address Environmental Justice on Minority Populations and Low-Income Populations, signed by President Clinton, February 11, 1994, directs federal agencies to take the appropriate and necessary steps to identify and address disproportionately high and adverse effects of federal projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law. As such, an assessment of potential disproportional or discriminatory effects of the project is necessary for the project. Racial data is provided here to present baseline data associated with the assessment or potential environmental justice impacts that may occur as a result of the RMP alternatives under consideration. Table 3-9 provides racial composition data for Wasatch County based on year 2010 census data.

Table 3-9: Wasatch County Race/Ethnic Distribution

Share of Population	2010
Hispanic or Latino (of any race)	13.5%
Not Hispanic or Latino	86.5%
One race	85.5%
White	84.2%
Black or African American	0.2%
American Indian and Alaska Native	0.2%
Asian	0.7%
Native Hawaiian and Other Pacific Islander	0.1%
Some Other Race	0.1%
Two or More Races	0.9%

Source: U.S. Census Bureau, 2010

One notable change in the 2010 Census was another large increase in Wasatch County's Hispanic population. In 1990, 2.5 percent of the county's population was Hispanic. By 2000, that share had doubled to more than 5 percent. Now in 2010, the Hispanic population has more than doubled again to a total 13.5 percent of the population.

3.15.4 Social Well-being

The social well-being of the area is where the basic needs of the populace are met. Many attempts can be made to quantify social well-being. Ways to quantify the social well-being of the area are where income levels are high enough to cover basic wants, where there is no poverty, where unemployment is insignificant, where there is easy access to social, medical, and educational services, and where everyone is treated with dignity and consideration.

What can be difficult to quantify is the actual quality of life for individuals. For example, although economic output rises, it does not guarantee a rise in life satisfaction or "well-being."

For the most part, Wasatch County has a social well-being similar to that of the State of Utah. The following subsections give details on where Wasatch County lines up socially in comparison with state and national statistics.

Income

In 2008, Wasatch County had a per capita personal income (PCPI) of \$29,060, and the county ranked 11th out of the 29 counties in Utah. The PCPI was 91 percent of the Utah state average of \$32,050; however, only 72 percent of the national average of \$40,166. Utah's PCPI was ranked 47th in the United States.

Employment

Overall, the employment situation in Wasatch County has been similar to that of the state as a whole. Table 3-10 lists unemployment rates for Wasatch County, the state of Utah, and the United States. As noted below, Wasatch County and the state both fair better than the average national unemployment rating.

Table 3-10: Unemployment Rates

Area	2001	2004	2006	2010
Wasatch County	4.5%	5.5%	3.2%	8.8%
Utah	4.4%	5.0%	3.0%	7.7%
United States	4.7%	5.5%	4.6%	9.6%

Source: Bureau of Labor Statistics, 2011

Poverty

From 1989 through 2009, the poverty rate for Wasatch County was consistently lower than the rates for Utah and the United States. Table 3-11 lists poverty rates for Wasatch County, Utah, and the United States. The poverty rate for Wasatch County increased in 2009; however, this rate remained more than three percentage points lower than Utah's rate and more than two percentage points lower than the national average.

Table 3-11: Poverty Rates

Area	1989	1999	2009
Wasatch County	7.9%	5.2%	8.5%
Utah	11.4%	9.4%	11.7%
United States	13.1%	12.4%	14.3%

Source: USDA Economic Research Service, 2011

Households

Based upon the data shown in Table 3-12, it is evident that Wasatch County has a strong orientation towards family. A large literature in economics has considered the relationship between family size and later life outcomes, including educational attainment and adult earnings. However, a consensus as to the relationship between family size and well-being remains elusive.

Table 3-12: Household Characteristics

	Wasatch County	Utah	United States
Total households	6,624	831,563	112,611,029
Family Households	80.3%	75.3%	66.7%
Nonfamily households (householder living alone)	19.7%	24.7%	33.3%
Average family size	3.44	3.62	3.19

Source: U.S. Census Bureau, American Community Survey, 2005-2009

Education

An individual's educational attainment is one of the most important determinants of their life chances in terms of employment, income, health status, housing, and many other amenities. An excellent education has benefits not only for the individual but also for the taxpayer and society. Poor education leads to large public and social costs in the form of lower income and economic growth, reduced tax revenues, and higher costs of such public services as health care, criminal justice, and public assistance.

The following figure demonstrates that Wasatch County is in good hands for social and economic growth. Only 7.5% of Wasatch County does not attain a high school diploma compared to the national average of 15.5%.

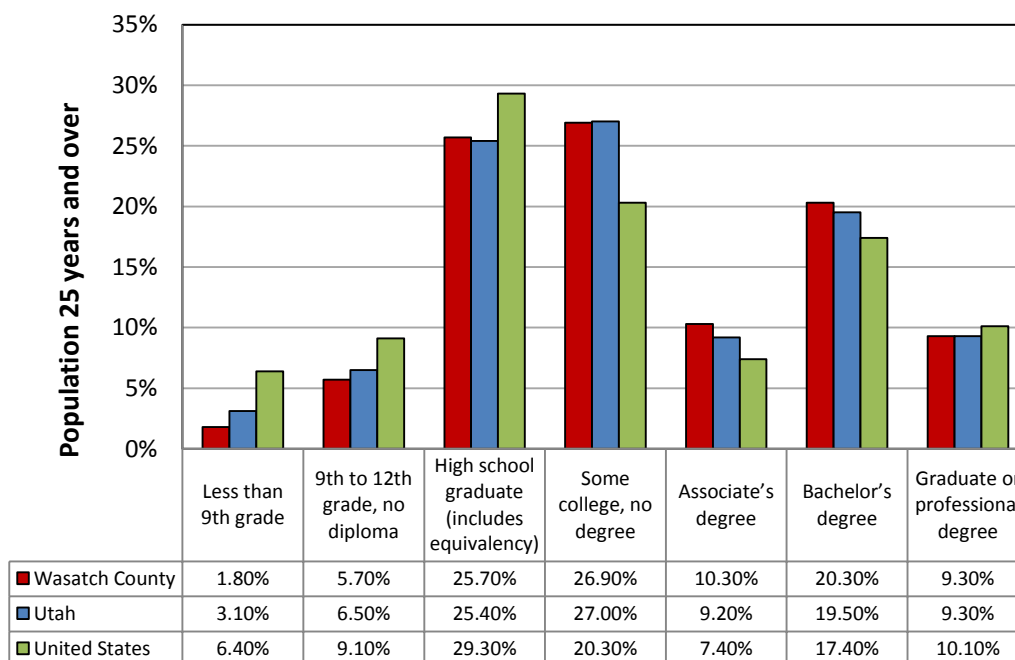


Figure 3-14: Education Attainment
(U.S. Census Bureau, American Community Survey, 2005-2009)

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Chapter 4: Environmental Consequences

4.1 Geology, Soils and Mineral Resources

Project impacts were determined by evaluating the extent of proposed physical alterations compared to existing conditions in the Project Management Area. The considerations used in determining impacts include the following:

- Risk potential of harmful erosion and sedimentation;
- Risk of catastrophic slope failures (landslides);
- The potential in management actions to degrade soil productivity; and
- Increased risk for seismic activity.

Since there is currently no development of mineral resources or sand and gravel resources within the Project Management Boundary, and none of the alternatives include development of mineral resources, no further consideration of mineral resources is necessary. Soil erosion and soil productivity are the two areas of concerns when comparing the effects of the alternatives on soils. Erosion is the detachment and movement of soil particles via water, wind, ice, or gravity.

Erosion is a natural process but it is of concern when it accelerates. Increases in erosion rates can decrease the soil depth or particles may become suspended in water forming sediments that affect stream or reservoir water quality. Nutrient cycling in the soil is important to soil health and productivity. It is important that nutrients contained in organic matter be recycled in the soil rather than washed into the reservoir. Recycling of nutrients in organic matter maintains a healthy community of soil organisms that can cycle the nutrients. The proposed alternatives could have localized effects on soil erosion and soil productivity, which could result in degraded water quality in the reservoir.

4.1.1 No Action

Under the No Action alternative, routine maintenance of existing facilities would continue with only small projects that could lead to ground disturbance. Control of noxious weeds would continue in all areas. Efforts to control the natural meandering and flooding of the Provo River in the Rock Cliff Recreation Area would cease and damage would not be repaired. Some additional paving would occur in the Hailstone Recreation Area, which would increase the impermeable surface area and runoff.

Impacts

Only minor ground disturbing activities would take place and these would consist of a small parking area and widened boat ramp at the Hailstone Recreation Area.

These activities would disturb soil resources in the immediate vicinity of the activity. The increased impermeable area would increase runoff volume and potentially the erosive potential of the runoff. Increased erosion potential could result in more sediment flowing into the reservoir and degrading water quality as well as impacts to soil resources. These impacts are considered minor.

A decision to not repair damage due to flooding in the Rock Cliff Recreation Area will result in ground changes. Without repairing damage and armoring the banks of the Provo River, the river will meander, erode soils, and destroy some of the existing facilities. The meandering river will cause deposition of soil on the inside of bends. The maintenance activities include minor ground disturbing activities, and would not create steep slopes that would increase the risk of slope failure or increased risk of seismic activity.

Measures

The small projects and maintenance would individually not be larger than one acre. Any contracts issued to construct the boat ramp widening and additional parking area should include revegetation of disturbed areas at the completion of construction to prevent and control erosion. During construction, Best Management Practices (BMP) should be practiced to prevent sediment from leaving the construction site and reaching the reservoir. Existing state and federal laws and regulations require sediment to be controlled on all construction sites. Measures to control erosion may include structural measures, such as silt fences, fiber mats, and fiber rolls; and non-structural measures, such as watering disturbed areas, hydroseeding disturbed areas, and installing permanent landscaping features.

Runoff from impervious areas should be controlled to prevent the runoff from eroding adjacent soil areas. Runoff can be controlled through methods such as dry wells, armored swales, detention and retention ponds, and vegetated buffers that would prevent concentrated flows.

Although the meandering of the Provo River in the Rock Cliff Recreation Area will impact the environment, it is a natural process that will neither be increased nor decreased in severity due to the decision to not repair damage. Structures that may be destroyed by the meander of the river should be removed if it appears that the structure will be damaged to prevent debris from moving into the reservoir and creating a hazard.

4.1.2 Alternative A: Moderate Resource Development

Alternative A includes additional development at the Hailstone, Ross Creek, and Rock Cliff Recreation Areas. This alternative also includes new development in the Crandall Point and Northwest Shore Areas. Unlike the no action alternative, efforts would be made to stabilize the Provo River in the Rock Cliff Recreation Area and damage caused by the river would be repaired. Additional trails are

proposed in the Hailstone Recreation Area, Ross Creek Recreation Area, Crandall Point Area, and Northwest Shore Area. These trails would be unpaved foot trails.

Additional development at the Hailstone Recreation Area would be located in areas of previous development and may include: expansion of dry storage facility, improvements to campground facilities such as RV pad improvements and cabin development, drilling an additional well and modifying the fee station to accommodate more visitors. Individually none of these items should disturb more than one acre of ground. Additional impervious areas would be created.

Development in the Crandall Point Area would be in previously undisturbed areas. Development would include a new trailhead with gravel parking area, fee station, and Perimeter Trail access. Additional unpaved trails would be developed for fisherman access to the reservoir and connections to other trail systems.

Proposed development along the Northwest Shore would occur in areas previously undisturbed. Development would include creation of primitive day-use areas accessed by new trails or from the reservoir. Additional trails may also connect the Perimeter Trail to trail systems outside the Project Management Boundary.

Development in the Ross Creek Recreation Area would occur in areas with and without previous development. Development could include structures associated with bike, non-motorized boat, and/or horse rental concessions. Additional trails would be developed to provide access to the reservoir and connect to the existing Perimeter Trail. The wakeless use area would be designated.

Development in the Rock Cliff Recreation Area would occur mostly in previously developed areas. Some additional structures may be constructed on either side of the river and improved vehicular access to the south side campsites from SR 32 would be pursued. Additional trails could also be developed to connect the Perimeter Trail to other trail systems. The largest impact would be related to the stream stabilization to protect existing facilities and repairs to facilities already damaged by flooding. Stream bank stabilization could include hard and/or soft armoring of the riverbanks. Hard armoring of riverbanks would include the use of riprap, gabion basket, or concrete structures. Soft armoring would include the use of geosynthetic materials to anchor and strengthen vegetation. The stabilization system used would be determined based on conditions such as flow velocity and flow direction relative to the bank. The wakeless use areas would be designated.

Impacts

Although no expansive single development project is proposed, the collection of small developments could combine to create moderate negative impacts to soil and geologic resources if not mitigated properly. Individually the developments would have a negligible to minor negative impact on soil and geologic resources. The development of new facilities will include land disturbance activities. Soils

and the stabilizing vegetation will be disturbed during construction activities. Any time soils and vegetation are disturbed there is an increased risk for erosion. Much of the proposed new development will result in more impervious areas. Impervious areas increase the volume and intensity of runoff events, which in turn increases the erosive potential of the runoff. Natural channels or drainages could be damaged by the increased volume and intensity of runoff. Increased erosion will result in topsoil being removed and transported to the reservoir as sediment. Sediment loaded runoff will adversely impact water quality in the reservoir.

A specific development that has the potential to have extensive impacts to soil resources is the proposed expansion of the trail system. Trails remove the stabilizing vegetation from a long linear area. Trails also have the potential to concentrate runoff by collecting sheet flow and directing the runoff to a single point. Concentrated runoff has a much greater erosive potential than sheet flow. The trail itself could erode significantly as well as areas downstream where the runoff has been concentrated. Trails decrease the permeability of the soils and thereby increase the runoff volume and intensity. As with the development discussed above this could lead to increased erosion of soil resources in downstream undisturbed areas.

The areas to be developed are in areas with gentle to steep slopes. Due to the need to flatten areas for roads, trails, buildings, parking areas, etc., slopes are steepened in some areas. These over steepened slopes are usually referred to as cutslopes. Cutslopes increase the risk of landslides by increasing the slope and by removing material whose mass resists the movement of the soil material. The greatest potential for landslides exists along the shore of the east arm due to the already steep slopes. The development of roads and trails in the Rock Cliff Recreation Area and along the shore of the east arm has the greatest potential of increasing the landslide risk. Due to shallower slopes, development in other areas has a lower potential of increasing the landslide risk.

Boating at high speeds results in waves being generated. These waves cause erosion of the shore. By designating the extent of the wakeless area, the shore area that will be impacted by boat-generated waves may decrease. Increased wakeless areas have the potential to reduce wave erosion. This proposed change would have a minor positive impact on soil and geologic resources.

None of the proposed actions will increase the risk of seismic activities.

Measures

The most common impact to soil and geologic resources is erosion resulting from soil disturbance and/or increased runoff due to impervious areas or concentrated flow. Any project undertaken whether it is development of a trail or a parking lot must address the increased erosion potential during and after construction.

Any construction activities that disturb one or more acres of land must be authorized under the State of Utah UPDES Storm Water General Permit for Construction Activities, Permit No. UTR300000. Each General Permit requires that a Storm Water Pollution Prevention Plan (SWPPP) shall be developed for each construction project covered by a Storm Water General Permit for Construction Activities. In addition, no person or entity may conduct construction activities that disturb an area smaller than one acre, if the disturbance is part of a larger common plan of development that will ultimately disturb an area greater than or equal to one acre. The person or entity must also file a Notice of Intent to discharge under the General Permit, prior to the start of any construction.

The SWPPP must incorporate an effective combination of erosion and sediment control practices to prevent and minimize any discharge of sediments or non-storm water discharges into the receiving waters. An effective combination of erosion and sediment control should include the use of both structural and non-structural measures, as defined by the General Permit. A number of BMPs have been identified and adopted by the State of Utah, and any entity planning to undertake construction activities should identify in their SWPPP the specific BMPs they intend to implement. There are a variety of measures that can be used for erosion and sediment control, such as minimizing the areas disturbed, use of erosion control blankets, fiber matting, hydro-seeding, cross ditching, etc. The selection of specific erosion and sediment control measures (slope, soil conditions, etc.) needs to be site specific. These site specific BMPs can be determined during project-specific NEPA compliance and when the SWPPP is prepared.

After construction, all projects should include a revegetation plan also included in the project-specific NEPA compliance. In some cases, revegetation alone will not be sufficient to prevent increased erosion due to increased volume and intensity of runoff from impervious areas. In these cases, structures such as dry wells, detention ponds, reinforced vegetation, armored channels, etc., will be necessary.

Trails will require specific efforts to prevent increased erosion. As possible, a trail should be placed in areas with coarse soils. The trail should also be designed and constructed to limit the runoff from upstream areas that are concentrated by the trail. This can be accomplished by creating high points along the trail that create short sections of the trail to prevent the collection of water over a large area and not allow runoff on the trail to reach speeds which would erode the soils in the trail. Grading of the trail to create the short sections is preferable to using logs, ditches, etc. to divert water off the trail. Logs can be removed and ditches filled in over time, but grading of the trail is less likely to be altered. Trails that will be used extensively should be paved or stabilized with gravel to limit erosion of the trail. In these situations, small ponds or dry wells may be needed to prevent erosion of adjacent undisturbed areas by the runoff from the trail.

When constructing roads and trails, steep slopes and areas already prone to landslides, should be avoided where possible. Specific measures to stabilize landslide potential slopes will need to be identified in the project-specific NEPA compliance. With proper mitigation, the impact to soil and geologic resources can be negligible.

4.1.3 Alternative B: Maximum Resource Development

Alternative B includes all of the items discussed in Alternative A with some additional development. Alternative A included items that were individually relatively small in areal extent. Alternative B includes developments that would be very large in extent such as a golf course on the Northwest Shore and day-use facilities and ball fields in the Ross Creek Recreation Area. As a result, the potential impacts of Alternative B are significantly greater than Alternative A; although, the type of impacts to soil and geologic resources will be the similar to those described for Alternative A.

At Hailstone, developments in addition to those identified in Alternative A, include building an additional dry boat storage area and paving some sections of existing trails.

The developments at Crandall Point are far more extensive in Alternative B. Day-use facilities would be developed on the shore including picnic pavilions. This alternative also includes a larger parking area compared to the parking area proposed in Alternative A.

As with Crandall Point, proposed developments at Ross Creek would include a day-use area with picnic pavilions and a manned fee station. Also included is the development of a soccer field, sand volleyball court, additional day-use facilities, and a non-motorized boat dock.

Alternative B includes some significant developments in the Rock Cliff Recreation Area. New developments include improved vehicle access to campsites and developed RV sites, as well as enlarging the boat ramp to accommodate large watercraft, improving trails for biking, and adding day-use facilities. This alternative also proposes a more proactive approach to protecting facilities from flood damage. A study should be conducted to identify hazards and make the necessary improvements.

Although the proposed developments at Ross Creek are extensive, the largest development proposed in Alternative B is a privately developed golf course in the Northwest Shore Area. Development associated with the golf course would be additional trails and water, power, and sewer facilities.

The other areas do not have any development beyond those described in Alternative A.

Impacts

The impacts associated with Alternative B are the same as identified in the discussion of Alternative A; namely, increased erosion potential due to soil disturbance, increased erosion potential due to greater volume and intensity of runoff from impervious areas, and cutslopes created during development of facilities on sloped areas. The potential impacts related to the development identified in Alternative B are much greater than for Alternative A due to the much larger scale of the proposed developments. Proposed developments in the Ross Creek Recreation Area, Northwest Shore Area, and Rock Cliff Recreation Area would disturb areas far greater than one acre in extent. The impact of this alternative on soil and geologic resources would be significantly negative if not mitigated properly. None of the proposed actions will increase the risk of seismic activity.

Measures

Although the scale and scope of the developments proposed for Alternative B are much larger than Alternative A, the measures to be taken to mitigate the impacts will be the same as described in Alternative A. A SWPPP will need to be prepared prior to construction for each project with the installation of BMPs as specified in the SWPPP. After construction, disturbed areas will need to be revegetated with additional runoff control structures necessary to protect undisturbed downstream areas and the water quality in the reservoir. Specific measures would need to be identified on a project basis. With proper mitigation, impacts to soil and geologic resources can be negligible.

4.2 Water Resources

This section of the report evaluates environmental consequences or effects to water resources for each of the three alternatives. It also identifies measures to be taken to mitigate the effects.

4.2.1 No Action

Impacts

Implementing the No Action Alternative would have no effect on Jordanelle Reservoir hydrology. The water supply, water demand, reservoir operation, and stream flows would remain the same as in the past.

Measures

No mitigation measures would be required.

4.2.2 Alternative A: Moderate Resource Development

Impacts

Implementing Alternative A would have a negligible effect on Jordanelle Reservoir hydrology. Drilling an additional well, or utilizing an alternate surface water source, to meet current and future water demands within the Hailstone Recreation Area could have an adverse effect on groundwater and therefore the water supply available to the Jordanelle Project. However, it would be limited to the current water right (up to 79 ac-ft/yr), and therefore impacts to reservoir hydrology are considered negligible when compared to the capacity of the reservoir, annual evaporation, and the volume of water flowing into and out of the project area. There would be no impacts to Project water demands, reservoir operations, or stream flows.

Measures

No mitigation measures would be required.

4.2.3 Alternative B: Maximum Resource Development

Impacts

Implementing Alternative B would have a similar negligible effect as Alternative A. Drilling an additional well, or utilizing an alternate surface water source, to meet current and future water demands within the park could have a minor adverse effect on groundwater and the water supply available to the Jordanelle Project. However, it would be limited to the current water right, and therefore impacts to reservoir hydrology are considered negligible. There would be no impacts to Project water demands, reservoir operations, or stream flows.

Measures

No mitigation measures would be required.

4.3 Water Quality

Effects to water quality will be evaluated for each alternative and compared to the No Action Alternative to identify potential project impacts. For this evaluation, it is assumed that operation of the Jordanelle Reservoir, and the water supply into and out of Jordanelle, would continue to follow historical trends.

4.3.1 No Action

Under the No Action Alternative, it is anticipated that no significant improvements to the recreation facilities or resources would occur. It is also assumed that current funding levels and maintenance practices would continue, and as a result, there would not be any major increases in recreation users or in restrooms or wastewater facilities, including users with pets or horses. However,

there may be limited construction activities to replace or enhance existing facilities.

Impacts

It is assumed that there would not be any measurable impact upon water quality in the future under the No Action Alternative. However, it is recognized there may be a small increase in the number of recreation users and consequently a small increase in wastewater being put into the waste treatment facilities, resulting in a small increase in nutrients being discharged to Jordanelle Reservoir from the JSSD wastewater treatment plan. It is also recognized that any construction activities could result in erosion and storm runoff causing sediment and turbidity flowing into Jordanelle Reservoir. However, any impacts would be minor, temporary, and localized near the source of the action.

Measures

If any construction occurs under the No Action Alternative, standard BMPs for construction activities should be followed to minimize erosion and potential sediment and turbidity from storm water runoff flowing into Jordanelle Reservoir as discussed in Section 4.1. Current policies requiring pet waste to be removed should be continued.

4.3.2 Alternative A: Moderate Resource Development

Under Alternative A, the construction of a number of new facilities is planned or possible. In addition, some existing facilities may be upgraded or replaced. Refer to the Summary of Alternatives for proposed or potential construction projects under Alternative A.

Impacts

Impacts on water quality may temporarily occur from any construction of new facilities, or upgrading or replacement of existing facilities. Any ground disturbance would expose raw soil to increased erosional forces of storm water and wind. This could potentially cause erosion and runoff of sediment-laden waters into Jordanelle Reservoir, causing siltation and turbidity in localized areas of Jordanelle. The impacts due to erosion are discussed in more detail in Section 4.1.2. It is expected that any impacts would be small, temporary, and localized at the construction area. As soon as the disturbed areas are stabilized, these minor water quality impacts would disappear. Increased usage of recreation facilities has the potential to increase the number of horses and pets in the Project Management Area. Animal waste products have the potential to degrade water quality in the reservoir.

Measures

The improvements proposed in Alternative A could result in an increase in the number of visitors to Jordanelle Reservoir each year and a potential increase in erosion of soil resources. The measures to control the impacts due to erosion are discussed in Section 4.1.2. The increase in visitors could cause an increase in

water quality impacts. Any improved public facilities would need to be designed to prevent increased water quality impacts. Increasing the amount of parking, additional storage facilities, additional boat ramps, improvements and expansion to campgrounds and sanitation facilities, extensions of trail systems and new trailheads, new parking lots, and other related developments could all increase water quality impacts in the tributaries to Jordanelle as well as in Jordanelle Reservoir itself.

In an effort to minimize the water quality impacts from additional development and increased use, some of the recommended mitigation measures could include the following:

- New restrooms, parking areas, and boat fueling areas should be designed to minimize the potential of pollutants encountering storm water or leaking into the reservoir.
- Design placement of landscape areas or berms between parking areas and the reservoir to provide a buffer and provide some pollutant removal and filtration.
- Identify designated on-shore fueling areas not located immediately adjacent to the shoreline.
- Design new restrooms to prevent sewage overflow that could enter the reservoir.
- Restrict the usage of recreation facilities by horses and pets to areas more than 200 feet upslope of the high water line. Pets and horses should not be allowed to enter the reservoir. The policy of pet owners cleaning up after their pets should be continued.

4.3.3 Alternative B: Maximum Resource Development

Under Alternative B: Maximum Resource Development, there could be a significant increase in the number of new facilities that are planned or possible. Refer to the Summary of Alternatives for proposed or potential construction projects under Alternative B. In addition, more of the existing facilities may be upgraded or replaced. These additional facilities could significantly increase the number of people that visit Jordanelle Reservoir.

Impacts

Potential impacts on water quality resulting from implementation of this Alternative B: Maximum Resource Development could be greater than for Alternative A, due to potentially a greater number of construction activities, more visitors coming to Jordanelle Reservoir, and the potential construction of a golf course within the Project Management Boundary. The same or greater impacts than those mentioned for Alternative A could be expected if Alternative B is implemented. More visitors would require additional restrooms and wastewater treatment facilities. The additional wastewater treatment facilities could result in more nutrients reaching the water in Jordanelle Reservoir, unless additional

measures were implemented. More construction and associated ground disturbance could result in more turbidity and sedimentation in localized areas in Jordanelle Reservoir due to erosion. Because of these potential additional impacts on water quality in Jordanelle Reservoir, more stringent methods or BMPs may need to be implemented to control turbidity and minimize nutrient loading into Jordanelle Reservoir.

In addition to the impacts mentioned in Alternative A, the proposed golf course could have adverse water quality impacts if the use of fertilizers, pesticides, and herbicides is not managed correctly. Water quality impacts downstream of poorly managed golf courses are well documented. The impacts are primarily from increased nutrients associated with fertilizer used on the golf course. Increased nutrient loading in the reservoir could result in algae blooms, decreased dissolved oxygen content, and the resultant fish kills.

Measures

The measures to prevent water quality impacts identified above for Alternative A, could also apply to this Alternative B. However, for Alternative B, it might be necessary to implement more stringent BMPs due to the possibility of impacts from increased construction activities and/or additional visitors using Jordanelle Reservoir. The potential water quality impacts resulting from runoff from the golf course should be addressed.

Some measures that could be used individually or collectively to control potentially poor water quality runoff from the golf course include:

1. Monitoring the fertilizer application rate to insure that no more fertilizer is applied than can be taken up by vegetation.
2. Restrict blanket application of herbicides and pesticides to limit the amount of these chemicals that could be in the runoff.
3. Limit the use of non-native plants that require fertilizer, herbicides, and pesticides.
4. Collect and chemically or mechanically treat all runoff from the golf course to remove nutrients and chemicals.
5. Create vegetated buffers that would utilize excess nutrients in runoff.
6. Collect runoff from the golf course and create an artificial wetland to treat the runoff.

The BMPs and measures described for the golf course could increase construction and/or management costs, but water quality impacts should be able to be reduced to acceptable levels. The overall water quality in Jordanelle Reservoir, and in the Provo River downstream, must remain at acceptable levels to meet the requirements for the designated beneficial uses of the water.

Since CUWCD is the agency that operates Jordanelle Reservoir, and the primary purpose of Jordanelle Reservoir is water supply, they need to be involved in reviewing any proposed facilities, to protect water quality. Therefore, any entity proposing new projects around Jordanelle Reservoir need to analyze potential impacts on water quality prior to construction. Wasatch County has also indicated that they are concerned that any planned development should not compromise water quality in Jordanelle Reservoir or in the Provo River.

Prior to any construction, a SWPPP needs to be prepared. During construction, BMPs as identified in the SWPPP should be instituted. Specific BMPs to be applied would be determined during project specific NEPA compliance and when the SWPPP is prepared.

4.4 Air Quality, Climate, Noise

This section presents the analyses conducted to determine impacts to air quality, climate, and noise based on the RMP alternatives under consideration.

4.4.1 No Action

Under the No Action Alternative, no comprehensive or other major improvements to the project's recreation facilities or changes in natural and cultural resource management would occur beyond those typically authorized under the current maintenance practices. Therefore, no additional impacts to air quality, climate, or noise would be expected to result from continuing current practices.

A continuation of the current maintenance practices would also not by itself lead to any significant increase in recreation users; however, increased visitation associated with the growth and development in the project vicinity will result in a slight increase in air emissions from recreational vehicles or automobile emissions. Noise levels would continue as they currently exist, with noise from general maintenance, visitor use, and surrounding areas generally continuing as described in Section 3.4.4.

Climate affects the recreational use and visitor days at the reservoir. For example, when precipitation is low for an extended period of time it will result in the reservoir being low and considerably less boaters would use it for recreation.

Impacts

Implementing the No Action Alternative would have no effect on air quality, climate, or noise.

Measures

No mitigation measures would be required.

4.4.2 Alternative A: Moderate Resource Development

Elements of this alternative would seek to solve some existing problems with facility layout, access, or deferred maintenance on structures or facilities.

The improvements proposed under Alternative A could result in slight increases in two primary categories of air emissions: particulate matter and engine emissions (carbon monoxide and ozone precursors). The increased visitation anticipated from the improvements under Alternative A would also create the potential for associated increases in user-generated noises.

Impacts

Primary impacts to air quality and noise would come from construction-related activities involved with:

- Improving facilities at the Hailstone Recreation Area,
- Creating a primitive area at Crandall Point,
- Developing access to recreation opportunities at Crandall Point,
- Improving access to recreation opportunities at Ross Creek,
- Adding yurts or cabins to Rock Cliff,
- Relocating utilities from existing bridge at Rock Cliff,
- Improving access to recreation opportunities at Rock Cliff,
- Developing unique primitive shoreline day-use areas on the Northwest Shore,
- Developing access to recreation opportunities on the Northwest Shore, and
- Maintaining a permanent row of buoys 500 feet from the face of Jordanelle Dam.

As a result, construction-generated particulate emissions (in the form of wind-borne dust) would increase, depending on the time of the construction (high visitor use times versus low visitor use times). Likewise, air emissions from paving and construction equipment are expected. However, construction air impacts would be short-term and temporary, occurring only periodically during the construction period.

Another impact would be the noise that would occur during construction of new facilities and improvements to existing facilities. Construction activities would add a new noise source to the surrounding area. However, construction noise levels would be short-term and temporary, occurring only periodically during the construction period, and ending once the facility modifications have been made.

Noise from construction activities would create the potential for disturbing area visitors using facilities where construction was occurring, as well as other areas from where construction noises would be audible. This noise would be short-term and temporary, but depending on the noise level, timing, and proximity to

receptors, could disturb sensitive receptors and detract from the recreation experience.

It is anticipated that the improvements suggested under Alternative A would attract additional visitors under normal operating conditions (e.g., favorable economy for recreational trips and favorable reservoir levels). An increase in visitor use is expected to result in a very minor increase in vehicle emissions and related pollutants. Improvements in vehicle emission controls will likely offset the increase from additional visitor use so that the impact is negligible.

Increased visitation would also create the potential for associated increases in user-generated noises. Generally, this noise would remain consistent with the type of noises that would be expected at the recreation facilities.

Measures

The anticipated short-term and temporary increase in air emissions, primarily dust and engine emissions can be reduced through prudent construction practices and scheduling. To the extent practicable, ground-disturbing activities should not be conducted on windy days and areas disturbed during dry periods should be periodically watered during construction to reduce the amount of generated dust. In addition, any large-scale earth disturbance and construction vehicle movement should be confined to periods of low visitor attendance. Any construction equipment used needs to meet current emissions standards for that type of equipment.

Considering recreation use patterns when timing construction activities can reduce the potential for noise impacts. It is recommended that Reclamation and its construction contractors will schedule construction activities to avoid construction during periods of anticipated high visitation. As such, construction should be scheduled to avoid high-use summer periods and should occur during the spring and fall months. On a weekly basis, construction should be scheduled to occur during weekdays and should avoid weekend construction. On a daily basis, construction should be scheduled to occur only between the hours of 7am and 6pm. Such scheduling considerations would reduce the severity of noise impacts.

To reduce noise impacts associated with facility maintenance activities, Reclamation and its contractors should schedule maintenance activities to occur during periods of low use, to the extent practical. It is recognized, however, that due to staffing and the need to regularly maintain facilities, certain maintenance activities would need to be done during higher use periods.

4.4.3 Alternative B: Maximum Resource Development

The focus of this alternative is to provide for and expand a variety of recreation opportunities above those provided for in Alternative A. This alternative

incorporates all of the same elements identified in Alternative A, but includes additional elements: such as upgrading of facilities, expansion of facilities, and bringing facilities up to current standards.

Impacts

In addition to the impacts described in Alternative A, the additional impacts to air quality and noise would come from the additional construction-related activities involved with:

- Creating additional public/private dry boat storage facilities at Hailstone,
- Paving specified trails at Hailstone,
- Additional park amenities as decided on at Hailstone,
- Developing a public day-use area at Crandall Point, including reservoir access, picnic pavilions, and enlarged parking lot,
- Developing a public day-use area at Ross Creek, including reservoir access, picnic pavilions, and fee station,
- Allowing development by private business partners of public facilities within the Ross Creek area,
- Improving the campground and adding day-use facilities to Rock Cliff,
- Improving trail for biking at Rock Cliff,
- Allowing private development of public facilities on the Northwest shore, and
- Extending the trail along the south shore of the east arm,

The impacts on air quality expected to result from Alternative B would be similar to those described in Alternative A; however, because of the greater level of construction and operational improvements proposed in Alternative B, the impacts would be greater than previously described.

However, some additional improvements under Alternative B include paving areas that would otherwise be subject to wind-blown dust near visitor use areas.

Due to the increased amount of facility improvements that would occur under Alternative B, there would be an increased potential for construction-related noise impacts to occur.

Measures

Implementation of construction air quality mitigation and construction noise mitigation identified for Alternative A would also serve to reduce Alternative B construction-related impacts.

4.5 Vegetation, Wetlands, Noxious Weeds

This section discusses the effects to upland, riparian and wetland vegetation that would likely occur as a result of the alternatives. It also identifies mitigation measures that would be implemented to avoid, minimize, and reduce impacts to less than significant levels.

4.5.1 No Action

The No Action alternative represents a continuation of existing management and land use practices. It would include on-going maintenance and repair of existing facilities. It would also include minor upgrades for needed improvements at existing recreation sites.

Impacts

Impacts to upland, wetland, and riparian vegetation would be negligible for the reasons discussed below. Disturbances to all vegetation types would be expected to be minimal because all construction activities would occur in areas that have been previously disturbed by the development of existing facilities. Mostly upland vegetation types would be affected. As discussed in Section 4.7 Threatened, Endangered and Special Status species, it is anticipated that construction activities would avoid disturbances to wet meadows that may be suitable habitat for Ute-ladies' tresses, a federally protected plant species. Additionally, no loss of riparian woodland/shrubland would be anticipated under the No Action Alternative.

Revegetation would be required to stabilize disturbed soils and control the presence and spread of noxious weeds. Reclamation, the Recreation Park Manager, and UDWR would continue their programs to control the presence and spread of noxious weeds. Therefore, the risk for noxious weeds is expected to be minor for all areas.

Implementation of the following measures would reduce long-term effects to less than significant.

Measures

Reclamation would require all construction activities to be reviewed for compliance with the federal Clean Water Act (33 U.S.C. 1251 et seq.) for the protection of wetlands. As required by this Act, construction activities that would result in the placement of dredged or fill material in wetlands must obtain permit authorization from the USACE. To ensure compliance, Reclamation would require all construction areas to be delineated for wetland and riparian habitats.

Reclamation would require all construction activities and changes in land use to be reviewed for compliance with Executive Order 11990. This order directs all

federal agencies to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.

To the extent practicable, unavoidable impacts to riparian or wetland vegetation would be mitigated in-kind and on-site.

To the extent practicable, all construction activities for working areas, staging areas, storage areas, waste areas, borrow areas, machinery/equipment access and parking would be confined to previously disturbed areas as a measure to minimize impacts to upland, riparian and wetland vegetation, and to minimize soil disturbances that could cause the spread of noxious weeds.

Existing roads would be used to access existing facilities and construction sites as a measure to minimize impacts to upland, riparian and wetland vegetation, and to minimize soil disturbances that could cause the spread of noxious weeds.

BMPs for erosion and sediment control would be applied to protect riparian and wetland vegetation.

Reclamation would require all construction activities to be reviewed for compliance with Executive Order 13112. This order requires all federal agencies to combat the introduction and spread of invasive species in the United States.

The Recreation Park Manager and UDWR would routinely monitor the effectiveness of their weed control programs and make any necessary adjustments to ensure compliance with the Utah Noxious Weed Act (R68-9).

All revegetation plans would be reviewed for maximum use of native plant species endemic to the Wasatch Mountain Range.

4.5.2 Alternative A: Moderate Resource Development

Alternative A would entail the continued repair, maintenance and management of existing facilities, plus a moderate amount of construction for the improvement and development of new facilities. It would also involve some changes in existing land uses where the new facilities would be constructed. Alternative A would also include the adoption of measures to protect and maintain natural resources and protect wildlife habitat values in the Project Management Area.

Impacts

Impacts to upland, wetland, and riparian vegetation would range from negligible to minor depending on location and vegetation type. Most construction activities would occur in or adjacent to areas that were previously disturbed by the development of existing facilities. At the Rock Cliff Recreation Area, impacts would be negligible because it is anticipated that construction activities would avoid disturbances to wet meadows that may be suitable habitat for Ute-ladies'

tresses, a federally protected plant species. Additionally, it is anticipated that disturbances to riparian woodland/shrubland vegetation would be minimized to minor amounts.

New construction activities at the other recreation areas would not result in a substantial removal of native vegetation. Disturbance to riparian and wetland vegetation would be avoided to the greatest extent practicable. Disturbances are anticipated to occur mainly in the sagebrush shrubland and other upland vegetation types. Construction of new trails and recreational facilities would increase visitation, which would increase the potential for vegetation trampling and soil disturbance. Impacts to plant diversity would be minor because these vegetation types are commonly found in the Project Management Area and throughout the Wasatch Mountain Range.

Revegetation would be required to stabilize disturbed soils and control the presence and spread of noxious weeds. Reclamation, the Recreation Park Manager, and UDWR would continue their existing programs to control the presence and spread of noxious weeds. Therefore, the risk for noxious weeds is expected to be minor for all areas.

Implementation of the following measures would reduce long-term effects to less than significant.

Measures

Measures would be the same as those identified for the No Action alternative.

4.5.3 Alternative B: Maximum Resource Development

Alternative B would include all of the repair, maintenance, and upgrade elements identified in Alternative A, plus additional construction activities for the upgrading, expansion, and development of new facilities. It would also entail a greater amount of change in existing land uses where the new facilities would be constructed. The nature of the effects would be the same as those that would occur under Alternative A, but the extent and magnitude of the effects would be greater. Alternative B would also include the adoption of measures to protect and enhance natural resources and improve wildlife habitat values in the Project Management Area.

Impacts

Impacts to upland, wetland, and riparian vegetation would range from negligible to moderate depending on location. Construction activities for routine maintenance, repairs, upgrades, and expansions would occur in or adjacent to areas that were previously disturbed by the development of existing facilities. As discussed in Section 4.7 Threatened, Endangered and Special Status species, it is anticipated that construction activities would avoid disturbances to wet meadows that may be suitable habitat for Ute-ladies' tresses, a federally protected plant

species. Additionally, it is anticipated that disturbances to riparian woodland/shrubland vegetation would be minimized to minor amounts. The proposed improvements in the Rock Cliff Recreation Area would likely result in the minor removal of riparian woodland/shrubland vegetation.

New construction activities, such as a new golf course on the Northwest Shore, could result in a substantial removal of native vegetation. Construction of new trails and recreational facilities would increase visitation, which would increase the potential for vegetation trampling and soil disturbance. Disturbance to riparian and wetland vegetation would be avoided to the greatest extent practicable. Most of the impacts would occur in the sagebrush shrubland and other upland vegetation types. Therefore, impacts to plant diversity would be expected to be moderate for the golf course construction, but minor for the construction of the other new facilities because these vegetation types are commonly found in the Project Management Area and throughout the Wasatch Mountain Range.

Revegetation would be required to stabilize disturbed soils and control the presence and spread of noxious weeds. Reclamation, the Recreation Park Manager, and UDWR would continue their programs to control the presence and spread of noxious weeds. Therefore, the risk for noxious weeds is expected to be minor for all areas. If a golf course were built, Reclamation would consult with USFWS and UDWR to establish fertilizer, herbicide, and pesticide guidelines for turf management to minimize effects to adjacent wildlife habitat.

Implementation of the following measures would reduce long-term effects to less than significant.

Measures

Measures would be the same as those identified for the No Action alternative.

4.6 Fish and Wildlife Resources

This section discusses the effects to fish, invasive aquatic species, and wildlife that would likely occur as a result of the alternatives. It also identifies mitigation and management measures that would be implemented to avoid, minimize, and reduce impacts to less than significant levels.

4.6.1 No Action

The No Action alternative represents a continuation of existing management and land use practices. It would include on-going maintenance and repair of existing facilities. It would also include minor upgrades for needed improvements at existing recreation sites.

Impacts

Fish Under the No Action alternative, there would be no changes to the management of water levels in the reservoir. There would be no construction activities to stabilize Provo River streambanks or to repair flood damage at the Rock Cliff Recreation Area. Widening of the boat ramp at the Hailstone Recreation Area would have negligible effects to fish habitat. With the implementation of BMPs for construction activities, there would be no degradation to existing water quality conditions in the reservoir or Provo River. Therefore, effects to existing fish populations found in the reservoir or Provo River would be negligible.

Reclamation and the Recreation Park Manager would continue their programs to control the introduction and spread of invasive zebra mussel and quagga mussel. With proper control and management procedures in place, the risk of introducing these invasive aquatic species to Jordanelle Reservoir is expected to be minor.

Wildlife Under the No Action alternative, impacts to big game, migratory birds, golden eagles, and other wildlife species would be expected to be negligible because all construction activities would occur in areas that have been previously disturbed by the development of existing facilities. Mostly upland vegetation types would be affected. It is anticipated that construction activities would avoid disturbances to wet meadows and wetlands, and that there would be no loss of riparian woodland/shrubland. There would also be no changes in existing recreational land uses that would cause wildlife disturbances or hinder the movement of big game or other wildlife species. Additionally, this alternative would not be expected to change the availability or quality of open water habitat for the numerous migratory bird species discussed in Section 3.6.2 Wildlife.

Wildlife disturbance caused by construction activities would be localized and temporary. Temporary effects would be minimized by restricting construction activities to avoid sensitive breeding or nesting seasons.

Implementation of the measures listed below would minimize potential impacts to wildlife, and ensure that the wildlife management and mitigation commitments specified in the 1987 FS to M&I System FES are fulfilled. Thus, the No Action alternative would not be expected to result in any significant adverse impacts to existing wildlife populations.

Measures

Reclamation and the Recreation Park Manager would routinely monitor the effectiveness of their programs to control invasive zebra mussel and quagga mussel. Management practices at boat launches and marinas would be adapted to control the introduction and spread of these invasive species following guidelines specified in the Utah Aquatic Invasive Species Management Plan.

Reclamation would require all construction activities to be reviewed for compliance with the federal Migratory Bird Treaty Act (16 U.S.C. 703 et seq.). This Act authorizes the USFWS to regulate the taking, either intentionally or unintentionally, of migratory birds. Migratory birds protected under this Act include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows, and other species. Their body parts, nests, and eggs are also protected under this Act. A complete list of protected species is identified in 50 CFR 10.13. Take is defined as “to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities.” A take does not include habitat destruction or alteration, as long as there is no direct taking of birds, nests, eggs or parts thereof.

To the extent practicable, the clearing and grubbing of vegetation for new construction activities would be done during the non-nesting season to avoid impacts to migratory birds.

Reclamation would continue to manage the Project Management Area in a manner that would be conducive to wildlife, which would help reduce the need for additional wildlife mitigation.

Reclamation would consult with USFWS and UDWR to evaluate wildlife impacts that would result from the construction of new facilities or changes in land use, and identify measures to maintain or enhance wildlife values. This would include measures to curtail construction and recreation activities during winter on crucial deer winter range and important sage-grouse winter habitat areas.

Reclamation would consult with USFWS and UDWR to reevaluate the management objectives and accomplishments at the West Hills WMA, and make any necessary adjustments to ensure that the 1987 mitigation commitments for golden eagle and sage-grouse are being fulfilled.

4.6.2 Alternative A: Moderate Resource Development

Alternative A would entail the continued repair, maintenance, and management of existing facilities, plus a moderate amount of construction for the improvement and development of new facilities. It would also entail some changes in existing land uses where the new facilities would be constructed. Alternative A would also include the adoption of measures to protect and enhance natural resources and improve wildlife habitat values in the Project Management Area.

Impacts

Fish Under Alternative A, there would be no changes to the management of water levels in the reservoir. There would be minor construction activities to stabilize Provo River streambanks. Widening of the boat ramp at the Hailstone Recreation Area and the development of shoreline use areas on the Northwest Shore would have negligible effects to fish habitat. With the implementation of

BMPs for construction activities, there would be no degradation to existing water quality conditions in the reservoir or Provo River. Therefore, effects to existing fish populations found in the reservoir or Provo River would be negligible.

Reclamation and the Recreation Park Manager would continue their programs to control the introduction and spread of invasive zebra mussel, quagga mussel, and other invasive aquatic species. Water users would be required to inspect their watercraft for invasive aquatic species and decontamination facilities would be accessible at all developed boat launches. With proper control and management procedures in place, the risk of introducing these invasive aquatic species to Jordanelle Reservoir is expected to be minor.

Wildlife Under Alternative A, disturbances to big game, migratory birds, golden eagles, and other wildlife species would be expected to be minor but would require mitigation. Impacts to the availability or quality of open water habitat for the numerous migratory bird species discussed in Section 3.6.2 Wildlife would be expected to be minor, and would mainly result from human disturbance caused by increased use of recreational watercraft.

Most construction activities for routine maintenance, repairs, upgrades, and expansions of the Hailstone and Rock Cliff Recreation Areas would occur in or adjacent to areas that were previously disturbed by the development of existing facilities, and the loss of wildlife habitat would be negligible. Construction of and future use of the Ross Creek, Crandall Point and Northwest Shore developments of new trails and facilities would result in the removal or fragmentation of native vegetation at the recreation areas, and so those areas may no longer be effective as wildlife mitigation offsets under the 1987 plan. It is anticipated that vegetation removal would mostly impact sagebrush shrubland, grassland/upland meadow, and other upland vegetation types. It is anticipated that the loss of these habitats would represent a minor reduction in the amount of crucial winter habitat for mule deer and elk. Alternative A would not include the construction any new facilities or changes in land use for winter recreation. Therefore, it is anticipated that effects to wintering mule deer or elk would be minor.

It is anticipated that construction activities would avoid disturbances to wet meadows and wetlands, and that there would only minor impacts to riparian woodland/shrubland. No removal or losses of coniferous or deciduous woodland habitats are anticipated. New construction would not impact any golden eagle nesting sites on cliffs or rock ledges. Therefore, effects to wildlife in the Rock Cliff Recreation Area are anticipated to be minor.

Wildlife disturbance caused by construction activities would be localized and temporary. Temporary effects would be minimized by restricting construction activities to avoid sensitive breeding or nesting seasons.

Construction of new trails and recreation facilities would increase visitation, which would increase the potential for human disturbances. Human presence would be expected to be greatest during the summer months when hiking and boating are popular. Those species that could not adapt to the increased presence of humans would be displaced into adjacent habitats when humans are present. Displaced species would likely include mule deer and elk.

Implementation of the measures listed below would minimize most wildlife impacts to less than significant. However, additional mitigation for the loss of big game habitat and displacement of mule deer, elk, and sage-grouse would be necessary to ensure that the wildlife management and mitigation commitments specified in the 1987 FS to M&I System FES are fulfilled, and to reduce impacts to mule deer, elk, and other wildlife to less than significant.

Measures

Measures would be the same as those identified for the No Action alternative. In addition, certain areas of open water habitat and shoreline could be temporarily closed to recreational use during critical migratory periods as a measure to mitigate impacts to migratory waterbirds.

4.6.3 Alternative B: Maximum Resource Development

Alternative B would include all of the repair, maintenance, and upgrade elements identified in Alternative A, plus additional construction activities for the upgrading, expansion, and development of new facilities. It would also entail a greater amount of change in existing land uses where the new facilities would be constructed. The nature of the effects would be the same as those that would occur under Alternative A, but the extent and magnitude of the effects would be greater. Alternative B would also include the adoption of measures to protect and enhance natural resources.

Impacts

Fish Under Alternative B, there would be no changes to the management of water levels in the reservoir. There would be minor construction activities to stabilize Provo River streambanks and to repair flood damage at the Rock Cliff Recreation Area. Widening of the boat ramp at the Hailstone Recreation Area, enlargement of the boat ramp at the Rock Cliff Recreation Area, and the development of shoreline use areas on the Northwest Shore would have negligible effects to fish habitat. With the implementation of BMPs for construction activities, there would be no degradation to existing water quality conditions in the reservoir or Provo River. Therefore, effects to existing fish populations found in the reservoir or Provo River would be negligible.

Reclamation and the Recreation Park Manager would continue their programs to control the introduction and spread of invasive zebra mussel, quagga mussel and other invasive aquatic species. Water users would be required to inspect their

watercraft for invasive aquatic species and decontamination facilities would be accessible at all developed boat launches. With proper control and management procedures in place, the risk of introducing these invasive aquatic species to Jordanelle Reservoir is expected to be minor.

Wildlife Under Alternative B, disturbances to big game and sage-grouse could be potentially significant, whereas impacts to migratory birds, golden eagles, and other wildlife species are anticipated to be minor. Impacts to the availability or quality of open water habitat for the numerous migratory bird species discussed in Section 3.6.2 Wildlife would be expected to be minor, and would mainly result from human disturbance caused by increased use of recreational watercraft.

Most construction activities for routine maintenance, repairs, upgrades, and expansions would occur in or adjacent to areas that were previously disturbed by the development of existing facilities, and the loss of wildlife habitat would be negligible. The construction of new trails, recreation facilities and a golf course could result in the substantial removal or fragmentation of native vegetation. It is anticipated that vegetation removal would mostly impact sagebrush shrubland, grassland/upland meadow, and other upland vegetation types. Impacts to most wildlife would be anticipated to be minor. However, this could result in a substantial loss of crucial winter habitat for mule deer and elk, year-round habitat for sage-grouse, and seasonal habitat for certain species of migratory birds and small mammals. Alternative B would also include the construction of new facilities and changes in land use for winter recreation. The combination of substantial winter habitat reduction and increased human disturbance during the winter could have significant impacts to wintering mule deer and elk. There will be some impact on wintering mule deer and elk; it cannot be determined at this time if it would be significant.

It is anticipated that construction activities would avoid disturbances to wet meadows and wetlands, and that there would be only minor impacts to riparian woodland/shrubland. No removal or losses of coniferous or deciduous woodland habitats are anticipated. New construction would not impact any golden eagle nesting sites on cliffs or rock ledges. Therefore, effects to wildlife in the Rock Cliff Recreation Area are anticipated to be minor.

Wildlife disturbance caused by construction activities would be localized and temporary. Temporary effects would be minimized by restricting construction activities to avoid sensitive breeding or nesting seasons.

Construction of new trails and recreation facilities would increase visitation, which would increase the potential for human disturbances. Human presence would be expected to be greatest during the summer months when hiking and boating are popular. Those species that could not adapt to the increased presence of humans would be displaced into adjacent habitats when humans are present. Displaced species would likely include mule deer and elk.

Implementation of the measures listed below would minimize most wildlife impacts to less than significant. However, additional mitigation for the loss of big game winter habitat and displacement of mule deer, elk, and sage-grouse would be required to ensure that the wildlife management and mitigation commitments specified in the 1987 FS to M&I System FES are fulfilled, and to reduce impacts to mule deer, elk, and other wildlife to less than significant.

Measures

Measures would be the same as those identified for Alternative A, but more extensive.

4.7 Threatened, Endangered, and Other Special Status Species

This section discusses the effects to threatened, endangered, and special status species that would likely occur as a result of the alternatives. It also identifies avoidance measures that would be implemented to avoid adverse effects to threatened and endangered species, and mitigation measures that would be implemented to avoid, minimize, and reduce impacts to special status species to less than significant levels.

4.7.1 No Action

The No Action alternative represents a continuation of existing management and land use practices. It would include on-going maintenance and repair of existing facilities. It would also include minor upgrades for needed improvements at existing recreation sites.

Impacts

Threatened and Endangered Species This alternative would be expected to have no effect on Canada lynx, bonytail chub, Colorado pikeminnow, humpback chub, razorback sucker or June sucker because there are no known occurrences of these species in the Project Management Area, there is no suitable habitat in the Project Management Area for these species, and the Project Management Area is not located within the known geographic distribution of these species. Additionally, there would be no changes to the management of water levels in the reservoir or releases from the dam that would affect downstream habitat in the Provo River for June sucker.

Although there are no known occurrences of Ute Ladies'-tresses within the Project Management Area, the wet meadows, oxbows, or gravel bars in the Rock Cliff Recreation Area and elsewhere in the Project Management Area may have suitable habitat for this rare plant species. Existing facilities would be maintained, but there would be no expansion of facilities or repair of facilities

damaged by flooding at the Rock Cliff Recreation Area under the No Action alternative. Routine maintenance, repairs, and minor upgrades would continue at the other facilities in the Project Management Area, but there would be no anticipated loss or disturbance of potentially suitable habitat due to the construction of new facilities. Therefore, this alternative would be expected to have no adverse effect on Ute Ladies'-tresses.

Candidate, Petitioned and Conservation Agreement Species The No Action alternative would be expected to have no effect on least chub because there are no known occurrences of this species in the Project Management Area, there is no suitable habitat in the Project Management Area for least chub, and the Project Management Area is not located within the known geographic distribution of least chub.

The Project Management Area contains suitable habitat for Bonneville cutthroat trout, sage-grouse, yellow-billed cuckoo, northern leopard frog, and Columbia spotted frog, and may have habitat for southern leatherside. However, the No Action alternative would be expected to have no effect on the current trends for these species because there would be very little construction activities that could result in the loss or degradation of potential habitat for these species. Additionally, there would be no expected effects to the viability of pure strain Bonneville cutthroat trout populations because the reservoir does not contain a pure strain population, nor is it managed by UDWR for the maintenance of a pure strain population.

Measures

Reclamation would require all construction activities to be reviewed for compliance with the federal Threatened and Endangered Species Act (16 U.S.C. 1531 et seq.).

To the extent practicable, all construction activities for working areas, staging areas, storage areas, waste areas, borrow areas, machinery/equipment access, and parking would be confined to previously disturbed areas as a measure to minimize impacts to undeveloped habitats.

Existing roads would be used to access existing facilities and construction sites as a measure to minimize impacts to undeveloped habitats.

BMPs for erosion and sediment control would be applied to protect water quality and riparian, wetland, and aquatic habitats.

Reclamation, the Recreation Park Manager and UDWR would continue their programs to control noxious weeds as a measure to manage and maintain sage-grouse habitat within the Project Management Area.

Reclamation would continue to participate and follow the management recommendations identified in Conservation Agreements for Bonneville cutthroat trout and Columbia spotted frog, as long as it remains a signatory party to those agreements.

Reclamation would consult with USFWS and UDWR for construction activities or changes in land use within the Project Management Boundary that would cause more than a minor disturbance to potential sage-grouse habitat.

Reclamation would consult with USFWS and UDWR to reevaluate the management objectives and accomplishments at the West Hills WMA, and make any necessary adjustments to ensure that the 1987 mitigation commitments for sage-grouse are being fulfilled.

Reclamation would require activities that would disturb previously undeveloped habitats to be evaluated for potential effects to sage-grouse. The USFWS and UDWR would be consulted and potential impacts would be mitigated, as necessary, to ensure that the 1987 wildlife management commitments for sage-grouse are fulfilled.

Reclamation would require activities that would disturb previously undeveloped habitats to be delineated for wetlands, riparian and wet meadow habitats, and evaluated for potential effects to currently-listed threatened, endangered, and special status species. The USFWS and UDWR would be consulted and potential impacts would be mitigated, as necessary, to ensure compliance with applicable rules, regulations, and agreements.

4.7.2 Alternative A: Moderate Resource Development

Alternative A would entail the continued repair, maintenance and management of existing facilities, plus a moderate amount of construction for the improvement and development of new facilities. It would also entail some changes in existing land uses where the new facilities would be constructed. Alternative A would also include the adoption of measures to protect and enhance natural resources and improve wildlife habitat values in the Project Management Area.

Impacts

Threatened and Endangered Species Alternative A would be expected to have no effect on Canada lynx, bonytail chub, Colorado pikeminnow, humpback chub, razorback sucker, or June sucker because there are no known occurrences of these species in the Project Management Area, there is no suitable habitat in the Project Management Area for these species, and the Project Management Area is not located within the known geographic distribution of these species. Additionally, there would be no changes to the management of water levels in the reservoir or releases from the dam that would affect downstream habitat in the Provo River for June sucker.

Routine maintenance and streambank stabilization practices, minor upgrades, and utility relocations would be implemented at the Rock Cliff Recreation Area. These activities would be limited in scope and are expected to avoid disturbances to wet meadows, oxbows, and gravel bars that would be suitable for Ute Ladies'-tresses. Additionally, no other construction work is anticipated to occur in wet meadow or wetland habitats at the other sites in the Project Management Area. Therefore, this alternative would be expected to have no adverse effect on Ute Ladies'-tresses.

Candidate, Petitioned and Conservation Agreement Species Alternative A would be expected to have no effect on least chub because there are no known occurrences of this species in the Project Management Area, there is no suitable habitat in the Project Management Area for least chub, and the Project Management Area is not located within the known geographic distribution of least chub.

The project area contains suitable habitat for Bonneville cutthroat trout, sage-grouse, yellow-billed cuckoo, northern leopard frog, and Columbia spotted frog and may have habitat for the southern leatherside. There would be no expected effects to the viability of pure strain Bonneville cutthroat trout populations because the reservoir does not contain a pure strain population, nor is it managed by UDWR for the maintenance of a pure strain population.

Construction of new Perimeter Trails and new facilities in the sagebrush shrubland, grassland/upland meadow, mixed Gambel oak shrubland, and pinyon-juniper woodland could result in the loss of occupied sage-grouse habitat. Additionally, changes in recreational land use could introduce human disturbances in areas that are currently used by sage-grouse for breeding, brood rearing, movement routes, and/or winter cover. Actions that could potentially impact sage-grouse would include:

- Extension of the Perimeter Trail connecting any of the recreational areas around the reservoir shoreline.
- Development of new facilities at Crandall Point.
- Development of new facilities at Ross Creek Recreation Area.
- Development of new shoreline day-use areas on the Northwest Shore.

Depending on location, adverse effects to sage-grouse could range from negligible to moderate. Adverse effects to sage-grouse would be avoided and minimized to the greatest extent practicable. Unavoidable impacts to sage-grouse would be mitigated to the extent practicable by evaluating both on-site and off-site mitigation opportunities in coordination with the USFWS and UDWR.

Routine maintenance and streambank stabilization practices, minor upgrades, and utility relocations would be implemented at the Rock Cliff Recreation Area. These activities would be limited in scope and are expected to avoid disturbances to wet meadow and wetland habitats and have minor impacts to riparian woodland/shrubland. Additionally, no other construction work is anticipated to occur on streambanks or in wet meadow, wetland, or riparian woodland/shrubland habitats at the other sites in the Project Management Area. Therefore, it is expected that adverse effects to southern leatherside, yellow-billed cuckoo, northern leopard frog, or Columbia spotted frog would be negligible.

Measures

Measures would be the same as those identified for the No Action alternative.

4.7.3 Alternative B: Maximum Resource Development

Alternative B would include all of the repair, maintenance, and upgrade elements identified in Alternative A, plus additional construction activities for the upgrading, expansion, and development of new facilities. It would also entail a greater amount of change in existing land uses where the new facilities would be constructed. The nature of the effects would be the same as those that would occur under Alternative A, but the extent and magnitude of the effects would be greater. Alternative B would also include the adoption of measures to protect and enhance natural resources.

Impacts

Threatened and Endangered Species Alternative B would be expected to have no effect on Canada lynx, bonytail chub, Colorado pikeminnow, humpback chub, razorback sucker, or June sucker because there are no known occurrences of these species in the Project Management Area, there is no suitable habitat for these species within the Project Management Area, and the Project Management Area is not located within the known geographic distribution of these species. Additionally, there would be no changes to the management of water levels in the reservoir or releases from the dam that would affect downstream habitat in the Provo River for June sucker.

Routine maintenance and streambank stabilization practices, utility relocations, upgrades to existing facilities and the expansion of new facilities would be implemented at the Rock Cliff Recreation Area. It is anticipated that these activities would be designed to avoid disturbances to wet meadows and wetlands that may be suitable habitat for Ute Ladies'-tresses. It is also anticipated that construction work at other sites in the Project Management Area would avoid wet meadows and wetlands that may be suitable for Ute Ladies'-tresses. Therefore, this alternative would be expected to have no adverse effect on Ute Ladies'-tresses.

Candidate, Petitioned and Conservation Agreement Species Alternative B would be expected to have no effect on least chub because there are no known occurrences of this species in the Project Management Area, the Project Management Area does not contain any suitable habitat for least chub, and the Project Management Area is not located within the known geographic distribution of least chub.

The Project Management Area contains suitable habitat for Bonneville cutthroat trout, sage-grouse, yellow-billed cuckoo, northern leopard frog, and Columbia spotted frog. There would be no expected effects to the viability of pure strain Bonneville cutthroat trout populations because the reservoir does not contain a pure strain population, nor is it managed by UDWR for the maintenance of a pure strain population.

Construction of new perimeter trails and new facilities in the sagebrush shrubland, grassland/upland meadow, mixed Gambel oak shrubland, and pinyon-juniper woodland could result in the loss of greater amounts of occupied sage-grouse habitat compared to Alternative A. Additionally, changes in recreational land use would have a greater likelihood of introducing human disturbances in areas that are used currently by sage-grouse for breeding, brood rearing, movement routes, and winter cover. Actions that could potentially impact sage-grouse would include:

- Extension of the Perimeter Trail connecting any of the recreational areas around the reservoir shoreline.
- Development of new facilities at Crandall Point.
- Development of new facilities at Ross Creek Recreation Area.
- Development of new shoreline day-use areas, a golf course, and winter cross-country ski area on the Northwest Shore.

Depending on location, adverse effects to sage-grouse could range from negligible to significant. Adverse effects to sage-grouse would be avoided and minimized to the greatest extent practicable. Unavoidable impacts to sage-grouse would be mitigated to the extent practicable by evaluating both on-site and off-site mitigation opportunities in coordination with USFWS and UDWR.

Routine maintenance and streambank stabilization practices, utility relocations, upgrades to existing facilities, and the expansion of new facilities would be implemented at the Rock Cliff Recreation Area. It is anticipated that these activities would be designed to avoid disturbances to well-vegetated streambanks, high quality wet meadows, and wetlands and have minor impacts to riparian woodland/shrubland. Additionally, no other construction work is anticipated to occur in wet meadow, wetland, or riparian woodland/shrubland habitats at the other sites in the Project Management Area. Therefore, effects to southern

leatherside, yellow-billed cuckoo, northern leopard frog, or Columbia spotted frog would be anticipated to be minor.

Measures

Measures would be the same as those identified for the No Action alternative.

4.8 Visual Resources

Potential visual impacts of the RMP alternatives under consideration include those associated with facility modifications and land uses or restrictions that may alter the visual character of open lands.

This assessment of potential visual impacts of the RMP alternatives considers the potential for temporary and permanent changes in the visual character of the Project Management Area.

As mentioned in Section 3.8, visual quality is subjective, and it is recognized that certain visible features that may be considered appealing or valuable to one set of viewers may be considered distracting or displeasing to others. Although, in general, natural resources are considered less visually intrusive or adverse, man-made features can also be considered to have a beneficial visual quality depending on their design and form, and whether they are consistent or contrast with the setting in which they are located.

4.8.1 No Action

Under the No Action Alternative, facility modifications and improvements would occur on a periodic as-needed basis. No new land use impacts have been identified for the No Action Alternative.

Impacts

Implementing the No Action Alternative would have no effect on visual resources.

Measures

No mitigation measures would be required.

4.8.2 Alternative A: Moderate Resource Development

Elements of this alternative would seek to solve some existing problems with facility layout, access, or deferred maintenance on structures or facilities. The improvements proposed under Alternative A could result in an improved visual character of the area by resolving public issues at various recreation areas.

Impacts

Elements of Alternative A that affects the visual character of the Project Management Area include the following modifications and improvements:

- Enlarging the existing dry storage facility at Hailstone,
- Campground improvements at Hailstone,
- Internal trail system between Hailstone facilities,
- Modification of fee station at Hailstone,
- Extending the Perimeter Trail from Hailstone to Crandall Point,
- Developing a trailhead and primitive area (including gravel parking lot, self-pay fee station, and vault toilet restroom) at Crandall Point,
- Developing trails for access to the reservoir at Crandall Point,
- Developing trails for access to the reservoir at Ross Creek,
- Allowing access to the Perimeter Trail from other trail systems at Ross Creek,
- Developing concession opportunities at Ross Creek,
- Adding yurts or cabins at Rock Cliff,
- Allowing access to Perimeter Trail from other trail systems at Rock Cliff,
- Developing unique shoreline day-use areas on the Northwest Shore,
- Developing access to recreation opportunities on the Northwest Shore, and
- Allowing access to the Perimeter Trail from other trail systems on the Northwest Shore.

Measures

Facility modifications and improvements would result in minor alterations to the appearance of facilities, and the construction of new facilities would place visible features in areas where no such structures currently exist. These modified and new facilities would be most visible from within or immediately adjacent to the areas modified. Resulting changes to the visual quality of the area would be relatively minimal and, depending upon the condition of the specific facility to be modified, visual quality may be improved with the modifications. The following mitigation measures would serve to ensure that any potentially adverse visual impacts from new facilities and modifications to existing facilities are kept to a minimum.

Reclamation will follow similar design parameters for all facilities within the Project Management Area, to promote that all new facilities and facility modifications are generally consistent with the surrounding natural and man-made landscape features. Criteria including structure location, structure color, fence design, trail design, and structure architecture should be applied to all new facilities, as well as existing facilities, undergoing substantial modifications.

Visual impacts associated with land management activities may occur as a result of developing areas that are currently undeveloped. Visual impacts associated with such activities could include short-term changes in appearance of areas on which vegetative coverage would be modified. As viewed from the roadways and

surrounding areas, these changes may be noticeable to frequent observers but are not considered adverse.

4.8.3 Alternative B: Maximum Resource Development

The focus of this alternative is to provide for and expand a variety of recreation opportunities above those provided for in Alternative A. This alternative incorporates all of the same elements identified in Alternative A, but includes additional elements: such as upgrading of facilities, expansion of facilities, and bringing facilities up to current standards.

Impacts

In addition to the impacts described in Alternative A, the additional impacts to the visual character of the Project Management Area include further development of recreational facilities as described below:

- Creating additional dry boat storage facilities at Hailstone,
- Paving trails in specified locations at Hailstone,
- Additional park amenities at Hailstone including trailhead with parking lot and interpretive areas,
- Additional concessions including recreational rentals at Hailstone,
- Developing a primitive public day-use area at Crandall Point including vault toilets, picnic pavilions, and enlarged parking lot,
- Developing a public day-use area at Ross Creek including picnic pavilions and fee station,
- Improving campground to include RV access with drive to campsites at Rock Cliff,
- Enlarging boat ramp to accommodate large watercraft at Rock Cliff,
- Improving trail for bikers in specified locations at Rock Cliff,
- Allowing private development along the Northwest Shore, which could include a public golf course and/or a cross country ski facility and concessionaire, and
- Extending the Perimeter Trail along the south shore of the east arm.

Measures

Implementation of facilities impacts mitigation identified for Alternative A would also serve to reduce those that may be associated with Alternative B.

4.9 Recreation

This section of the report evaluates environmental consequences or effects on recreation for each of the three alternatives. It also identifies measures to be taken to mitigate the effects. Recreation resources are categorized under five headings;

1) Fishing, 2) Boating, 3) Reservoir Access, 4) Recreation Experience, and 5) Recreation Management/Operations.

4.9.1 No Action

Impacts

This analysis addresses anticipated impacts with implementing the No Action Alternative. Impacts are evaluated under the five recreation resource categories described above.

Fishery Implementing the No Action Alternative would have a negligible effect on reservoir fishing. The current minor improvements to boat ramp and parking facilities would provide some minimal short-term benefits but would not keep pace with the growing demand associated with the anticipated increasing park visitation.

Boating Implementing the No Action Alternative would have a negligible effect on boating. Enlarging the parking area and increasing boat launch capability at Hailstone would have some short-term positive effect but long-term effects would be negligible.

Reservoir Access Implementing the No Action Alternative would not be expected to impact reservoir access as current conditions would continue into the future.

Recreation Experience Implementing the No Action Alternative would not be expected to affect the quality and variety of recreation experiences available at the park. Park facilities would be maintained and upgraded as necessary to maintain current recreation values. Park visitors would continue to enjoy the wide variety of recreational opportunities and high level of service currently provided at the park.

Recreation Management/Operations Implementing the No Action Alternative would continue the historic pattern of high operation and maintenance costs and a stable revenue stream into the future. Some facility and management improvements would be made as funding is available but the moderate improvements are not expected to keep up with the growing demand on ageing infrastructure. This growing demand would place additional demands on already limited resources. Attaining some degree of park financial self-sufficiency would be expected to be even more difficult than in the past. Implementing the No Action Alternative would therefore have a minor adverse effect on future management and operation of the park.

Measures

No mitigation measures are required for implementing the No Action Alternative.

4.9.2 Alternative A: Moderate Resource Development

Impacts

This analysis addresses anticipated impacts in each of the five recreation resource categories associated with implementing Alternative A measures.

Fishing Alternative A measures that could affect the fishing resource include trail improvements, boat ramp facility improvements, and new access trails to the reservoir at Crandall Point and Ross Creek.

The proposed extension of the Perimeter Trail and the connections to adjoining trails would improve fisherman access to the shoreline of the reservoir. Improvements to boat ramps and facilities would have a positive effect on water surface fishing. Also, constructing additional parking areas and day-use beach areas would have a positive effect on the fishing resource. Combined, these improvements would be expected to have a moderate positive effect on fishing.

Boating Alternative A measures that could affect boating include the enlargement of the dry storage area for non-motorized boats at Hailstone, the maintenance of wakeless areas (Hailstone, Ross Creek, and Rock Cliff), and the construction of additional park facilities/areas at Ross Creek and Rock Cliff.

The enlargement of the storage area for non-motorized boats would have a positive but relatively minor effect on the boating resource. Additional recreation facilities around the reservoir would have a positive effect on boating by providing additional beach and boat beaching areas. Overall, implementing Alternative A would be expected to have a minor positive effect on the boating resource.

Reservoir Access Alternative A measures that would affect public access to the reservoir include trail improvements and the potential improvements in access from the main roads to the Ross Creek and Rock Cliff Recreation Areas. Extending the Perimeter Trail to the Hailstone Recreation Area would add significant value to the trail system since most of the park visitors come to the Hailstone area. Also, constructing interior trail systems and connecting the Perimeter Trail to other trail systems outside the Project Management Boundary would significantly improve the value and use of the trail. Improving access from SR 248 to the Ross Creek Recreation Area and from SR 32 to the Rock Cliff Recreation Area would improve public access and safety to the reservoir. Overall, implementing Alternative A would have a significant positive effect on reservoir access.

Recreation Experience Alternative A measures that would affect visitor recreation experience can be categorized under three headings: trail improvements, park facility modifications, and park improvements. The extent of impact within each of these categories was analyzed and is presented below.

Trail improvements – Trails play a vital role in successful recreation development as more people are looking for ways to enjoy nature and stay physically active. Trails provide a wide variety of recreational opportunities such as walking, cycling, horseback riding, jogging, and sightseeing. Use of the trails at Jordanelle has been limited due to several trail deficiencies as noted herein. Proposed trail improvements include the extension of the Perimeter Trail to Hailstone, constructing internal trails within the park, connecting park trails with other trail systems outside the Project Management Boundary, and developing a trailhead and access at Crandall Point. Implementing these proposed trail improvements could have a significant positive effect on the recreation experience for many visitors to the park.

Park facility modifications – Many park facilities are in need of updating to meet new demands and maintain current function. Facility modifications that would affect recreation experience include: 1) enlarge dry storage area for non-motorized boats, modify campground to include larger pads for bigger RV's, modify entry fee station, drill well to provide sufficient landscape irrigation capability, and install cabins (all at Hailstone); 2) Provide infrastructure improvements at Ross Creek; and 3) Modify facilities at Rock Cliff by stabilizing flood-vulnerable facilities and utilities where possible and adding pavilions and yurts or cabins. These modifications are expected to have an overall moderate positive effect on the recreation experience.

Park improvements – Park improvements proposed in Alternative A include: 1) develop unique shoreline day-use areas accessible by boat or trail on the Northwest Shore of the reservoir, 2) maintain the wakeless areas in the Hailstone, Ross Creek, and Rock Cliff areas to provide areas for beaches and use of non-motorized water craft, 3) create educational opportunities at Hailstone, 4) renovate facilities and add yurts or cabins at Rock Cliff, and 5) pursue improved road access to the Ross Creek and Rock Cliff Recreation Areas. These improvements would provide additional and varied recreational opportunities for park visitors, for an expected moderate positive effect on the recreation experience.

Summary – The combined effect of implementing Alternative A measures on Recreation Experience is expected to be moderate positive.

Recreation Management/Operations Measures that would affect recreation management and operations are divided into three categories; trail improvements, park facility modifications, and park improvements. Each is evaluated based on its effect on park staff and resources and how it would affect its revenue and expenses.

Trail improvements – Trail improvements would consist of extending the Perimeter Trail, connecting the trail to existing trail systems outside the Project

Management Boundary, and installing fee stations and implementing other measures to manage the increased use. Implementing these improvements would increase long-term operation and maintenance expenses, increase staff time and resources needed to manage the increased use, and increase revenue. It is anticipated that the additional revenue generated as a result of the improved trail system and increased use would more than compensate for the additional staff and incremental trail operation and maintenance expenses. The net positive effect on park management and resources is therefore expected to be minor positive.

Park facility modifications – Most of the proposed park facility modifications – modify fee entrance station, drill a well, enlarge RV pad sizes, add pavilions, relocate utilities from the bridge at Rock Cliff, etc. – are proposed in an effort to help increase revenue or reduce operation and maintenance expenses. Implementing Alternative A would be expected to have a moderately positive effect on recreation management and operations.

Park improvements – The proposed Alternative A improvements - develop shoreline day-use areas on the Northwest Shore, maintain the wakeless areas and provide additional recreational opportunities in the Ross Creek, Rock Cliff, and Hailstone areas, create educational opportunities at Hailstone, pursue improved access to the Ross Creek and Rock Cliff areas, etc. – are designed to improve the value and diversity of recreation opportunities for park visitors. Implementing these proposed park improvement measures would increase the demand on park staff and resources and would increase operation and maintenance expenses but would also increase park visitation, and therefore, park revenue. The balance between expense and revenue would depend on a variety of factors. Due to this unknown, the expected effect on park management and operations of this alternative is considered revenue-neutral, or negligible.

Measures

Implementing Alternative A may adversely affect the wildlife values of lands within the Project Management Boundary as more land is used for recreation and more people are expected to visit the park. Implementation will therefore require mitigation of adverse impacts to wildlife values. It may be possible to integrate mitigation for new development with any adjustment to the 1987 Wildlife Mitigation Plan especially the West Hills WMA. The proposed actions will have a moderate impact on recreation, but that impact would be positive or neutral for some specific items. The proposed actions are mostly intended to improve the recreation opportunities.

4.9.3 Alternative B: Maximum Resource Development

Impacts

This analysis addresses anticipated impacts in each of the five recreation resource categories associated with implementing Alternative B measures.

Fishing Alternative B measures that could affect the fishing resource include the additional improvements within the trail system (improving portions of the Perimeter Trail and extending it along the south side of the east arm of the reservoir), and construction of the primitive day-use area at Crandall Point (vault toilets, beaches, lakeside boat access, picnic and pavilion facilities, and no-wake zones). Both of these measures are expected to have a positive effect on fishing. Therefore, implementing Alternative B is expected to have a minor positive effect on the fishing resource.

Boating Constructing additional public and private dry boat storage facilities at Hailstone, as proposed in Alternative B, would have a minor positive effect on the boating resource, as would enlarging the boat ramp at Rock Cliff to accommodate larger boats.

Reservoir Access Alternative B measures that would affect reservoir access include proposed trail improvements and park development in the Crandall Point area. Paving portions of the Perimeter Trail in the Hailstone and Rock Cliff areas, extending it along the south shore of the east arm, and allowing access to the trail from the proposed private development on the Northwest Shore would improve the value and use of the trail systems. Constructing the park facilities in the Crandall Point Area (beach areas, lakeside boat access, and picnic/pavilion facilities) would provide additional access to the reservoir. Creating these additional access points to the reservoir would have a moderate positive effect on access to the reservoir.

Recreation Experience Alternative B measures that would affect visitor recreation experience are categorized under two headings; trail improvements and park improvements. The extent of impact within each of these categories is analyzed and presented below.

Trail improvements – Proposed trail improvements that would impact recreation experience include improving portions of the Perimeter Trail, extending the Perimeter Trail along the south shore of the east arm of the reservoir, and allowing access to the Perimeter Trail to other trails in the northwest area of the reservoir. Implementing these significant trail improvements would have a moderate positive effect on the recreation experience.

Park improvements – Park improvements proposed in Alternative B include:

- Develop additional amenities in the Hailstone area (trailhead, increased parking, interpretive areas, etc.),
- Include additional concessions in the Hailstone Area (cross country ski trails and rentals, snowshoeing, wake tow cable park, winter tubing, etc.),
- Develop primitive public day-use areas at Crandall Point (vault toilets, picnic pavilion facilities, beach area and access, lakeside boat access (no formal launch facilities), no wake zone, and enlarged parking lot),

- Develop public day-use area at Ross Creek (soccer field, sand volleyball court, day-use facilities, non-motorized boat rentals, and dock, etc.),
- Develop facilities on the Northwest Shore for public use (golf course, cross country ski facility, etc.), and
- Modify facilities in the Rock Cliff area to accommodate RV vehicles, larger boat launching, and higher-density day use.

Implementing the first five proposals would be expected to have a positive effect on recreation experience for some, and a negative effect for others, for an expected combined net moderate positive effect. Implementing the sixth proposal, however, would be expected to have a positive effect for some and a greater negative effect for others for an overall moderate negative effect. This determination was made based primarily on public opinion received during the RMP process.

Recreation Management/Operations Alternative B measures that would potentially affect recreation management and operations are categorized into five general areas:

- Develop additional amenities and concessions at Hailstone,
- Develop additional day-use facilities in the Crandall Point and Ross Creek areas,
- Modify existing and add new facilities in the Rock Cliff area, and
- Develop public recreation facilities within the Ross Creek and Northwest Shore areas.

Implementing Alternative B measures would have a direct effect on park management and operations, both positive and negative. While implementation would increase operation and maintenance expenses and require additional staff resources to manage, it would also increase park visitation and revenues. Implementation would also assist the Recreation Park Manager in meeting their goal of providing quality recreation opportunities to a large population base in a major destination resort environment. Before implementing any of the Alternative B measures, however, a more thorough evaluation would need to be done to determine the degree of effect it would have on the park management and operations. Each measure would need to be evaluated, and a decision made, on a case-by-case basis.

Measures

Implementing Alternative B would adversely affect wildlife values of lands within the Project Management Boundary as more land is used for recreation and more people are expected to visit the park. Implementation would therefore require mitigation of impacts and an adjustment to the 1987 Wildlife Mitigation Plan.

4.10 Transportation and Access

Potential transportation and access impacts and mitigation measures for each alternative under consideration are presented in this section. Impacts on transportation and access include those associated with construction activities that would be required to create new facilities and to modify existing facilities. In addition, maintenance of new facility and change in traffic volume levels may occur as a result of implementing any of the alternatives under consideration.

The assessment provided in this section considers the potential for both beneficial and adverse impacts to transportation and facility access. The expected increases to traffic volumes were not determined. However, a qualitative assessment of the potential for temporary and permanent changes in transportation facilities and accessibility to new and existing facilities was conducted.

4.10.1 No Action

Under the No Action Alternative, current practices would continue. Certain improvements to access roads may occur. However, these improvements would not introduce any new impacts since they are typical of the types and extent of improvements normally provided.

Impacts

No impacts to transportation and access would occur under the No Action Alternative.

Measures

No mitigation measures would be required.

4.10.2 Alternative A: Moderate Resource Development

Transportation and access impacts of Alternative A would occur from construction, maintenance, and recreational use of project facilities, as discussed in the following sections.

Impacts

Alternative A improvements were discussed in Chapter 2, and include improvement to Hailstone Recreation Area, Crandall Point, Ross Creek Recreation Area, and Rock Cliff Recreation Area, and the Northwest Shore. Construction traffic would use area roadways and access roads during construction of new facilities and improvements to existing facilities. Construction would require the use of vehicles for workers and equipment. Construction activities would increase existing traffic volumes; however, construction traffic would be temporary and end when the facility modifications have been completed. Construction durations of any facility modifications could range from a few days to several months.

Traffic and activities associated with facilities construction would create the potential for causing traffic delays. These delays would not block access and would be short term. The construction mitigation measures discussed below would reduce the potential for such impacts to occur.

During construction near roadways, the contractor would be required to maintain at least one lane in each direction and would be required to maintain access to facilities during construction. All construction activities near US Highway 40, State Route 248, and State Route 32 would require the contractor to use appropriate signalization and flag persons to guide traffic as necessary for public and worker safety. Implementation of these procedures and construction practice considerations would serve to ensure that there would be no major transportation impacts during construction.

Measures

This section describes potential measures to mitigate the impacts from Alternative A. The potential impacts related to construction can be reduced, by considering recreation use patterns when timing construction activities. It is recommended that Reclamation and its construction contractors will schedule construction activities to avoid construction during periods of anticipated high visitation. As such, construction would be scheduled to occur to avoid high-use summer periods and could instead be conducted during spring and fall months. On a weekly basis, construction could be scheduled to occur during weekdays and would avoid weekend construction.

Alternative A would improve certain facilities and increased visitation is anticipated to occur over time. Increased visitation would create the potential for associated increases in visitor vehicle trips on facility access roads. Due to current volumes of traffic on roadways, increases in visitation over time are not expected to affect transportation access within the Project Management Area. However, State Route 248 and State Route 32 traffic volumes are expected to increase due to new developments around the region.

4.10.3 Alternative B: Maximum Resource Development

Transportation and access impacts of alternatives B would occur from construction, maintenance, and recreational use of project facilities, as discussed in the following sections.

Impacts

Impacts of Alternative B would be similar to those identified for Alternative A above. Due to the increased amount of facility improvements and new facility installation that would occur under Alternative B, there would be an increased potential for construction-related traffic impacts to occur. With the exception of Hailstone Recreation Area, improvement and development of new facilities in other recreation areas would require improvements to access facilities and

roadways to accommodate the increase traffic volume. These improvements may include off ramps, turning lanes, appropriate signage, and improvements to access roadways.

Measures

Implementation of construction traffic mitigation identified for Alternative A would also serve to reduce Alternative B construction-related impacts.

4.11 Cultural Resources

Each alternative will be evaluated compared to the No Action Alternative to identify potential impacts to cultural resources as a result of the Jordanelle Reservoir RMP. For this evaluation, it is assumed that operation of Jordanelle Reservoir would continue under current conditions.

4.11.1 No Action Alternative

Impacts

Under the No Action Alternative, there is a potential for impacts to cultural resources. This alternative involves the continuation of current practices, as described in 2.2. The No Action Alternative would involve the replacement or repair of existing facilities, which, in some cases represent cultural resources. In addition, there may be a need for other ground-disturbing activities as a result of practices under the No Action Alternative. This type of activity has the potential to impact both surficial and subsurface cultural resources.

Measures

Reclamation will be responsible for ensuring the completion of cultural resource compliance for all site-specific projects as a means to fulfill Section 106 of the NHPA.

4.11.2 Alternative A: Moderate Resource Development (Preferred Alternative)

Impacts

Under Alternative A, there is a potential for impacts to cultural resources. Although, Reclamation and SHPO have made a determination that no historic properties are affected. This alternative involves a variety of improvements and management actions, as described in 2.3. Alternative A would involve improvements to various recreational facilities, which has the potential to impact both surficial and subsurface cultural resources. In addition, there may be a need for other ground-disturbing activities as a result of practices under Alternative A. This type of activity has the potential to impact cultural resources.

Measures

The same measures listed above for the No Action Alternative also apply for Alternative A.

4.11.3 Alternative B: Maximum Resource Development

Impacts

Under Alternative B, there is a potential for impacts to cultural resources. Although, Reclamation and SHPO have made a determination that no historic properties are affected. This alternative involves all of the elements of Alternative A, but also involves several additional elements, as described in 2.4. Alternative B would involve improvements and expansions to various recreational facilities that have the potential to impact both surficial and subsurface cultural resources. In addition, there may be a need for other ground-disturbing activities as a result of practices under Alternative B. This type of activity has the potential to impact cultural resources.

Measures

The same measures listed above for the No Action Alternative also apply for Alternative B.

4.12 Paleontological Resources

Each alternative will be evaluated compared to the No Action Alternative to identify potential impacts to paleontological resources as a result of the Jordanelle Reservoir RMP. For this evaluation, it is assumed that operation of Jordanelle Reservoir would continue under current conditions.

4.12.1 No Action

Impacts

Under the No Action Alternative, there is a potential for impacts to paleontological resources. This alternative involves the continuation of current practices, as described in 2.2. The No Action Alternative may involve a need for ground-disturbing activities, which have the potential to impact both surficial and subsurface paleontological resources.

Measures

If paleontological resources are identified prior to or during ground disturbing activities associated with any site-specific projects, Reclamation will be responsible for ensuring compliance with paleontological resource protocols, as a means to fulfill Section 6302 of the PRPA of 2009.

4.12.2 Alternative A: Moderate Resource Development

Impacts

Under Alternative A, there is a potential for impacts to paleontological resources. This alternative involves a variety of improvements and management actions, as described in 2.3. Alternative A may involve a need for ground-disturbing activities, which have the potential to impact both surficial and subsurface paleontological resources.

Measures

The same measures listed above for the No Action Alternative also apply for Alternative A.

4.12.3 Alternative B: Maximum Resource Development

Impacts

Under Alternative B, there is a potential for impacts to paleontological resources. This alternative involves all of the elements of Alternative A, but also involves several additional elements, as described in 2.4. Alternative B may involve a need for ground-disturbing activities, which have the potential to impact both surficial and subsurface paleontological resources.

Measures

The same measures listed above for the No Action Alternative also apply for Alternative B.

4.13 Indian Trust Assets

No ITAs have been identified within or near the Project Management Boundary. As such, there are no anticipated impacts to ITAs as a result of any of the aforementioned alternatives.

4.14 Hazardous Materials

None of the alternatives include actions that would disturb known mine tailings. None of the alternatives include the storage of hazardous materials. Increased development would bring additional vehicle and boat usage with the attendant risk of fuel or other petroleum product spills. However, existing measures to control this risk should reduce the impact to negligible. The golf course proposed in Alternative B has the potential to store hazardous materials for equipment and lawn care. However, these potential impacts will need to be addressed in the project specific NEPA compliance since it is not known how or if hazardous materials will be used. Impacts of the alternatives on hazardous materials are

considered negligible assuming current policies and procedures regarding the handling of fuel are maintained.

4.15 Socioeconomic Factors (Environmental Justice)

There would be no disproportionate disruption of minority groups by implementation or the construction of the proposed project because the project is not located near large minority group populations. No disproportionate negative impacts on minorities or low-income communities are expected.

4.15.1 No Action

Implementation of the No Action alternative would have no effect on any low-income or minority communities in the project vicinity because past conditions would continue into the present. This action would therefore have no adverse human health or environmental effects on minority and low-income populations as defined by environmental justice policies and directives.

Impacts

N/A

Measures

N/A

4.15.2 Alternative A: Moderate Resource Development

Implementation of Alternative A would not disproportionately (unequally) affect any low-income or minority communities in the project vicinity because the proposed project would not involve major facility construction, population relocation, health hazards, hazardous waste, property takings, or substantial economic impacts. This action would therefore have no adverse human health or environmental effects on minority and low-income populations as defined by environmental justice policies and directives.

Impacts

N/A

Measures

N/A

4.15.3 Alternative B: Maximum Resource Development

Implementation of Alternative B would not disproportionately (unequally) affect any low-income or minority communities in the project vicinity because the proposed project would not involve major facility construction, population relocation, health hazards, hazardous waste, property takings, or substantial economic impacts. This action would therefore have no adverse human health or

environmental effects on minority and low-income populations as defined by environmental justice policies and directives.

Impacts

N/A

Measures

N/A

4.16 Cumulative Impacts

A cumulative impact under NEPA (40 CFR 1508.7) is an impact that results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. This section discusses potential cumulative impacts that may result from the project, and as such considers the project-specific impacts identified in Sections 4.1 through 4.15, above, in conjunction with other past, present and reasonably foreseeable actions within the Project Management Boundary.

Past and current actions or activities within the Project Management Boundary include those associated with Reclamation's management of recreational and other resources at Jordanelle Reservoir and Dam. In addition, actions by other agencies in the Project Management Area contribute impacts, which must be assessed. These actions include periodic activities such as routine maintenance of area roadways, grazing on lands within the Project Management Boundary, prescribed burns or wildfires within the region, and land use and resources management decisions associated with lands and resources adjacent to Reclamation lands. The actions and activities are considered by combining their effects with project-specific impacts to result in cumulative impacts. The following sections summarize the results of the cumulative impacts for each resource.

4.16.1 Geology, Soils, and Mineral Resources

No adverse cumulative geology, soils, or mineral resources impacts would be anticipated to occur. Impacts to geology, soils, and mineral resources would be negligible if BMPs are used during construction and disturbed areas are mitigated properly.

4.16.2 Water Resources

Drilling an additional well or developing another surface source at Hailstone Recreation Area would affect the water supply at Jordanelle. However, the

impacts would be negligible compared to the capacity of the reservoir. None of the actions presented under either of the alternatives identified would cause significant additional demand on water resources; as such, no adverse cumulative impact on water resources is anticipated.

4.16.3 Water Quality

Potential water quality impacts would be associated with short-term construction activities, increased usage of recreation facilities, and development of a golf course; however, these impacts would be minor and negligible if proper mitigation measures are implemented as identified in Section 4.3. No other sources of water quality impacts have been identified in the Project Management Area that would contribute cumulatively and compromise the quality of the water in the reservoir. Therefore, no cumulative water quality impacts would be anticipated as a result of implementing any of the alternatives.

4.16.4 Air Quality, Climate, Noise

Potential impacts to air quality, climate, and noise are minor and anticipated to occur only during short-term construction activities. Because no adverse impacts are anticipated as a result of implementing any of the alternatives, no cumulative impacts to air quality, climate, and noise are expected.

4.16.5 Vegetation, Wetlands, Noxious Weeds

Minor impacts to vegetation and wetlands are anticipated. Risks associated with the spread of noxious weeds would also be minor. Implementation of a golf course as proposed under Alternative B would have moderate impact and could cause substantial removal of native vegetation. However, if mitigation measures are implemented as recommended in Section 4.5, the impacts would be minor and no adverse cumulative impacts are anticipated.

4.16.6 Fish and Wildlife Resources

Potential effects to fish and wildlife would be negligible to minor, and no adverse cumulative impacts are anticipated.

4.16.7 Threatened, Endangered, and Other Special Status Species

No adverse impacts are anticipated on threatened or endangered species. Effects on sage-grouse would be avoided and minimized to the greatest extent practicable. Unavoidable impacts to sage-grouse would be mitigated to the greatest extent practicable by evaluating mitigation opportunities in coordination with the USFWS and UDWR. There would be no changes in management of water levels and releases from the dam that would affect downstream habitat in the Provo River for the June sucker. As such, no adverse cumulative impacts are anticipated.

4.16.8 Visual Resources

Potential visual impacts of the identified alternatives under consideration would be associated with facility modifications and land uses or restrictions that may alter the visual character of open lands. The modified new facilities would be most visible from within or immediately adjacent to the areas modified. Following mitigation measures identified in Section 4.8 will ensure that any potentially adverse visual impact from new facilities and modifications to existing facilities are kept to a minimum. Therefore, no adverse cumulative impacts are anticipated.

4.16.9 Recreation

The alternatives under consideration would be expected to have beneficial impacts on recreational resources; and therefore, no adverse cumulative recreation impacts would be anticipated. However, implementation of Alternative A or Alternative B would have a direct effect on park management and operations. The proposed development would increase operation and maintenance expenses and require additional staff resources to manage the new facilities. Nevertheless, park visitations and revenues would also be expected to increase. In addition, the development of identified alternatives would assist the Recreation Park Manager in meeting their goal of providing quality recreation opportunities to a large population based in a major destination resort environment. As such, a more thorough evaluation, on a case-by-case, would need to be done to determine the degree of effect it would have on park management and operations.

4.16.10 Transportation and Access

Potential transportation and access impacts are primarily associated with short-term construction activities. If mitigation measures are followed as identified in Section 4.10, these impacts would be minimal and no adverse cumulative impacts would be anticipated. If new facilities are developed in the Ross Creek Recreation Area, improvements to accessibility from SR 248 should be pursued to avoid unsafe ingress and egress to visitors. Improvements to facilities on the south side of the Provo River at Rock Cliff Recreation Area may also necessitate improving access directly from SR 32.

4.16.11 Cultural Resources

Potential cumulative impacts to cultural resources could result from reasonably foreseeable future actions associated with the No Action Alternative, Alternative A, and Alternative B. Fluctuations in reservoir levels (wave action) as well as sedimentation could lead to cumulative cultural resource impacts located near Jordanelle Reservoir. Modifications and improvements to existing facilities, which in some cases represent cultural resources, are another form of potential cumulative impact. Other potential cumulative impacts, such as vandalism and erosion could result from increased public use within the Project Management Boundary. Reclamation will ensure completion of cultural resource compliance

for site-specific projects as a means to fulfill its responsibilities under Section 106 of the NHPA, as well as reduce or mitigate impacts to cultural resources.

4.16.12 Paleontological Resources

Potential cumulative impacts to paleontological resources could result from reasonably foreseeable future actions associated with the No Action Alternative, Alternative A and Alternative B. Fluctuations in reservoir levels (wave action) as well as sedimentation could lead to cumulative paleontological resource impacts located near Jordanelle Reservoir. Modifications and improvements to existing facilities, which may involve ground disturbance, also have the potential to impact paleontological resources. Other potential cumulative impacts, such as vandalism and erosion could result from increased public use within the Project Management Boundary. Reclamation will ensure completion of paleontological resource compliance for site-specific projects as a means to fulfill its responsibilities under Section 6302 of the PRPA as well as reduce or mitigate impacts to paleontological resources.

4.16.13 Indian Trust Assets

No ITAs have been identified within the Project Management Boundary. As a result, no past, present, or reasonably foreseeable actions associated with the alternatives are expected to result in cumulative impacts to ITAs. Therefore, cumulative impacts to ITAs are unlikely under the No Action Alternative, Alternative A, and Alternative B.

4.16.14 Hazardous Materials

Because there are no anticipated hazardous material impacts, no adverse cumulative impacts would be expected.

4.16.15 Socioeconomic Factors

Because there are no anticipated socioeconomic impacts, no adverse cumulative impacts would be expected.

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Table 4-1: Impacts Table

RESOURCES		IMPACTS		
		NO ACTION	ALTERNATIVE A: Multi-Purpose Emphasis (Moderate Resource Development)	ALTERNATIVE B: Recreation Emphasis (Maximum Resource Development)
Geology, Soils and Mineral Resources	Hailstone Recreation Area	Minor temporary impacts due to soil disturbance during construction of boat ramp widening and additional parking.	Minor impact due to development of additional facilities and trails within a previously developed area. Impacts can be temporary and/or negligible if BMPs are used during construction and disturbed area is mitigated properly.	Moderate impact due to larger area of impact compared to Alternative A. However, impacts are still within previously developed areas. Impacts can be temporary and/or negligible if BMPs are used during construction and disturbed area is mitigated properly.
	Crandall Point	No impacts anticipated.	Moderate impacts due to development of parking area and trails in a previously undisturbed area. Impacts can be temporary and/or negligible if BMPs are used during construction and disturbed area is mitigated properly.	Moderate impacts but greater than for Alternative A. Additional facilities and an expanded parking lot in a previously undisturbed area. Impacts can be temporary and/or negligible if BMPs are used during construction and disturbed area is mitigated properly.
	Northwest Shore	No impacts anticipated.	Minor impact due to development of trails and primitive day-use area. Impacts can be temporary and/or negligible if BMPs are used during construction and disturbed area is mitigated properly.	Significant impacts due to the construction of a golf course. Extensive use of BMPs during construction and mitigation after would be necessary to reduce this to a negligible impact.
	Ross Creek Recreation Area	No impacts anticipated.	Minor impacts due to existing infrastructure improvements. Impacts can be temporary and/or negligible if BMPs are used during construction and disturbed area is mitigated properly. Increased wakeless area would have a minor positive impact on shoreline erosion.	Significant impact due to the extent of the proposed developments. Extensive use of BMPs during construction and mitigation after would be necessary to reduce this to a negligible impact.
	Rock Cliff Recreation Area	Minor impact due to possible debris in reservoir from meandering of the river destroying existing facilities.	Minor impacts associated with additional facilities and efforts to stabilize the Provo River and repair damage caused by the river. The natural meandering of the Provo River would be controlled to prevent damage to existing and proposed facilities. Impacts can be temporary and/or negligible if BMPs are used during construction and disturbed area is mitigated properly. Increased size of the wakeless area would have a minor positive impact on shoreline erosion.	Significant impact due to the extent of the proposed developments. Extensive use of BMPs during construction and mitigation after would be necessary to reduce this to a negligible impact. Road cuts in steep areas increase significantly the risk of a landslide. The Provo River would be further controlled and restricted to prevent damage of facilities.
	Primitive Shoreline	No impacts anticipated.	No impacts anticipated.	Extension of Perimeter Trail would have minor impacts on soil and geologic resources due to potential for increased erosion.
	West Hills WMA	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.
Water Resources	Hailstone Recreation Area	No impacts anticipated.	Drilling an additional well, or utilizing an alternate surface source, could have an adverse effect on groundwater, and therefore, the water supply to the Jordanelle Project. However, the limit of the current water right is 79 ac-ft/yr and the impact would be negligible compared to the capacity of the reservoir.	Impacts similar to Alternative A.
	Crandall Point	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.
	Northwest Shore			
	Ross Creek Recreation Area			
	Rock Cliff Recreation Area			
	Primitive Shoreline			
	West Hills WMA			

Table 4-1: Impacts Table

RESOURCES		IMPACTS		
		NO ACTION	ALTERNATIVE A: Multi-Purpose Emphasis (Moderate Resource Development)	ALTERNATIVE B: Recreation Emphasis (Maximum Resource Development)
Water Quality	Hailstone Recreation Area	No impacts anticipated.	Minor impacts on water quality may temporarily occur from any construction of new facilities, or upgrading or replacement of existing facilities. Increased usage of recreation facilities has the potential to increase the number of horses and pets within the project area. Animal waste products have the potential to degrade water quality.	Impacts from Alternative B could be greater than Alternative A, due to a potentially greater number of construction activities, more visitors coming to Jordanelle Reservoir, and the potential of a golf course within the project area. The increase in visitors may require additional restrooms and wastewater treatment facilities. Additional wastewater treatment facilities could result in minor increases of nutrients reaching the reservoir. More construction and ground disturbance could result in more turbidity and sedimentation in localized areas of Jordanelle Reservoir because of erosion. The proposed golf course could have adverse water quality impacts if the use of fertilizers, pesticides, and herbicides is not managed correctly. Additional nutrient loading in the reservoir could result in algae blooms, decrease dissolved oxygen content, and result in fish kills.
	Crandall Point			
	Northwest Shore			
	Ross Creek Recreation Area			
	Rock Cliff Recreation Area			
	Primitive Shoreline			
	West Hills WMA			
Air Quality, Climate, Noise	Hailstone Recreation Area	No impacts anticipated.	Short-term impacts to air quality and noise due to construction-related activities.	Impacts similar to Alternative A.
	Crandall Point			
	Northwest Shore	No impacts anticipated.	Short-term impacts to air quality and noise due to construction-related activities.	Impacts similar to Alternative A with increase in noise-generating recreational activities.
	Ross Creek Recreation Area	No impacts anticipated.	Short-term impacts to air quality and noise due to construction-related activities. Increase in noise-generating recreational activities.	Impacts similar to Alternative A.
	Rock Cliff Recreation Area	No impacts anticipated.	Short-term impacts to air quality and noise due to construction-related activities.	Impacts similar to Alternative A.
	Primitive Shoreline	No impacts anticipated.	No impacts anticipated	Short-term impacts to air quality and noise due to construction-related activities.
	West Hills WMA	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.
Vegetation, Wetlands, Noxious Weeds	Hailstone Recreation Area	Negligible impacts to upland vegetation. No Impacts to riparian or wetland vegetation anticipated. Risk for spreading noxious weeds would be minor.	Minor impacts to upland vegetation. No impacts to riparian or wetland vegetation anticipated. Risk for spreading noxious weeds would be minor.	Minor impacts to upland vegetation. No impacts to riparian or wetland vegetation anticipated. Risk for spreading noxious weeds would be minor.
	Crandall Point			
	Northwest Shore	Negligible impacts to upland vegetation. No Impacts to riparian or wetland vegetation anticipated. Risk for spreading noxious weeds would be minor.	Impacts similar to No Action.	Moderate impacts to upland vegetation due to golf course development. No impacts to riparian or wetland vegetation anticipated. Risk for spreading noxious weeds would be minor.
	Ross Creek Recreation Area	Negligible impacts to upland vegetation. No Impacts to riparian or wetland vegetation anticipated. Risk for spreading noxious weeds would be minor.	Impacts similar to No Action.	Impacts similar to No Action.
	Rock Cliff Recreation Area	Negligible impacts to upland, riparian, and wetland vegetation. Risk for spreading noxious weeds would be minor.	Minor impacts to upland and riparian vegetation. Negligible impacts to wetlands. Risk for spreading noxious weeds would be minor.	Impacts similar to Alternative A.
	Primitive Shoreline	Negligible impacts to upland vegetation. No Impacts to riparian or wetland vegetation anticipated. Risk for spreading noxious weeds would be minor.	Minor impacts to upland and riparian vegetation. Negligible impacts to wetlands. Risk for spreading noxious weeds would be minor.	Minor impacts to upland and riparian vegetation. Negligible impacts to wetlands. Risk for spreading noxious weeds would be minor.
	West Hills WMA			

Table 4-1: Impacts Table

RESOURCES		IMPACTS		
		NO ACTION	ALTERNATIVE A: Multi-Purpose Emphasis (Moderate Resource Development)	ALTERNATIVE B: Recreation Emphasis (Maximum Resource Development)
Fish and Wildlife Resources	Hailstone Recreation Area	Effects to fish would be negligible. Risk for introducing invasive aquatic species would be minor. Effects to existing wildlife populations would be negligible.	Effects to fish would be negligible. Risk for introducing invasive aquatic species would be minor. Effects to wildlife would be minor. Additional mitigation for mule deer and elk would likely be necessary.	Effects to fish would be negligible. Risk for introducing invasive aquatic species would be minor. Effects to big game could be significant and would require additional mitigation to offset impacts to crucial winter habitat. Effects to migratory bird, golden eagle, and other wildlife would be minor.
	Crandall Point			
	Northwest Shore			
	Ross Creek Recreation Area			
	Rock Cliff Recreation Area			
	Primitive Shoreline			
	West Hills WMA			
Threatened, Endangered, and Other Special Status Species	Hailstone Recreation Area	No adverse effects to T&E Species. No adverse effects to Special Status Species.	No adverse effects to T&E species. Negligible to Moderate impacts to sage-grouse that would require mitigation. No adverse effects to other Special Status Species anticipated.	No adverse effects to T&E species. Negligible to potentially significant impacts to sage-grouse that would require mitigation. No adverse effects to other Special Status Species anticipated.
	Crandall Point			
	Northwest Shore			
	Ross Creek Recreation Area			
	Rock Cliff Recreation Area			
	Primitive Shoreline			
	West Hills WMA			
Visual Resources	Hailstone Recreation Area	No impacts anticipated.	Enhance scenic quality of the project area.	Impacts similar to Alternative A with increased visible development.
	Crandall Point			
	Northwest Shore			
	Ross Creek Recreation Area	No impacts anticipated.	Enhance scenic quality of the project area with increased visible development.	Impacts similar to Alternative A.
	Rock Cliff Recreation Area	No impacts anticipated.	Enhance scenic quality of the project area.	Impacts similar to Alternative A with increased visible development.
	Primitive Shoreline	No impacts anticipated.	No impacts anticipated.	Enhance scenic quality of the project area.
	West Hills WMA	No impacts anticipated.	No impacts anticipated.	No impacts anticipated

Table 4-1: Impacts Table

RESOURCES		IMPACTS		
		NO ACTION	ALTERNATIVE A: Multi-Purpose Emphasis (Moderate Resource Development)	ALTERNATIVE B: Recreation Emphasis (Maximum Resource Development)
Recreation	Hailstone Recreation Area	Minor positive impacts associated with enlarging the boat ramp and parking area. Fishing and boating would have short-term positive benefits, but long-term benefits would be negligible as the improvements would likely not keep pace with the anticipated demand caused by an increase in park visitation. No impacts are expected to the quality and variety of recreation experiences available at the park. This alternative would continue the historic pattern of high O&M costs and a stable revenue stream into the future. Continued moderate improvements to aging infrastructures are not anticipated to keep pace with the growing demand.	Implementation of Alternative A would have a moderate positive impact on fishing and boating. The enlargement of no-wake zone areas, improvements to boat ramps, and development of an internal trail system would improve the quality and positively impact the recreation experience of park visitors. Improvements and enlargement of existing facilities would provide for the anticipated increase in park visitors. Development of educational facilities, additional areas for beaches and areas for use of non-motorized water craft will also have a positive effect on the recreation experience of park visitors.	Impacts similar to Alternative A. The additional development of dry boat storage facilities will have a minor positive impact on boating. Paving portions of the Perimeter Trail would improve the value of the trail system. Developing additional amenities (trailhead, increased parking, interpretive areas) and developing additional concessions (cross country ski trails and rentals, snowshoeing, wake-tow cable park, winter tubing, etc.) would have a moderate positive effect on the recreation experience for some park visitors and a negative effect for others, for a combined net moderate positive effect. Implementation would affect park management by directly increasing O&M expenses, but would also increase park visitation and revenue.
	Crandall Point	No impacts anticipated.	Extending the perimeter trail to Hailstone would add significant value to the trail system since most park visitors come to the Hailstone park area. The trail would provide a variety of recreation opportunities such as walking, biking, horseback riding, and sightseeing. The proposed improvements to the trail system at Crandall Point would have a significant positive impact on the recreation experience for many park visitors.	Impacts similar to Alternative A. The additional development of a public day-use areas including beach area and access, lakeside boat access, no-wake zone, public pavilions, and enlarged parking lot is expected to have a moderate positive impact on fishing, boating, and the overall recreation experience. Implementation would increase O&M costs and park revenue.
	Northwest Shore	No impacts anticipated.	Allowing access to the Perimeter Trail and developing primitive shoreline day-use areas, accessible by boat or by Perimeter Trail, would have a moderate positive impact on the recreation experience of park users.	Impacts similar to Alternative A. The additional development of private facilities (golf course and cross country ski facility) is expected to have a positive effect on recreation experience for some park visitors, and a negative effect for others, for an expected combined net moderate positive effect. Implementation would increase O&M costs and park revenue.
	Ross Creek Recreation Area	Negligible impacts on fishing, boating, and overall recreation experience.	Positive impacts to fishing and boating. Installation of trail system will provide fisherman with better access to the reservoir. Improvement to access road from SR248 would have a positive impact and provide a safe public access to the park. Expansion of wakeless areas and provide additional areas for beaches are expected to have a positive effect on the recreation experience of park users.	Impacts similar to Alternative A. The additional development of facilities for public use (soccer field, sand volleyball court, day-use facilities, non-motorized boat rentals and dock, etc.) is expected to have a positive effect on recreation experience for some park visitors, and a negative effect for others, for an expected combined net moderate positive effect. Implementation would increase O&M costs and park revenue.
	Rock Cliff Recreation Area	Negligible impacts on fishing, boating, and overall recreation experience.	Positive impacts to fishing and boating. Improvement to access road from SR32 would have a positive impact and provide a safe public access to the park. Modifications to the flood-vulnerable facilities and utilities, where possible, and adding pavilions and yurts are expected to have a positive effect on the recreation experience of park users.	Impacts similar to Alternative A. The additional development to modify facilities to accommodate RV vehicles, larger boat launching, and higher-density day use is expected to have a positive effect for some and a greater negative effect by others, for an overall net moderate negative effect. Implementation would increase O&M costs and park revenue.
	Primitive Shoreline	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.
	West Hills WMA			

Table 4-1: Impacts Table

RESOURCES		IMPACTS		
		NO ACTION	ALTERNATIVE A: Multi-Purpose Emphasis (Moderate Resource Development)	ALTERNATIVE B: Recreation Emphasis (Maximum Resource Development)
Transportation and Access	Hailstone Recreation Area	No impacts anticipated.	Construction activities would increase traffic volume on access roadways and limit access to existing recreational facilities during construction. Fewer visitors would be anticipated during construction periods.	Similar to Alternative A, but with an increase in potential for increased construction-related impacts.
	Crandall Point	No impacts anticipated.	No additional exit from Highway 40 will be required. Improvements to the access roadway from Hailstone Recreational Area will be required to provide adequate access to trailhead and parking lot. The improvements to access and transportation would provide a safer environment for users, which would increase the volume of users each year.	Similar to Alternative A, but with an increase in potential for increased construction-related impacts.
	Northwest Shore	No impacts anticipated.	Minor construction related impacts.	Similar to Alternative A, but with an increase in potential for increased construction-related impacts.
	Ross Creek Recreation Area	Unsafe ingress and egress from SR 248. The access roadway is in poor condition and is gradually degrading.	Improvements to accessibility from SR 248 are needed to provide safe ingress and egress to visitors. Construction related impacts including temporary traffic delays may occur. Improvements to access and transportation would increase the volume of visitors each year.	Similar to Alternative A, but with an increase in potential for increased construction-related impacts.
	Rock Cliff Recreation Area	No impacts anticipated.	Construction activities would increase traffic volume on access roadways and limit access to existing recreational facilities. Improvements to access and transportation would increase the volume of visitors each year.	Similar to Alternative A, but with an increase in potential for increased construction-related impacts.
	Primitive Shoreline	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.
	West Hills WMA			
Cultural Resources	Hailstone Recreation Area	Possible impacts to surficial and subsurface culture resources caused by implementation of No Action Alternative.	Possible impacts to surficial and subsurface cultural resources caused by implementation of Alternative A.	Impact similar to Alternative A with a higher potential to impact surficial and subsurface cultural resources cause by increased development.
	Crandall Point	No impacts anticipated.	Possible impacts to surficial and subsurface cultural resources caused by implementation of Alternative A.	Impact similar to Alternative A with a higher potential to impact surficial and subsurface cultural resources cause by increased development.
	Northwest Shore			
	Ross Creek Recreation Area	Possible impacts to surficial and subsurface culture resources caused by implementation of No Action Alternative.	Possible impacts to surficial and subsurface cultural resources caused by implementation of Alternative A.	Impact similar to Alternative A with a higher potential to impact surficial and subsurface cultural resources cause by increased development.
	Rock Cliff Recreation Area			
	Primitive Shoreline	No impacts anticipated.	Possible impacts to surficial and subsurface cultural resources caused by implementation of Alternative A.	Impact similar to Alternative A with a higher potential to impact surficial and subsurface cultural resources cause by increased development.
	West Hills WMA	No impacts anticipated.	No impacts anticipated	No impacts anticipated.

Table 4-1: Impacts Table

RESOURCES		IMPACTS		
		NO ACTION	ALTERNATIVE A: Multi-Purpose Emphasis (Moderate Resource Development)	ALTERNATIVE B: Recreation Emphasis (Maximum Resource Development)
Paleontological Resources	Hailstone Recreation Area	Possible impacts to surficial and subsurface paleontological resources caused by implementation of No Action Alternative.	Possible impacts to surficial and subsurface paleontological resources caused by implementation of Alternative A.	Impact similar to Alternative A with a higher potential to impact surficial and subsurface paleontological resources caused by increased development.
	Crandall Point	No impacts anticipated.	Possible impacts to surficial and subsurface paleontological resources caused by implementation of Alternative A.	Impact similar to Alternative A with a higher potential to impact surficial and subsurface paleontological resources caused by increased development.
	Northwest Shore			
	Ross Creek Recreation Area	Possible impacts to surficial and subsurface paleontological resources caused by implementation of No Action Alternative.	Possible impacts to surficial and subsurface paleontological resources caused by implementation of Alternative A.	Impact similar to Alternative A with a higher potential to impact surficial and subsurface paleontological resources caused by increased development.
	Rock Cliff Recreation Area			
	Primitive Shoreline	No impacts anticipated.	Possible impacts to surficial and subsurface paleontological resources caused by implementation of Alternative A.	Impact similar to Alternative A with a higher potential to impact surficial and subsurface paleontological resources caused by increased development.
	West Hills WMA	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.
Indian Trust Assets	Hailstone Recreation Area	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.
	Crandall Point			
	Northwest Shore			
	Ross Creek Recreation Area			
	Rock Cliff Recreation Area			
	Primitive Shoreline			
	West Hills WMA			
Hazardous Materials	Hailstone Recreation Area	No impacts anticipated.	Negligible impacts associated with the potential increase in oil spills caused by increase of park visitors.	Impacts similar to Alternative A.
	Crandall Point			
	Northwest Shore	No impacts anticipated.	Negligible impacts associated with the potential increase in oil spills caused by increase of park visitors.	Negligible impacts associated with the potential increase in oil spills caused by increase of park visitors. Golf course has the potential to store hazardous materials for equipment and lawn care. However, these potential materials will need to be addressed in project specific NEPA compliance since it is not known how or if hazardous materials will be used.
	Ross Creek Recreation Area	No impacts anticipated.	Negligible impacts associated with the potential increase in oil spills caused by increase of park visitors.	Impacts similar to Alternative A.
	Rock Cliff Recreation Area			
	Primitive Shoreline	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.
	West Hills WMA			

Table 4-1: Impacts Table

RESOURCES		IMPACTS		
		NO ACTION	ALTERNATIVE A: Multi-Purpose Emphasis (Moderate Resource Development)	ALTERNATIVE B: Recreation Emphasis (Maximum Resource Development)
Socioeconomic Factors	Hailstone Recreation Area	No impacts anticipated.	No impacts anticipated.	No impacts anticipated.
	Crandall Point			
	Northwest Shore			
	Ross Creek Recreation Area			
	Rock Cliff Recreation Area			
	Primitive Shoreline			
	West Hills WMA			

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Chapter 5: Consultation and Coordination

5.1 Coordination and Public Involvement

Several approaches assisted with issue development of goals and objectives for the management of resources within the Project Management Boundary. These included the formation of a coordination team, holding public meetings, and the creation of a project website. Media releases were used to inform the public of scheduled meetings and events.

5.1.1 Coordination Team

An important phase of public involvement included coordination with managing entities and stakeholders. The accuracy of the RMP and EA depended highly on input provided from all interested parties. The coordination team included representatives from the primary stakeholders, Reclamation, CUWCD, the DOI-CUPCA office, State Parks, the Mitigation Commission, UDWR, USFWS, and Wasatch County.

Several coordination team meetings were held throughout the development of the RMP. Their purpose was to compile available documents; discuss issues, opportunities, and concerns; and develop the project alternatives identified in the EA. The coordination team was given the opportunity to review the RMP and EA documents prior to public release.

5.1.2 Public Involvement

The purpose of the public involvement program was to obtain public views on recreation development priorities, resource management concerns and issues, areas of special interest, and what recreational management changes should be considered within the planning area. Every effort was made to reach as many representatives of the various interest groups and agencies that have an interest in Jordanelle Reservoir.

Public participation is an important element of both development of the RMP and the EA. Public comments were invited and were integral during the development of the RMP and EA. Public comments were considered in the draft preparations of the RMP and EA and the documents were made available on the internet for public review and comment between September 15 and November 15, 2011.

Public Meetings

FCE provided an open forum for the exchange of ideas and information; solicit issues, needs, and opportunities; and explain agency constraints. Two public

meetings were held as part of this process. The public meetings were held in the Jordanelle State Park Hailstone Event Center. This center complies with Reclamation's March 30, 1988 policy statement on accessibility for disabled persons, and provided a meeting place in areas appropriate and convenient for interested public to attend.

To publicize the initial public involvement program, a Scoping Notice was prepared to announce the RMP study, explain the RMP process and schedule, identify the primary objectives of the RMP, and set the date, time and place for the initial public meeting. The initial public scoping meeting was held on November 4, 2010 to present the purpose and process for developing the RMP and EA. The meeting provided an opportunity for members of the public to ask questions concerning the project and provide oral comments. An additional two weeks were given to provide written comments.

A second public meeting was held on October 27, 2011, during the 60-day public comment period for the RMP and EA.

World Wide Web

In addition to the formal public scoping process, an avenue was provided to facilitate public involvement. A website (<http://www.jordanellermmp.com>) was created and maintained during the preparation of the RMP and EA. The website notified the public of key dates for public scoping meetings and documents available for public review were posted on the website. Contact information was made available so that the public's questions and concerns could be addressed via phone and email.

5.2 Additional Agencies Contacted

5.2.1 Bureau of Indian Affairs

Reclamation contacted the BIA Uintah and Ouray Agency in Fort Duchesne, Utah and Fort Hall Agency in Fort Hall, Idaho regarding potential impacts to ITAs within or near the Jordanelle Reservoir RMP/EA project area. No responses were received from either BIA agency.

5.2.2 Utah Geological Survey

Reclamation requested a paleontological resource file search from Martha Hayden, Paleontological Assistant with the UGS in March 2011. File search results and recommendations from the UGS were received in a letter dated March 7, 2011.

5.2.3 Utah State Historic Preservation Office

Reclamation submitted a determination of no historic properties affected for the Jordanelle Reservoir RMP and EA to the Utah SHPO in March 2011. The Utah

SHPO concurred with Reclamation's determination in a letter dated March 23, 2011.

5.3 Native American Consultation

Reclamation conducted Native American consultation throughout the public involvement process. Consultation letters were sent to the Ute Indian Tribe of the Uintah and Ouray Reservation and the Northwestern Band of Shoshoni Nation of Utah in March 2011. This consultation was conducted in compliance with 36 CFR 800.2(c)(2) on a government-to-government basis. Through this effort, each tribe is given a reasonable opportunity to identify any concerns about historic properties; to advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance; to express their views on the effects of the proposed action on such properties; and to participate in the resolution of adverse effects. No responses were received from the tribes.

5.4 List of Preparers

5.4.1 Project Team Members

Franson Civil Engineers

1276 South 820 East, Ste. 100
American Fork, Utah 84003
801-756-0309

Jay Franson, P.E.
Principal/Technical Advisor
jfranson@fransoncivil.com

Monique Robbins, P.E.
Senior Engineer/Resource
Management Plan
mrobbins@fransoncivil.com

Layne Jensen, P.E.
Senior Manager/Environmental
Assessment
ljensen@fransoncivil.com

Alex Vaz
Engineer 1
avaz@fransoncivil.com

Lauren Ploeger, P.E.
Senior Engineer/Public Involvement
& Project Management
lploeger@fransoncivil.com

Charity Mair
Reports Writer/Editor
cmair@fransoncivil.com

Lon Franson
Senior Designer
lfranson@fransoncivil.com

Valerie Haskin
Office Assistant
vhaskin@fransoncivil.com

Environmental Assessment for
Jordanelle Reservoir Resource Management Plan

Matt Gurr
Designer
mgurr@fransoncivil.com

Jennifer Westwood
Office Assistant
jwestwood@fransoncivil.com

Henrie Engineering

Jay Henrie
President/Project Coordination
1829 South 100 West
Orem, UT 84058
801-885-7444
henrieengineering@gmail.com

Steve Noyes

Independent Consultant
2301 East 850 South
Springville, UT 84663
801-369-3964
jsnoyes1@yahoo.com

Frontier Corporation USA

221 N. Gateway Drive, Suite B
Providence, UT 84332
435-753-9502

Collin Covington
Watershed/Wetlands Scientist
ccovington@frontiercorp.net

Dennis Wenger
Senior Project Manager
dwenger@frontiercorp.net

U.S. Bureau of Reclamation

Provo Area Office
302 East 1860 South
Provo, UT 84606

Brian Joseph
801-379-1082
bjoseph@usbr.gov

5.4.2 Coordination Team Members

U.S. Bureau of Reclamation

Provo Area Office
302 East 1860 South
Provo, UT 84606

Kerry Schwartz, COTR
801-379-1150
kschwartz@usbr.gov

Brian Joseph
801-379-1082
bjoseph@usbr.gov

Peter Crookston
801-379-1152
pcrookston@usbr.gov

Johnn Sterzer
801-379-1070
jsterzer@usbr.gov

Central Utah Water Conservancy District

355 W. University Pkwy
Orem, UT 84058

Jared Hansen
801-226-7152
jhansen@cuwcd.com

Paul Pierpont
801-226-7190
paul@cuwcd.com

Reed Oberndorfer
801-226-7160
reed@cuwcd.com

Sarah Sutherland
801-226-7147
sarah@cuwcd.com

Chris Elison
801-226-7100
chrise@cuwcd.com

DOI – CUPCA office

302 East 1860 South
Provo, UT 84606

Lynn Hansen
801-379-1238
lhansen@usbr.gov

Utah State Parks and Recreation

1594 W. North Temple #116
PO Box 146001
Salt Lake City, UT 84114

Jamie Dalton
801-538-7207
jdalton@utah.gov

Jeff Rasmussen
801-870-7138
jeffrasmussen@utah.gov

Bruce Hamilton
801 533-5127
brucehamilton@utah.gov

Leon Tate
801 538-7342
leontate@utah.gov

Fred Hayes
801 538-7323
fredhayes@utah.gov

Mary Tullius, Director
801-538-7336
marytullius@utah.gov

Derek O'Donnell
801 538-7346
derekodonnell@utah.gov

Susan Zarekarizi
801-538-7496
susanzarekarizi@utah.gov

Jordanelle State Park

SR 319 #515
Box 4
Heber City, UT 84032

Laurie Backus, Manager
435-649-9540
lauriebackus@utah.gov

Utah Reclamation Mitigation and Conservation Commission

230 South 500 East, #230
Salt Lake City, UT 84102

Mark Holden
801-524-3146
mholden@usbr.gov

Utah Division of Wildlife Resources

Central Region
1115 N. Main St.
Springville, UT 84463

Doug Sakaguchi
801-491-5653
dougsakaguchi@utah.gov

Michael Slater
801-491-5650
michaelslater@utah.gov

Ashley Green
801 491-5678
ashleygreen@utah.gov

U.S. Fish & Wildlife Service

2369 Orton Cir, Ste 50
West Valley, UT 84119

Betsy Herrmann
801-975-3330
betsy_herrmann@fws.gov

Wasatch County

25 N. Main St.
Heber City, UT 84032

Mike Davis, County Manager
435-657-3180
mdavis@co.wasatch.ut.us

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Chapter 6: References & Glossary

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6.2 Glossary of Terms

Concessionaire	non-federal commercial business that supports appropriate public recreational uses and provides facilities, goods or services for which revenues are collected. A concession involves the use of lands within the Project Management Boundary and usually involves the development of improvements.
Coordination Team	Reclamation, CUWCD, DOI-CUPCA office, State Parks, Mitigation Commission, UDWR, USFWS, and Wasatch County
Exclusive Use	Any use which excludes other appropriate public uses or users for extended periods of time.
Jordanelle Project	Jordanelle Reservoir and associated facilities and resources
Laser Sailboat	Small sailing dinghy, sailed by either one or two people. Used for competitive racing.
Managing Partners	Reclamation, CUWCD, UDWR, and State Parks
Primary Jurisdiction Zone	Area within the Project Management Boundary that surrounds the dam, outlet works, feeder canals, and distribution works
Project Management Area	Federal land and water areas under the primary jurisdiction of the Department of the Interior, Bureau of Reclamation
Project Management Boundary	Boundary of the Project Management Area
Recreation Park Manager	Term used to represent entity under contract with Reclamation to manage recreation resources; currently is State Parks.

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Appendix A

List of Environmental Commitments

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List of Environmental Commitments

The following environmental commitments (mitigation measures) will be implemented to offset potential effects to environmental resources within the Project Management Boundary. The following measures apply to all alternatives.

- Prior to the initiation of any federal undertaking within the Project Management Boundary, all cultural resources sites within the undertaking APE area will be evaluated for their NRHP eligibility. The significance criteria applied to evaluate cultural resources defined in 36 CFR 60.4 is defined as follows:

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and

 - A. That are associated with events that have made a significant contribution to the broad patterns of our history; or
 - B. That are associated with the lives of persons significant in our past; or
 - C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
 - D. That has yielded, or may be likely to yield, information important in prehistory or history.
- If historic properties are located within the undertaking APE, and if they will be adversely affected by activities associated with the undertaking, a Memorandum of Agreement (MOA) will be developed. The MOA would be among, Reclamation, the Utah State Historic Preservation Office (SHPO), the Advisory Council on Historic Preservation (ACHP), if it chooses to participate, and any other party that assumes responsibility under the agreement. The MOA would include the terms and conditions agreed upon to resolve the adverse effects of the undertaking upon historic properties.
- Any person who knows or has reason to know that he/she has inadvertently discovered possible human remains on federal land, he/she must provide immediate telephone notification of the discovery to Reclamation's Provo Area Office archaeologist. Work would stop until the proper authorities are able to assess the situation onsite. This action would promptly be followed by written confirmation to the responsible federal agency official, with respect to federal lands. The Utah SHPO and interested Native American tribal representatives would be promptly notified. Consultation would begin immediately. This requirement is prescribed under the Native American

Graves Protection and Repatriation Act (43 CFR Part 10); and the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470).

- Should vertebrate fossils be encountered by the proponent prior to or during ground disturbing activities, construction must be suspended immediately. Reclamation's Provo Area Office archaeologist should be contacted and work in the area of discovery shall cease until a qualified paleontologist can be contacted to assess the find.
- Best Management Practices (BMP) will be practiced to prevent sediment from leaving construction sites and entering the reservoir. Existing state and federal laws and regulations require sediment to be controlled on all construction sites. Following completion of construction stabilization, measures such as revegetation should be instituted to prevent erosion.
- Any construction of one or more acres of land must be authorized under the State of Utah UPDES Storm Water General Permit for Construction Activities, Permit No. UTR300000. Each General Permit requires that a Storm Water Pollution Prevention Plan (SWPPP) be developed for each construction project covered by Storm Water General Permit.
- Erosion control plans and re-vegetation plans will be developed and implemented in project-specific NEPA compliance.
- When constructing roads and trails, steep slopes and areas already prone to landslides, should be avoided where possible. Specific measures to stabilize landslide potential slopes will need to be identified in the project-specific NEPA compliance.
- To minimize water quality impacts from additional development and increased use, Reclamation and CUWCD will continue to monitor Jordanelle Reservoir and new facilities will be designed to prevent water quality impacts. Site-specific NEPA compliance will need to occur to prevent water quality impacts due to a specific project.
- Reclamation and the Recreation Park Manager would routinely monitor the effectiveness of their programs to control invasive zebra mussel and quagga mussel. Management practices at boat launches and marinas would be adapted to control the introduction and spread of these invasive species following guidelines specified in the Utah Aquatic Invasive Species Management Plan.
- Reclamation would require all construction activities to be reviewed for compliance with the federal Migratory Bird Treaty Act (16 U.S.C. 703 et seq.). This Act authorizes the USFWS to regulate the taking, either intentionally or unintentionally, of migratory birds. Migratory birds protected under this Act include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows, and other species. Their body parts, nests, and eggs are also

protected under this Act. A complete list of protected species is identified in 50 CFR 10.13.

- Reclamation would consult with USFWS, the Mitigation Commission and UDWR to reevaluate the management objectives and accomplishments at the West Hills WMA, and make any necessary adjustments to ensure that the 1987 mitigation commitments are being fulfilled.
- Reclamation would require all construction activities to be reviewed for compliance with the federal Threatened and Endangered Species Act (16 U.S.C. 1531 et seq.). Reclamation would require activities that would disturb previously undeveloped habitats to be delineated for wetlands, riparian and wet meadow habitats, and evaluated for potential effects to currently-listed threatened, endangered, and special status species. The USFWS and UDWR would be consulted and potential impacts would be mitigated, as necessary, to ensure compliance with applicable rules, regulations, and agreements.
- Construction sites would be closed to public access. Temporary signs and fencing would be installed when appropriate to prevent public access. Construction would be scheduled during periods of low use, to the practical extent.
- Reclamation's Provo Area Office would ensure compliance with the environmental commitments.
- Reclamation would mitigate for all adverse effects of the implementation of the selected alternative on the fish and wildlife resources. Specific measures would be determined in consultation with the Mitigation Commission, USFWS, and UDWR.

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Appendix B

Distribution List

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Distribution List

Bruce Juhl
All Seasons Adventures
4000 Canyons Resort Dr.
PO Box 680547
Park City, UT 84098
info@allseasonsadventures.com
435-649-9619

Jack Prescott
Back Country Horsemen
High Uintah Chapter
PO Box 1230
Kamas, UT 84036
jrpscott@allwest.net
435-640-1088

Dick Walter
Back Country Horsemen
High Uintah Chapter
PO Box 1230
Kamas, UT 84036
coverallutah@gmail.com
435-640-5532

Tom White
Back Country Horsemen
High Uintah Chapter
PO Box 1230
Kamas, UT 84036
twwpi@yahoo.com
435-640-6503

Jeffrey Gardner
Boy Scouts of America
Old English Fort District
4823 Taylors Park Dr.
Taylorsville, UT 84123
801-550-2649

Kevin Gullede
Boy Scouts of America
Pony Express District
348 S. 1575 W.
Lehi, UT 84043
801-787-3712

Randell Keys
Boy Scouts of America
Bridal Veil Falls District
1475 N. 1130 W.
Orem, UT 84057
801-432-6222

Brent Lundberg
Boy Scouts of America
Lone Peak District
1933 E. Brandon Park Way
Sandy, UT 84092
801-582-3663

Trever Mozingo
Boy Scouts of America
Eagle Peaks District
11862 Elm Ridge Rd
Sandy, UT 84094
801-652-1636

Greg Phillips
Boy Scouts of America
Silver Mesa District
525 Foothill Blvd
Salt Lake City, UT 84113
801-582-3663

Mr. Daniel Picard, Superintendent
Bureau of Indian Affairs
Uintah and Ouray Agency
PO Box 130
Fort Duchesne, UT 84026

Environmental Assessment for
Jordanelle Reservoir Resource Management Plan

Mr. Dean Box, Superintendent
Bureau of Indian Affairs
Fort Hall Agency
PO Box 220
Fort Hall, ID 83203

Chris Elison
CUWCD
355 W. University Pkwy
Orem, UT 84058
chrise@cuwcd.com

Jared Hansen
CUWCD
355 W. University Pkwy
Orem, UT 84058
jhansen@cuwcd.com
801-226-7152

Reed Oberndorfer Ph.D., Water
Quality Director
CUWCD
355 W. University Pkwy
Orem, UT 84058
reed@cuwcd.com
801-226-7160

Paul Pierpont
CUWCD
355 W. University Pkwy
Orem, UT 84058
paul@cuwcd.com
801-226-7190

Sarah Sutherland
CUWCD
355 W. University Pkwy
Orem, UT 84058
sarah@cuwcd.com
801-226-7147

Brooke Hontz
Daly Summit Consulting
PO Box 2128
Park City, UT 84060
brooke@dalysumit.com
435-640-1941

Stan Castleton, CEO
DDRM Companies
333 Main Street 3rd Floor
Park City, UT 84060
srcastleton@ddrmgp.com
435-655-3288 ex. 202

Alane Boyd
Desert Rose Environmental
3258 W. Big Spruce Way
Park City, UT 84098
alane@desertroseenv.com
801-580-9692

Betsy Herrmann
Fish and Wildlife Service
Utah Field Office
2369 W Orton Circle, Suite 50
West Valley, UT 84119
betsy_herrmann@fws.gov
801-975-3330x139

Jay Franson, P.E.
Franson Civil Engineers
1276 S. 820 E., Ste 100
American Fork, UT 84003
jfranson@fransoncivil.com
801-756-0309

Layne Jensen, P.E.
Franson Civil Engineers
1276 S. 820 E., Ste 100
American Fork, UT 84003
ljensen@fransoncivil.com
801-756-0309

Lauren Ploeger, P.E.
Franson Civil Engineers
1276 S. 820 E., Ste 100
American Fork, UT 84003
lploeger@fransoncivil.com
801-756-0309

Monique Robbins, P.E.
Franson Civil Engineers
1276 S. 820 E., Ste 100
American Fork, UT 84003
mrobbins@fransoncivil.com
801-756-0309

Tom Minahan
Friends of Jordanelle State Park
1375 W. Quail Meadows Dr. #22
Park City, UT 84098
tom.minahan@gmail.com

Dennis Wenger
Frontier Corp. USA
221 N. Gateway Drive, Suite B
Providence, UT 84332
dwenger@frontiercorp.net
435-753-9502

Judy Edwards
Governor's Office of Public Land
Policy Coordination
5110 State Office Building
Box 141107
Salt Lake City, UT 84114
judyedwards@utah.gov
801-537-9023

Chris Hudon Partner
Grey Duke
6300 N Sagewood Dr., Suite 459
Park City, UT 84098
Chris@greduke.com
435-729-0194

Randy Olshen
H2O Overdrive
128 W. 320 S., Ste B204
Kamas, UT 84036
rolshen@ihs4life.com
888-426-4104 x708

Mayor David Phillips
Heber City
75 N. Main St.
Heber City, UT 84032

Richard Boulter
Heber Valley Chamber of Commerce
475 N. Main
Heber City, UT 84032
rboulter@co.wasatch.ut.us
435-654-0353

Mr. Jay Henrie
Henrie Engineering
1829 S. 100 W.
Orem, UT 84058
henrieengineering@gmail.com
801-885-7444

Mayor Bob Martino
Hideout City
10860 N. Hideout Trail
Hideout, UT 84036
mayor@hideoututah.gov
Mustangprp@aol.com
801-209-7370

Dean Heavrin
Hideout City
10860 N. Hideout Trail
Hideout, UT 84036
dheavrin@outlawgc.com

High Altitude Wakeboarding
4252 W. Sunrise Dr.
Park City, UT 84098
435-901-8522

Environmental Assessment for
Jordanelle Reservoir Resource Management Plan

Peter Pillman, Director
IBI group
10 Exchange Place, Suite 112
Salt Lake City, UT 84111
ppillman@ibigroup.com
801-532-4233

Ray Whitchurch, Associate
IBI group
10 Exchange Place, Suite 112
Salt Lake City, UT 84111
rwhitchurch@ibigroup.com
801-532-4233

Steve Jackson
Jackson Engineering
3376 Stonehill Lane
Cottonwood Heights, UT 84121
steve@jackson-engineering.com
801-558-5293

Shazelle Terry
JVWCD
15305 South 3200 West
Herriman, UT 84003
shazellet@jvwcd.org
801-446-2004

Mr. Dan Matthews, Manager
Jordanelle Special Service District
10420 N. Jordanelle Blvd, Ste A
Heber City, UT 84032

Mr. Glenn Vanwagner, Chair
Jordanelle Special Service District
10420 N. Jordanelle Blvd, Ste A
Heber City, UT 84032

Laurie Backus
Jordanelle State Park
SR 319 #515
Box 4
Heber City, UT 84032
lauriebackus@utah.gov
435-649-9540

Tyler Fields
Lofty Peaks Adventures
Jordanelle Rentals
5175 E. SR 35
Kamas, UT 84036
basledhead@yahoo.com
435-615-7397

Wynn Passey
Lofty Peaks Adventures
Jordanelle Rentals
5175 E. SR 35
Kamas, UT 84036
wpassey@comcast.net
435-615-7397

Brinton Passey
Lofty Peaks Adventures
Jordanelle Rentals
5175 E. SR 35
Kamas, UT 84036
435-615-7397

Randy Casper
Marine Products
949 W. 1700 S.
Salt Lake City, UT 84104
randy@marine-products.com
801-209-4823

Shawn Seager, AICP, Senior Planner
Mountainland Association of
Governments
586 E. 800 N.
Orem, UT 84093
shawn.seager@gmail.com
801-229-3837

Kristen Caldwell
National Ability Center
1000 Ability Way
PO Box 682799
Park City, UT 84068
kristenc@discovernac.org
435-200-0994

Environmental Assessment for
Jordanelle Reservoir Resource Management Plan

Honorable Gwen Davis,
Chairwoman
Northwestern Band of Shoshoni
Nation of Utah
707 North Main Street
Brigham City, UT 84302

Honorable Dana Williams, Mayor
Park City
445 Marsac Avenue
Park City, UT 84060

Buster Pike
Park City Laser Sailing Association
4363 Willow Creek Drive
PO Box 981236
Park City, UT 84098
buster.pike@bigredant.com
435-659-1360

Heinrich Deters
Park City Municipal Corporation
P.O. box 2711
Park City, UT 84060
hdeters@parkcity.org
435-615-5205

Park City Office
333 Main Street, Suite 325
P.O. Box 4151
Park City, Ut 84060

Niklaus Hess
Park City Rowing Academy
7397 Brook Hollow Loop Rd
P.O. Box 980174
Park City, UT 84098
pcrowingacademy@gmail.com
801-245-9351

Geoff Hurwitch, President
Park City Sailing Association
geoffh437@yahoo.com
435-659-6641

Mr. Keith Denos
Provo River Water Users Assoc.
285 W. 1100 N.
Pleasant Grove, UT 84062

Robyn MacDuff
Director
Raptor Inventory Next Survey
8804 Tracy Drive
Sandy, UT 84093
rmacduff@rins.org
801-571-1470

Wayne Peay
RINS
8804 Tracy Drive
Sandy, UT 84093
wayneipeay@gmail.com
801-910-4397

Joseph Donnell Park Manager
Rockport State Park
josephdonnell@utah.gov
435-336-2241

Lucy Minahan
Sailing on the Jordanelle
1375 W. Quail Meadows Dr., #22
Park City, UT 84098
lucymin@comcast.net
435-640-9266

Barry Walker
South Summit School District
375 E. 300 S.
Kamas, UT 84036
bw@ssummit.org
435-783-4301

Janine Donald
SPLORE
774 E. 3300 S., #105
Salt Lake City, UT 84106
janined@splore.org
801-484-4128

Environmental Assessment for
Jordanelle Reservoir Resource Management Plan

State of Utah, Governor's Office of
Planning & Budget
Resource Development Coordination
Committee
116 State Capitol Building, Ste E210
Salt Lake City, UT 84114

Arie C. Bogerd
Stichting Mayflower
Recreational/Mountain Ford
P.O. Box 100
4140 AC Leerdam
Netherlands
mayfinance@solcon.nl
011-31-345-615353

Mr. Bob Richer, Chair
Summit County Commission
1223 Angus Court
Park City, UT 84060

Chris Bowerbank, Race Director
Summit Event Management
TriUtah
400 W. 2875 N.
Lehi, UT 84043
chris@triutah.com
801-631-2614

Chris Santacroe
Super Fly Inc.
Park City Paragliding
8683 Sandy Pkwy
Sandy, UT 84070
chris@superflyinc.com
801-706-6076

Steve Luker
Talisker Club Activities
Tuhaye Sales Gallery
10105 N Tuhaye Park Dr
Tuhaye, UT 84036
activities@taliskerclub.com
435-659-9778

Lee Roy Farrell
Director of County Affairs
Talisker Mountain Inc.
lfarrell@taliskermountain.com

Michelle Breinholt
Treasure Mountain International
School
2530 Kearns Blvd
Park City, UT 84060
mbreinholt@pcschoools.us
435-645-5640

Chris Crockett
UDWR
1115 North Main Street
Springville, UT 84663
chriscrockett@utah.gov
801-491-5655

Mr. Jason Gipson, Chief
US Army Corp of Engineers
Regulatory Branch
533 W. 2600 S., Ste 150
Bountiful, UT 84010

Mr. Scott Stoddard
US Army Corp of Engineers
Sacramento Division
533 W. 2600 S., Ste 150
Bountiful, UT 84010

Ms. Nancy Coulam
US Bureau of Reclamation
Upper Colorado Regional Office
125 S. State Street, Rm 6107
Salt Lake City, UT 84138

Peter Crookston
US Bureau of Reclamation
302 E. 1860 S.
Provo, UT 84606
pcrookston@usbr.gov
801-379-1152

Lynn Hansen
US Bureau of Reclamation
DOI - CUPCA
302 E. 1860 S.
Provo, UT 84606
lhansen@usbr.gov
801-379-1238

Valerie Heath-Harrison
US Bureau of Reclamation
125 South State Street, Room 6107
Salt Lake City, UT 84138
vheathharrison@usbr.gov
801-524-3664

Brian Joseph
US Bureau of Reclamation
302 E. 1860 S.
Provo, UT 84606
bjoseph@usbr.gov
801-379-1082

Mr. Kerry Schwartz
US Bureau of Reclamation
302 E. 1860 S.
Provo, UT 84606
kschwartz@usbr.gov
801-379-1150

Mr. John Sterzer
US Bureau of Reclamation
302 E. 1860 S.
Provo, UT 84606
jsterzer@usbr.gov
801-379-1070

Larry Crist, Field Supervisor
US Fish & Wildlife Service
2369 Orton Cir, Ste 50
West Valley, UT 84119
larry_crist@fws.gov
801-975-3330

Representative Jason Chaffetz
US House of Representatives
51 S. University, Ste 318
Provo, UT 84601

Representative James Matheson
US House of Representatives
240 E. Morris Ave, Ste 235
South Salt Lake, UT 84115

Aly Brooks
US TriSports
Race Management
11508 Blue Rise Ave
South Jordan, UT 84095
aly@ustrisports.com
801-699-4030

Louis Melini
Utah Bicycle Touring Society
3348 Louise Ave
Salt Lake City, UT 84109
lvmelini@comcast.net
801-487-6318

Mr. Paul Dremann, Vice President
Utah Council Trout Unlimited
2348 Lynwood Drive
Salt Lake City, UT 84109

Sonia Witte
Utah Crew
Great Salt Lake Rowing
510 14th Avenue
Salt Lake City, UT 84103
soniawitte@gmail.com
801-440-4542
801-649-3857

Mr. Walter Baker, Director
Utah Dept of Environmental Quality
Utah Division of Water Quality
PO Box 144870
Salt Lake City, UT 84114-4870

Ms. Dianne Nielson, Executive
Director
Utah Dept of Environmental Quality
195 North 1950 West, 4th Floor
PO Box 144810
Salt Lake City, UT 84114-4810

Environmental Assessment for
Jordanelle Reservoir Resource Management Plan

Evan Freeman, Aquatic Nuisance
Species Biologist
Utah Dept of Natural Resources
777 SR 319
Heber City, UT 84032
evanfreeman@utah.gov
435-649-9368

Sarah Lindsey
Utah Dept of Natural Resources
1594 W. North Temple
PO Box 145610
Salt Lake City, UT 84114-5610
saralindsey@utah.gov
801-538-4759

Mr. Michael Styler, Executive
Director
Utah Dept of Natural Resources
1594 W. North Temple
PO Box 145610
Salt Lake City, UT 84114-5610

Scott White, Lieutenant
Conservation Officer
Utah Dept of Natural Resources
Central Region
1115 N. Main St.
Springville, UT 84463
scottwhite@utah.gov
801-491-5678

Mr. Mark Bridleson
Utah Division of Drinking Water
PO Box 144830
Salt Lake City, UT 84114-4830

Mr. Dave Wham, Watershed
Coordinator
Utah Division of Water Quality
195 North 1950 West
PO Box 144870
Salt Lake City, UT 84114-4870

Mr. Eric Millis, Deputy Directory
Utah Division of Water Resources
1594 West North Temple, Suite 310
PO Box 146201
Salt Lake City, UT 84114-6201

Mr. Todd Sonely
Utah Division of Water Resources
1594 West North Temple, Suite 310
PO Box 146201
Salt Lake City, UT 84114-6201

Mr. Dennis Strong, Director
Utah Division of Water Resources
1594 West North Temple, Suite 310
PO Box 146201
Salt Lake City, UT 84114-6201

Mr. Boyd Clayton, Acting State
Engineer
Utah Division of Water Rights
1594 West North Temple, Suite 220
P.O. Box 146300
Salt Lake City, UT 84114-6300

Mr. Ross Hansen
Utah Division of Water Rights
1594 West North Temple, Suite 220
PO Box 146300
Salt Lake City, UT 84114-6300

Ashley Green
Utah Division of Wildlife Resources
Central Region
1115 N Main St
Springville, UT 84463
ashleygreen@utah.gov

Mr. James Karpowitz Director
Utah Division of Wildlife Resources
1594 W. North Temple, Suite 2110
PO Box 146301
Salt Lake City, UT 84114-6301

Doug Sakaguchi
Utah Division of Wildlife Resources
Central Region
1115 N. Main St.
Springville, UT 84463
dougsakaguchi@utah.gov
801-491-5653

Michael Slater
Utah Division of Wildlife Resources
Central Region
1115 N. Main St.
Springville, UT 84463
michaelslater@utah.gov
801-491-5650

Utah Division of Wildlife Resources
Northern Region
515 E. 5300 S.
Ogden, UT 84405

Rebekka Stone
Utah Paddle Surfing
PO Box 1753
Salt Lake City, UT 84110
utahpaddlesurfing@gmail.com
801-359-7873

Mark Holden
Utah Reclamation Mitigation and
Conservation Commission
230 S. 500 E., #230
Salt Lake City, UT 84102
mholden@usbr.gov
801-524-3146

Jamie Dalton
Utah State Parks
1594 W. North Temple #116
PO Box 146001
Salt Lake City, UT 0
jdalton@utah.gov
801-538-7207

Derek O'Donnell
Utah State Parks
1594 W. North Temple #116
PO Box 146001
Salt Lake City, UT 0
derekodonnell@utah.gov

Mr. Jim Harland, Region Manager
Utah State Parks & Recreation
SR 319 Box 3
Heber City, UT 84032

Jeff Rasmussen
Utah State Parks & Recreation
1594 W North Temple
PO Box 146001
Salt Lake City, UT 84114
jeffrasmussen@utah.gov
801-870-7138

Leon Tate
Utah State Parks & Recreation
1594 W North Temple
PO Box 146001
Salt Lake City, UT 84114
leontate@utah.gov

Mary Tullius, Director
Utah State Parks & Recreation
1594 W. North Temple #116
PO Box 146001
Salt Lake City, UT 84114-6001
marytullius@utah.gov
801-538-7336

Susan Zarekarizi
Utah State Parks & Recreation
1594 W North Temple
PO Box 146001
Salt Lake City, UT 84114
susanzarekarizi@utah.gov
801-538-7496

Environmental Assessment for
Jordanelle Reservoir Resource Management Plan

Honorable Richard Jenks, Chairman
Ute Indian Tribe of the Uintah and
Ouray Reservation
PO Box 190
Fort Duchesne, UT 84026

Keith Bevan
Valley Mental Health ARTEC
6200 S. 3809 W.
Kearns, UT 84118
keithb@vmh.com
801-541-7383

Neil Anderton, Council Member
Wasatch County
25 N. Main St.
Heber City, UT 84032

Kip Bangerter, Council Chair
Wasatch County
25 N. Main St.
Heber City, UT 84032

Kent Berg
Wasatch County
Public Works
1891 W. 3000 S.
Heber City, UT 84032
kberg@co.wasatch.ut.us
435-654-1661

Kendall Crittenden, Council Member
Wasatch County
25 N. Main St.
Heber City, UT 84032

Mike Davis, County Manager
Wasatch County
25 N. Main St.
Heber City, UT 84032
mdavis@co.wasatch.ut.us
435-657-3180

Val Draper, Council Member
Wasatch County
25 N. Main St.
Heber City, UT 84032
vwdraper@yahoo.com
435-657-3195

Steve Farrell, Council Member
Wasatch County
25 N. Main St.
Heber City, UT 84032
sbfarrell325@msn.com
435-657-3195

Mike Kohler, Council Member
Wasatch County
25 N. Main St.
Heber City, UT 84032
mikekohler2009@gmail.com
435-657-3195

Quintin Lewis
Wasatch County
Public Works Weed Control
1891 W. 3000 S.
Heber City, UT 84032
qlewis@co.wasatch.ut.us
435-654-1661

Al Mickelsen, Planning
Wasatch County
25 N. Main St.
Heber City, UT 84032
amickelsen@co.wasatch.ut.us

Jay Price, Council Member
Wasatch County
25 N. Main St.
Heber City, UT 84032

Bob Riddle, Environment
Wasatch County
25 N. Main St.
Heber City, UT 84032
rriddle1227@msn.com

Steve Smith
Wasatch County
Public Works Weed Control
1891 W. 3000 S.
Heber City, UT 84032
ssmith@co.wasatch.ut.us
435-654-1661

Doug Smith
Wasatch County
188 S Main
Heber City, UT 84032
dsmith@co.wasatch.ut.us
435-657-3205

Dwight Hill
Wasatch County Health Department
55 S. 500 E.
Heber City, UT 84032
dwighth@utah.gov
435-657-3261

Sheriff Todd Bonner
Wasatch County Sheriff's Office
1361 S. Highway 40
Heber City, UT 84032
tbonner@wasatchso.state.ut.us

Luke Peterson, Director
Wasatch Tourism & Development
475 N. Main
Heber City, UT 84032
lpeterson@co.wasatch.ut.us
435-654-3666

Ryan Starks, Director
Wasatch Tourism & Development
475 N. Main
Heber City, UT 84032
rstarks@gohebervalley.com

Mr. Mark Anderson, Assistant
General Manager
WBWCD
2837 E. Highway 193
Layton, UT 84040

Timothy Fehr
Wildlife Protection Society/Ular
Projects Consulting
ular@earthlink.net
435-640-8030

Roy Bartee
10315 Eastdell Dr
Sandy, UT 84092
rbartee@barteellc.com
801-599-7772

Senator Robert Bennett
Wallace F Bennet Federal Building
125 S. State St., Ste 4225
Salt Lake City, UT 84138

Sarah Byer
83 H Street
Salt Lake City, UT 84103
801-232-5655

Matt Carollo
PO Box 681564
Park City, UT 84068
matt@fischerproductions.com
435-714-9666

Kathy Donnell
55 E. 400 S.
Kamas, UT 84036
kathydonnell@utah.gov
435-782-3030

Craig Eroh
40 St. Moritz Terrace
Park City, UT 84098
mtnluddite@yahoo.com
435-729-9096

Emily Gaines
12052 Mill Ridge Circle
Sandy, UT 84094
emilygaines1@yahoo.com
338-4091

Environmental Assessment for
Jordanelle Reservoir Resource Management Plan

Jim Gibson
827 Bridle Way
Oakley, UT 84055
jgibson82@hotmail.com
435-640-0963

Brent Hall
bhall@ddrmgp.com

Senator Orrin Hatch
8402 Federal Building
125 S. State St.
Salt Lake City, UT 84138

Hugh Hurlow
2760 S Dearborn St
Salt Lake City, UT 84106
mhhurlow@msn.com
801-467-7136

Michael Kennedy-Yoon
601 D Street
Salt Lake City, UT 84103
801-554-3311

Jeremy King
307 East 500 South
Salt Lake City, UT 84111
jking@njraarchitects.com
801-364-9259

Mike Kisow
1736 W. FoxBay Dr. #G104
Heber City, UT 84032
mikekisow@gmail.com
412-596-3589

Mr. Tom McKay
67 E. 200 N.
Heber City, UT 84032
tossmkay@gmail.com
801-550-1241

Normandie Mindheim
131 S. 1850 E.
Heber City, UT 84032
mindheim@xmission.com
435-657-2513

Nick Ondrejka
PO Box 981897
Park City, UT 84098
nick@ondrejka.com
435-487-9029

Bill Rusconi
1739 Walker Court
Park City, UT 84098
wrusconi@myriad.com
801-584-3525

Shawnee Loris Sawyer
Kamas, UT 84036
shawneeloris@hotmail.com

Ralph Sawyer
1431 Beacon Dr
Salt Lake City, UT 84108
rts_pc@yahoo.com
801-583-2882

Mr. Cris Schulz
8001 Parleys Lane
Park City, UT 84098

Nick and Sue
nickandsue@yahoo.com

Christopher Stokes
1649 S 500 E
Bountiful, UT 84010
ccstokes@netzero.com
801-631-2741

Stokes Family
1649 S 500 E
Bountiful, UT 84010
801-397-7097

Environmental Assessment for
Jordanelle Reservoir Resource Management Plan

Carol Sweeney
214 D Street
Salt Lake City, UT 84103
sweeneycarol@yahoo.com
801-332-1369

Tom Wheelwright
8665 S Kenwood Ln
Tempe, AZ 85284
samwheelwright@juno.com
480-203-1120

Valerie Thurnell
1067 S 500 E A203
Heber City, UT 84032
valerie.thurnell@wasatch.edu
435-640-9840

Joseph Yost
207 5th Ave
Salt Lake City, UT 84103
utahpiper@yahoo.com
801-355-0546

Jeff Unruh
1570 Harrison
Salt Lake City, UT 84105
801-582-6137

Julie
1403 Quail Meadow Rd. #16
Park City, UT 84098
Jumin1@aol.com
435-640-8642

Jim Wahl
10807 North Hideout Trail
Hideout, UT 84036
jwahl@outlawgc.com
760-567-6147

Kelly
kelly@americanparknetwork.com

Meredith Wade
136 U Street
Salt Lake City, UT 84103
801-864-4699

Mitchell Wade
136 U Street
Salt Lake City, UT 84103
mitchell@institute3.org
801-696-4486

Suzanne Walther
485 East 1600 North
Orem, UT 84097
suzwalt@yahoo.com
801-400-6650

Tom Ward
2110 Belle Starr Ct
Park City, UT 84060
tward@xmission.com
435-647-3727

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Appendix C

Public Comments and Responses

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Public Comments and Responses

Comment 1: Central Utah Water Conservancy District

Comment 1

The Central Utah Water Conservancy District (CUWCD) appreciates the opportunity to provide comments on the Draft Environmental Assessment (EA) and Resource Management Plan (RMP) for the Jordanelle Reservoir. As the entity that operates Jordanelle dam and reservoir, CUWCD is very interested in this project.

General Comments on the EA

Primary and Secondary purposes of Jordanelle —

- 1) Be consistent in text and in tables when referencing the Primary and Secondary purposes of Jordanelle. We like the definition on page 1-1 of the EA, with the exception of listing supplemental irrigation as a secondary purpose since it is already listed as a primary purpose as "agricultural".
- 2) It would be good to emphasize that water operations including timing of deliveries, flood control, water rights, water contracts, hydropower, and water quality should not be impacted in any way by any proposed actions of this document.

We would like language added throughout the documents about the State Park helping out with security monitoring of the Primary Jurisdiction Zone along the buoys to keep people away from the dam.

Water Resources Section — Consider whether this level of detail is necessary for this document. If it is included, the information needs to be accurate. Pgs. 3-10 through 3-15.

It might be good to mention that in a full flood control situation some of the park facilities would be under water.

General Comments on the RMP

In Section 1.7, Project History and Uses, second paragraph, change to, "...Salt Lake County by way of the Provo River, Olmsted and Jordan Aqueducts,". This should be referenced this way throughout the documents.

Correct last paragraph concerning the water exchange with Utah Lake being equal to that withheld in Jordanelle Reservoir. Make sure this concept is correct everywhere in the documents.

Pg. 2-4, Sec. 2.4, Management Opportunities and Constraints, we suggest that you separate the constraints from the opportunities throughout the document and reiterate that the opportunities cannot affect the constraints. Constraints would include water rights, water contracts, water quality, hydropower and Primary Jurisdiction Zone security.

Beginning on pg. 3-9, Section 3.2, Water Resources, same comment as for the EA, decide if this level of detail is necessary and if it is, make sure all of the information is accurate.

Specific Comments on the EA

Pg. 1-11, Sec. 1.4.1, Jordanelle Dam — change 3rd sentence to read, "within the reservoir to optimize water quality and temperature in the Provo River below the dam." Delete the next sentence about regulating water temperatures for fish.

Pg. 1-19, Sec. 1.5, remove last two sentences about the Francis and Heber Sub-Area documents since they are explained in detail in following two sections.

Pg. 1-20, Sec. 1.5.2, correct language since the Final EA has been completed and the FONSI was signed as of September 2011.

Pg. 2-9, Sec. 2.3.7, and pg. 2-15, Sec. 2.4.7, add language about State Park helping with security of the Primary Jurisdiction Zone.

Pg. 2-8, Sec. 2.3.5, consider allowing RV camping in Alternative A or at least make the camp ground accessible to vehicles at each camp site for "car camping".

Pg. 4-8, Sec. 4.2.2, considering adding language about getting water from JSSD.

Pg. 4-11, last paragraph, change "should remain" to "must remain at acceptable levels to meet the requirements for the designated beneficial uses of the water."

Pg. 4-51, Table 4-1, Water Resources, add option to receive water from JSSD.

Specific Comments on the RMP

Inside cover on both documents — CUWCD's mission statement should read, "...to responsibly develop, conserve, and deliver water."

Pg. 1-20, Sec. 1.8, 4th paragraph, change wording to, "Management within the Primary Jurisdiction Zone is the responsibility of CUWCD with oversight by Reclamation to provide..."

Pg. 1-22, determine if this level of detail is needed, and if so, information should be accurate.

Pg. 2-6, Issue B2: Water Operations, the actual lowest point for inflow into Jordanelle is towards the end of March or right before spring runoff begins to exceed the minimum instream flows.

Pg. 2-8, Issue C4: Use Conflicts, consider adding enforcement of keeping boaters out of the Primary Jurisdiction Zone.

Pg. 2-12, Issue G1 : Security, this would be a good place to add language about the State Park helping with enforcing the security of the Primary Jurisdiction Zone.

Pg. 4-3, Table 4-1, B. Water Resources, should include Secondary Purposes so flood control is captured as well.

Pg. 4-21, Table 4-2, Water Resources, Reservoir Water Level Fluctuations, should read, "...water operations agreement and flood control requirements to control water operations."

Thank you for your consideration of these comments. Please contact me at 801-226-7147 for any discussion of these matters.

***Sarah Sutherland (Environmental Programs Manager,
Central Utah Water Conservancy District, Orem, Utah)***

Response to Comment 1

Responses to "General Comments on the EA"

Modifications were made to ensure consistency when referencing the primary and secondary purposes of Jordanelle in both the EA and RMP. The primary purposes are listed as municipal, industrial, and agricultural purposes. The secondary purposes include recreation, fish and wildlife, flood control and power.

The following was added to the Preface of the EA and RMP documents: *"Water operations including timing of water deliveries, flood control, water rights, water contracts, hydropower, and water quality would not be impacted in any way by any proposed actions of this document."*

The following language was added to the EA and RMP: *"Recreation Park Manager will assist with security monitoring along the buoys to keep people away from the dam."*

Language was added to the EA and RMP to clarify that under flood control situations, park facilities could be inundated.

Responses to “General Comments on the RMP”

Section 1.7 comments: the Project History and Uses section was simplified in the RMP, and similar changes were made throughout the documents.

Section 2.4 comment: Opportunities and Constraints were separated.

Section 3.2 comment: Information in this section was simplified and is accurate according to the information that was provided by CUWCD and Reclamation.

Responses to “Specific Comments on the EA”

The recommended edits were made to the comments on the following pages: pg. 1-11, Section 1.4.1; pg. 1-19, Section 1.5; pg. 1-20, Section 1.5.2; pg. 2-9, Section 2.3.7; pg. 2-15, Section 2.4.7; pg. 4-8, Sec. 4.2.2; pg. 4-11; and pg. 4-51, Table 4-1.

Changes were not made to following comments:

Pg. 2-8, Section 2.3.5 regarding car camping. This issue had previously been discussed during the scoping meetings and with the Coordination Team. Reclamation and State Parks are sensitive to the intended purpose and vision of the Rock Cliff Recreation Area and feel that the Preferred Alternative should consider alternative camping methods but not dictate them.

Responses to “Specific Comments on the RMP”

The recommended edits were made to the comments on the following pages: inside cover of EA and RMP; pg 1-20, Section 1.8; pg 1-22; pg 2-6, Issue B2; pg 2-8, Issue C4 combined with pg 2-12, Issue G1, pg 4-3, Table 4-1; and pg 4-21, Table 4-2.

Comment 2: Mitigation Commission

Comment 2

1. The caption on Photo 1-7 has a typo. *Photo 1-7: Crandall Point and Hailstone Recreation Area looking West* ~~Photo 1-4~~

2. Second paragraph, *West Hills Wildlife Management Area Operating Agreement Contract No. N/A, Dated 11/18/1992*, page 1-21:

“According to the agreement, UDWR’s main objectives for the West Hills WMA are to improve habitat for the big game (deer and elk) and sage-grouse, protection for golden eagle breeding and nesting habitat, development of public access to

include parking areas, fencing as needed for the UDWR's management, informational signing, and terrestrial habitat improvements including water developments and range improvements. These objectives are consistent with Reclamation's mitigation commitments. Reclamation ~~is~~ was responsible for funding the management objectives, and the UDWR is now responsible for the long-term management and operation of the WMA."

3. Page 1-23, "*Provo Area Office Access Management Policy for Jordanelle Reservoir Draft Dated 01/21/2000*"

It is not clear what the purpose of including this document reference is. It is a Draft; does it have any force or effect? Was it acted upon by the Parks and Rec Board? And if so, what effect does that have on Reclamation?

4. The document is ambiguous with respect to hydropower as a "secondary project purpose", or not (I think it "is not"). On Page 1-8, under "1.7 Project History and Uses", in the 3rd paragraph, it states (emphasis added):

"Secondary purposes of Jordanelle Reservoir include public recreation, flood control protection to communities downstream of the Provo River, drought relief, fish and wildlife mitigation and enhancement, and supplemental irrigation water. The project includes a total of 15,100 ac-ft/year of supplemental irrigation water, which includes 3,000 ac-ft/year that is used by exchange in the Francis Sub-Area above Jordanelle Reservoir. Power generation at Jordanelle Dam is authorized by DOI under a "lease of power privilege".

On Page 2-6, in the second paragraph under "Issue B2: Water Resources" it states (emphasis added):

"Secondary purposes of Jordanelle Reservoir are recreation, fish and wildlife mitigation and enhancement, power generation, flood control, drought relief, and water for supplemental irrigation. As stated above, the reservoir is operated first for water supply and second for the benefit of these other important project purposes. For example, power is generated on the water that is released for water supply rather than releasing water to optimize power generation. Recreation and fish and wildlife benefits are derived as the reservoir is operated for water supply. Flood control operation of the reservoir can be accomplished without adversely impacting the water supply."

It is our understanding that power generation is not a Secondary Project Purpose. Our understanding may not be correct, but we feel it is important to be accurate about this. Hydroelectric development at Jordanelle is non-federal, through a lease with the Federal government. The July, 2005 Final Environmental Assessment for Jordanelle Dam Hydroelectric Project states on Page 1-2 that one of the project purposes is to:

- Generate hydroelectric power as an incidental use to the delivery of water for CUP purposes, which include municipal and industrial water supply, irrigation supply, flood control, and fish and wildlife.

The Final EA further states on Page 1-2 that:

The CUPCA authorized the construction of other features of the Bonneville Unit. Section 208 of the CUPCA provides that CUP power facilities be developed and operated in accordance with the CRSP Act and states, "Use of Central Utah Project water diverted out of the Colorado River Basin for power purposes shall only be incidental to the delivery of water for other authorized project purposes. Diversion of such waters out of the Colorado River Basin exclusively for power purposes is prohibited." DOI, in consultation with the Western Area Power Administration, selected the joint proposal of CUWCD/HL&P to develop non-federal hydroelectric power at Jordanelle Dam through a lease of power privilege (Federal Register Vol. 64, No. 127, P. 36030-36032). The Federal Register notice stated that "any lease of power privilege at...Jordanelle Dam...must accommodate existing contractual commitments related to operation and maintenance of such existing facilities."

So, that is not really definitive either, not stating whether power is a "project purpose". But it is clear that power is incidental to the "other project purposes"; and so if those are secondary, then perhaps power is tertiary?

5. Page 2-9.

"Issue D3: Reservoir Fishery

Maintaining a good fishery, in cooperation with UDWR, at Jordanelle Reservoir is very important because the quality of fishing has a direct effect on State Park visitation. However, management of the reservoir fishery is secondary to the operation of the reservoir in fulfillment of its primary purpose to deliver 92,400 ac-ft of M&I water and 12,100 ac-ft of irrigation water to Salt Lake, Utah, and Wasatch Counties annually."

6. Page 2-12. The last sentence of the second paragraph is not consistent with first paragraph and should be deleted. As the requests by private developers do not request exclusive use (see below), the policy against it should not be a constraint. And the last sentence of paragraph 3 says that establishing a new or revised policy is outside the scope of the RMP. That may be, but why even mention the possibility of new policies if there is no current conflict with existing ones, or issue that needs to be resolved.

"Issue F3: Access

Managing access to the reservoir has been a significant issue for Reclamation and State Parks from the onset of the Jordanelle Project. Reclamation law and policy restricts exclusive private access to, or use of, Reclamation lands and facilities to protect water quality, natural resources, and reduce management problems. This policy has been enforced since that time (see Section 3.9.3). Private developers and others have proposed conceptual plans that include some level of private development of public

facilities within the Project Management Boundary. These plans do not request exclusive access to or use of these proposed facilities. Reclamation will need to respond to requests based on their existing policy.

The primary constraint to addressing the above issues is funding as additional work beyond the scope of this RMP is needed. Additional work could include property boundary surveys, negotiations, and management agreements among managing partners. ~~Another constraint is Reclamation's policy of "no exclusive private use."~~

Funding will likely be the biggest constraint to addressing access management issues around Jordanelle Reservoir. Reaching a compromise position that satisfies all the various public and private interests may also be a constraint. Establishing a new or revised policy will require additional work outside the scope of this RMP."

7. Page 3-40. First sentence at top of page applies to the West Hills WMA, not Project Management Boundary lands. Grazing was to be excluded within the Project Management Boundary.
8. Page 4-4. Again, verify that "power" is a project purpose, or remove it.
"Objectives:
B.2.1 Continue to operate and meet primary project purposes of delivering M&I water and secondary project purposes of ~~power~~, recreation, fish and wildlife, drought relief, and flood control, by honoring all existing and future contracts and agreements with respect to water deliveries and operations."
9. Page 4-10. 4.5.2 Crandall Point. Just a reminder that because no development at all of Crandall Point was covered in the 1979 or 1987 NEPA, make sure that even the existing level of development is described and analyzed in the EA, to make sure it is covered under Reclamation's ultimate decision.
10. Page 4-15. 4.5.8 West Hills Wildlife Management Area. I believe the "Goal" statement is misleading. It seems to me that the second bullet under "Specific Management Actions" is really the goal of the agencies at this time. The commitment would be to continue to manage the area to preserve its mitigation values at least until the evaluation is complete and a (possibly new) direction is decided.

~~Goal: Preserve area to maintain wildlife habitat values. Reevaluate mission and accomplishments of West Hills WMA and adjust if needed to ensure fulfillment of 1987 wildlife mitigation requirements~~

Objectives:
1. Continue management by UDWR to implement the 1987 Wildlife Mitigation Plan.

Specific Interim Management Actions:

- UDWR to protect against introduction and spread of noxious weeds and other pests detrimental to natural values, agriculture, or public health and safety.
- ~~Reevaluate mission and accomplishments of West Hills WMA and adjust if needed to ensure fulfillment of 1987 wildlife mitigation requirements.~~[THIS IS THE GOAL]
- Preserve area to maintain wildlife habitat values
- Evaluate potential alternative mitigation sites for required wildlife mitigation, if needed.

All of the above comments would apply throughout the RMP tables; as well as the very-similar text of the EA.

***Mark Holden (Projects Manager, Utah Reclamation
Mitigation and Conservation Commission, Salt Lake City, Utah)***

Response to Comment 2

The recommended edits have been made to the EA and RMP for the following comments: Photo 1-7, pg. 1-21, pg. 2-9, Issue D3; pg. 2-12, Issue F3; and pg. 3-40.

Pg. 1-23: This was not deleted. The date that the policy was adopted by the Board of State Parks was updated.

Comments related to Power on page 1-8, page 2-6 and Page 4-4:

Power is a secondary purpose of the Jordanelle Project. Power was always considered a secondary benefit but was postponed and not part of the original construction. Even though it wasn't constructed at the same time as the other facilities, project costs were allocated to power. Wording has been changed in both the EA and the RMP to correct the ambiguity noted in the comment.

Pg 4-10: There are currently no facilities at Crandall Point. Therefore, nothing existing needs to be included in this NEPA process. When development occurs, site-specific NEPA will be done.

Pg 4-15: This change was not made. Reclamation chose to leave the goal and management action as they were stated in the draft RMP.

Comment 3: Reclamation Archeologist

Comment 3

In the EA document:

On page 3-59

In the last sentence of the first paragraph under section 3.11.1 change the phrase “project vicinity” to “Project Management Area”

On page 3-63

In the second sentence of the first paragraph under section 3.12.1 change the phrase “project vicinity” to “Project Management Area”

On Page A-1

Under the first main bullet point, right after the second paragraph that begins with “The quality of significance ...”, change the four secondary bullet points to A., B., C., and D. These are actually criteria that are classified as criterion A, B, etc. so the four criteria need to be identified by their letter not by the secondary bullet points

On page B-4

Completely remove the entire entry for Honorable Ivan Wongan

On page B-5

Change the first entry from “Chairman” to “Chairwoman”

On page B-9

Completely remove the entire entry for Honorable Curtis Cesspooch

In the RMP document:

On page 3-59

In the last sentence of the first paragraph under section 3.11.1 change the phrase “project vicinity” to “Project Management Area”

On page 3-63

In the second sentence of the first paragraph under section 3.12.1 change the phrase “project vicinity” to “Project Management Area”

On page 3-63

In the second paragraph that begins “The Jordanelle Reservoir RMP,” change BOTH instances of “RMP/EA” to just “RMP”

On page 3-64

In the second full paragraph that begins “The Jordanelle Reservoir RMP,” change BOTH instances of “RMP/EA” to just “RMP”

Brian Joseph, (Archeologist, U.S. Bureau of Reclamation, Provo, Utah)

Response to Comment 3

The recommended edits have been made to the EA and RMP.

Comment 4: Provo River Watershed Council

Comment 4

I am writing as Chairman of the Provo River Watershed Council (PRWC), formerly the Jordanelle Technical Advisory Committee. As you know, our group was very involved in previous management planning efforts on Deer Creek and Jordanelle Reservoirs and continues to be very interested in water quality management in the Provo River Watershed. In recent conversations with Kerry Schwartz, it became apparent that while the Division of Water Quality was notified of the release of the EA and RMP through Walt Baker, such notification never found its way to me. I personally did not become aware that the documents were out for review until I was notified by a staff member who had attended RDCC meeting last week and mentioned it to me in passing. The short of the matter is that the availability of the RMP and EA for review was never forwarded to the PRWC's core membership entities: Metropolitan Water District of Salt Lake and Sandy, Salt Lake City, Jordan Valley Water Conservancy District, Metropolitan Water District of Provo, And Metropolitan Water District of Orem, and Central Utah Water Conservancy District. As such, I am concerned that an important set of stakeholders have not had an opportunity to review and comment on these important documents. I would like to request that the PRWC be briefed on the RMP at our November 22, 2011 meeting, and allowed a short extension to your comment deadline to submit any comments. Please feel to contact me to discuss any of these issues further.

David Wham (Utah Division of Water Quality, Salt Lake City, Utah)

Response to Comment 4

PRWC's requests for a briefing and extension were granted. No further comments were submitted.

Comment 5: Rock Cliff Goals and Objectives

Comment 5

Comments in reference to Section 4.5.5 Rock Cliff Recreation Area

Goal: Provide for the preservation and enhancement of the existing facilities, as well as preserve wildlife habitat values in the area.

Overall the goals and objectives seem to fit the intent of Rock Cliff which was to develop a nature center and highlight the existing ecosystem. The Master plan from 1989 states that Federal and State wildlife agencies expressed concern that, even within recreation development areas, design should be sensitive to any natural wetlands and stands of vegetation, which may be of benefit to wildlife. The general public placed a high value on wildlife considerations.⁽¹⁾ As you saw with the first round of comments, the public still places a high value on wildlife and preservation of the area.

My concern with the draft is under specific management actions on page 4-13

- Consider alternative camping methods (e.g. yurts, cabins)
- Add pavilions as needed.

I think there is room for improvement at Rock Cliff (RC) in order to get more people to visit. By adding cabins and/or yurts on the south side you will be allowing vehicles to drive-in which will impact the riparian wetland.

Almost everyone who camps at RC or that visits for the day, comments how wonderful, quiet and beautiful RC is. If you spend any time at RC you will see a lot of wildlife and have the opportunity to see the interaction of species and landscape and how they all work together. (12 years of visitor comments available at Nature Center)

We need to protect wild places from ourselves. With the current and future development all around Jordanelle, Rock Cliff is an important place for animals. It is where they can find healthy food, water, shelter and space, and where they have a safe place to raise young to keep their population healthy.

To recap what I wrote last year...

Functions of Wetlands: This is what makes RC important as a natural area

A. Habitat

- a. Some of the most productive ecosystems in the world
- b. Some plants grow only in wetlands
- c. Spawning areas for fish
- d. Heavily used by migratory birds
- e. Amphibians rely on wetlands for survival
 - i. Columbia spotted frog are a Tier 1 conservation species

B. Climate Control

- a. Up to 2/3 of water enters the atmosphere via evapotranspiration
- b. Moderate temperatures and humidity
- c. Reduce carbon dioxide in the atmosphere

C. Decontamination

- a. Remove phosphates, metals and agricultural runoff from water

- b. Plants use nutrients in the water, improving water quality
- D. Flood control and water storage
 - a. Reduces flow
 - b. Absorb water like sponges
 - c. Slowly release water to downstream habitats
- E. Nutrient Cycling
 - a. Decomposers make nutrients available to the food chain
 - b. Constantly transform and release carbon, nitrogen, phosphorus, and sulfur into the atmosphere
 - c. Significant contribution to oxygen in the atmosphere
- F. Soil Conservation
 - a. Up to 90% of sediments are removed from suspension
 - b. As stream flow is reduced, sediment settles out
 - c. Wetland plants bind soil, reducing erosion
 - d. Nutrients are also accumulated from upstream habitats
- G. Human enrichment
 - a. Provide beauty, solitude and recreation to many⁽²⁾

We are so busy these days that we forget to “be still” and notice our surroundings. We can learn so much from just being in nature and being in a quiet place where animals are visible and observable. We are losing these places to development in Wasatch and Summit County. The intent of Rock Cliff was to develop a nature center and highlight the existing ecosystem.

I am happy to see the following bullets in the document.

- Consult with USFWS, Mitigation Commission, and UDFWR regarding the development of new project facilities and land use plans to protect wildlife values envisioned in the 1987 FS to M&I System FES. Mitigate for areas lost to recreational development and use.
- Consult with UDWQ and CUWCD about water quality impacts of any new projects.

By protecting the land at Rock Cliff we protect the reservoir from all the upstream runoff debris, which in turn protects our future drinking water. We provide our children and grandchildren a place of solitude and we protect the animals and plants that in return give us so much including clean air and clean water.

The value of Rock Cliff cannot be measured by the amount of money made. It should be measured in the education it provides and the inspiration it gives people to protect our fragile planet.

⁽¹⁾Bingham Engineering, SLC, UT. 1989. BOR and JDSP Master Plan Final Report and Technical Data.

⁽²⁾Utah State University. Master Naturalist Watersheds Course. 2007.

Kathy Donnell
(Park Naturalist, Wasatch Mountain State Park, Midway, Utah)

Response to Comment 5

Thank you for your comments. Reclamation and State Parks are sensitive to the intended purpose and vision of the Rock Cliff Recreation Area. That is why the alternative is worded as “*Consider* alternative camping methods.” The goal is to maintain the existing nature of Rock Cliff. However, this wording in the RMP allows Reclamation and State Parks some flexibility in accomplishing that goal in conjunction with other goals listed in the RMP.

Comment 6: Closing of Nature Center

Comment 6

I was very disgusted when the Rockcliff Nature Center was closed and Kathy Donnell was moved. She had built up fantastic programs which were very popular and used by our school district and many others. Her work was exemplary and more involved than I have seen at any recreation area. I hope she and her programs will be brought back to this unique riparian area.

Valerie Thurnell (Heber City, Utah)

Response to Comment 6

The management direction listed in the RMP is to “Maintain Nature Center and pursue other opportunities or uses to maintain and create additional education facilities.” The closing of the center was executed by State Parks due to a limited budget. As the current Recreation Park Manager, State Parks has the jurisdiction to reopen the Nature Center as funding allows.

Comment 7: Raptor Inventory Nest Survey

Comment 7

I am writing on behalf of the Raptor Inventory Nest Survey (RINS) which is a volunteer raptor monitoring project that currently includes 82 volunteers, monitoring over 3,500 raptor nest sites on 135 USGS quadrangles in the State of Utah. Data collected by the RINS project has been employed by the Salt Lake and Fillmore offices of the BLM, the Department of Defense, the Fish and Wildlife Service and Division of Wildlife Resources in the respective planning and evaluation projects. Currently, the RINS database contains 37,000 monitoring records generated by the dedicated efforts of RINS volunteers.

The RINS project has been monitoring three USGS quads that include historic and currently active raptor nest sites that are in the Jordanelle RMP ? Heber City, Park City East and Francis. The Heber City and Park City East quads have been monitored since 1997. The Francis quad has been monitored since 1999. The

three quads have 80 historic or active nest sites and it is estimated that 41 sites would be located within the area being considered in the Jordanelle RMP. Four raptor species that have been observed nesting in the area? Osprey, Red-tailed Hawk, Golden Eagle and Great Horned Owl. Raptors are protected by federal and state laws, with the Bald and Golden Eagle Protection Act providing specific protection for Golden Eagles. Protection of raptors during the nesting periods is of particular concern.

The Rock Cliff area is an area of special interest, with the variety of raptors that nest in this especially rich riparian zone. As the Jordanelle RMP is drafted, it is essential that the development of the area be limited. The low impact walk-in camping area offers a unique camping experience that limits disruption to all wildlife including raptors. The Rock Cliff nature center with an on-site naturalist provided invaluable interpretive and educational services. The center with a naturalist should be re-instated in order to fully realize the potential of the Rock Cliff experience.

As the Jordanelle RMP is prepared, we strongly urge the consideration of the impacts on raptors and on their habitats in the wildlife section of the plan. Experiencing nature is a highlight of a visit to the Jordanelle area and raptors significantly enrich that experience. I appreciate the opportunity to submit these comments and look forward to following the development of the RMP. Should you have any questions or if I can be of any assistance, please feel free to contact me.

Robyn A. MacDuff (Director, Raptor Inventory Nest Survey (RINS))

Response to Comment 7

Impacts to Nesting Raptors

Reclamation is aware that there are nesting raptors in and around the Jordanelle Project Management Area. Future actions to implement the land uses, development of new facilities, and/or upgrade of existing facilities as prescribed in the RMP would be subject to additional site-specific analysis and compliance review with NEPA and other applicable environmental rules and regulations, including the Bald Eagle and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Future actions would also be subject to the wildlife mitigation measures identified in Section 4.6 of the EA. Measures pertaining to raptors would include:

- “Reclamation would require all construction activities to be reviewed for compliance with the federal Migratory Bird Treaty Act (16 U.S.C. 703 et seq.). This Act authorizes the USFWS to regulate the taking, either intentionally or unintentionally, of migratory birds. Migratory birds protected under this Act include all common songbirds, waterfowl,

shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows, and other species...”

- “To the extent practicable, the clearing and grubbing of vegetation for new construction activities would be done during the non-nesting season to avoid impacts to migratory birds.”
- “Reclamation would continue to manage the project area in a manner that would be conducive to wildlife, which would help reduce the need for additional wildlife mitigation.”
- “Reclamation would consult with USFWS and UDWR to evaluate wildlife impacts that would result from the construction of new facilities or changes in land use, and identify measures to maintain or enhance wildlife values...”

Closing of the Nature Center

The Rock Cliff Nature Center is administered, operated and maintained by the Utah Division of State Parks and Recreation. The nature center was closed due to short falls in the Utah State budget. As such, it is the State’s responsibility to determine the cost effectiveness of reopening the Rock Cliff Nature Center and employing an on-site naturalist.

Comment 8: Trail System

Comment 8

I am happy to see that trail expansion and connectivity is part of the plan, but this needs to be an even bigger priority. This is a beautiful area, and there should be a high quality trail system that serves mountain bikers and runners who want to travel the perimeter of the reservoir. This trail should connect with other trails at Jordanelle, and the larger trail system in the surrounding area.

Undisclosed Name and Address

Response to Comment 8

Improvements and connections to the perimeter trail, as designated in the RMP, will occur as funding becomes available and as entities develop trails outside of the Project Management Boundary. Thank you for your input.

Comment 9: Non-motorized Craft

Comment 9

First of all, thank you for keeping us, meaning non-motorized craft, in mind as you develop the RMP. We appreciated seeing the space put aside for the Laser storage in particular but are thankful that as a whole, you are interested in developing an area for non-motorized craft where sailors, rowers and paddlers of varying types can launch and retrieve their boats in relative safety.

One topic that came out of the meeting that was of particular interest was the misunderstanding that the Park City Sailing Association, and by extension all non-motorized craft, are asking for a ramp to be put in by the beach house. We were not making that request and feel as though we can launch off the beach with the current setup. We are hoping to install docks, a discussion already begun in the Spring of 2011 with the Park, to store the safety/coach boats for both the PCSA and Park City Rowing groups as well as to facilitate launching of the Park City Rowing shells. Those docks would be separate from the ADA docks.

Another mis-understanding was that we were asking for the DNR or BOR to pay for a fence to house all of the non-motorized craft over near the Beach House on the sandy lot. The PCSA would in fact spear-head the efforts to raise the funds necessary to pay for the fence to be installed. This fence would house sailboats for the Junior Sailing program, small sailboats from the general public/members of the PCSA as well as the rowing shells and private SUPs all on racks. Each of the groups involved would be responsible for building their own racks but storage would be made available to them to create a non-motorized community in that area. All of the funds would be generated through donations and fund-raising efforts driven by PCSA.

Geoff Hurwitch (PCSA President, Park City Sailing Association)

Response to Comment 9

Thank you for your comment and clarification. Coordination with the Recreation Park Manager, namely State Parks, by the Park City Sailing Association and other non-motorized watercraft users regarding storage and launching is encouraged.

Comments 10 – 11: Concessions at Ross Creek

Comment 10

On behalf of the Wasatch Tourism and Economic Development Board, I write a letter in support of modifying the Draft Jordanelle RMP to not limit concession activities, including “bike, non-motorized boat, and/or horse rentals.”

Within ten years, there may be opportunities to propose special uses within the Ross Creek Recreation Area. We encourage the RMP to consider our request to be able to provide potential proposals within the identified area over the next ten years.

Please feel free to contact me if you have any questions or if I can provide additional information. We applaud the efforts of the RMP and appreciate your consideration.

Ryan Starks (Director, Wasatch Tourism & Development)

Comment 11

In review of the Draft Jordanelle RMP it is our understanding that the management direction for this area is proposed to be limited to concession activities such as “bike, non-motorized boat, and /or horse rentals.” The RMP identified, implementation, operation/maintenance of these activities through the private sector.

The Ross Creek Recreation Area offers unique opportunities for development of facilities to enhance the recreational access to the Jordanelle Reservoir. The location of this recreation area is assessable from SR248 allowing for easy access from east and west regions without the need for highway or local access improvements. The only improvements needed are at the access point of SR248. The existing abandoned highway which leads down to the reservoir provides ready-made access to the shoreline. Relative minimal improvement requirements result in minimal impact on the existing environment while providing access to the reservoir. This is one area of the reservoir where both water and sewer utility services are in close proximity and most easily developed for public use. The orientation of the abandoned highway to the north tip of the reservoir can provide for planning and development of differing use areas along the shoreline. Based on these points this area provides unique opportunities.

These factors make this area attractive for consideration by private sector concessionaires to develop, operate, and maintain recreational facilities. The existing highway access and availability of utilities allow for this area to support such facilities as public restrooms, food services, boat trailer access, multiple water craft uses and access. The configuration of the north tip of the reservoir allows for special water area designation for wakeless and non-motorized watercraft.

A limiting factor in the consideration of such recreational private sector development of facilities is the current proposal of not allowing for motorized boat access of this location. The RMP outlines any recreational development must be proposed through application to authorizing office. We propose that the RMP not exclude the opportunity for a proposal which includes motorized boat access at this location. As the RMP outlines, any recreational facility development must

be considered by application to the authorizing office. This application process allows ensuring that the goals and objectives of the RMP are met when considering a proposal for development. Such items as separation of water use areas can be evaluated to maintain the intent of the RMP to provide recreational opportunities to the wide range of public use. Issues such as private funding and management of facilities, security, boat inspection station, can all be evaluated as part of such an application. The inclusion of motorized boating as an allowed use in the area provides for the private sector to use creativity in planning for recreational uses and facilities that meet the intent of the RMP while providing opportunities for a financially viable project in this area. In the end the authorizing office can maintain the intent of the RMP for this area through the project application process.

We have met with various agencies in Wasatch County as exhibited by the copy of this e-mail (Mike Davis/ Wasatch County Manager, Doug Smith/Wasatch County Planning Dept., and Ryan Starks/Wasatch County Economic Development Director) and they agree and support comments we are making to the RMP. Thank You for your consideration in this request.

Lee Roy Farrell (Director of County Affairs, Talisker Mountain Inc.)

Response to Comments 10 – 11

Thank you for your comments. The RMP provides the following specific management action, “respond to private concessionaire requests to develop, operate, and maintain new public facilities”. While the RMP states “private,” it does not exclude public government from providing facilities as long as they are within Reclamation’s law of “no exclusive use”, which means that the facilities must be available to all the public. Whether it is a private or public entity that wants to act as the concessionaire, either entity would follow the same procedures that require a plan to be submitted to Reclamation for review. Environmental review would be mandatory. For reference, the specific opportunities for the Ross Creek area are itemized on page 4-12 of the RMP.

Additionally, the RMP states in Section 2.6.4 that “... not all recreation areas will provide every opportunity. By focusing on certain activities at the various recreation areas, the complexity associated with managing for a wide array of opportunities at one site is decreased and the effectiveness of management and enforcement is increased.” It is beyond the ability of the Recreation Park Manager, currently Utah State Parks, to manage and operate additional facilities that would require additional manpower.

Comments 12 – 26: Wake Free Zone at Rock Cliff

Comment 12

The Jordanelle Reservoir would be truly spectacular if the Rock Cliff arm was wake free. It would provide a great location for non motorized activities. Wakes are frightening for small human powered boats. It would be wonderful to have a place in the central Wasatch where people can enjoy calm waters with easy access. Other than the Great Salt Lake, there are not many reservoirs that are close to the metropolitan areas where people can go without worrying about wakes. The Jordanelle is so easy to get to and incredibly beautiful. Many people would benefit from a wake free zone on the Rock Cliff arm of the Jordanelle.

Sarah Byer (Salt Lake City, Utah)

Comment 13

Please designate the Rock Cliff arm of the reservoir wake-free, to better accommodate a wider variety of water activities including rowing, paddle boarding, sailing, and fishing.

Hugh Hurlow (Salt Lake City, Utah)

Comment 14

Having the reservoir as a wake-free zone would be beneficial not only to those who enjoy the reservoir, but also for the ecology of the lake. Motorboats which have engines powerful enough to cause a wake in the Jordanelle consume massive amounts of fossil fuels, adding to pollution in and around the lake. The burning of fossil fuels can also pollute the water, through sublimation, potentially marring the water, making it unsuitable or at least more dangerous to drink. In addition to the environmental concerns, the local residents would much enjoy a reduction in noise, and those who enjoy the lake in quieter, more peaceful ways, would be benefitted.

Michael Kennedy-Yoon (Salt Lake City, Utah)

Comment 15

I would like to propose that the rock creek arm of the reservoir be designated as a wake free portion of the lake. There are plenty of activities that would benefit from this.

Steeper banks on the rock creek arm make wake free even more necessary.

Jeremy King (Salt Lake City, Utah)

Comment 16

Being a Sail boater in Jordanelle every weekend, I would like to see less congestion in the put in and take out area. The wake free zone is the only place to get away from the many motor boaters on the reservoir.

Ralph Sawyer (Salt Lake City, Utah)

Comment 17

As a small boat sailor and active rowing 'crew' parent, who recreates along the Wasatch front with family and friends, I would very much like a wake free area set aside for rowing, sailing and swimming in the Rock Cliff arm of the Jordanelle. Thank you for considering adding this important region of safety on the Jordanelle.

Christopher Stokes (Bountiful, Utah)

Comment 18

Our household would love to see some "wake free" areas made available on the Jordanelle Reservoir. We are members of Utah Crew and would love to have this resource for the crew team.

Stokes Family (Bountiful, Utah)

Comment 19

A no-wake area for human-powered watercraft would be great. I've rowed on the Rock Cliff arm and would love to be able to do that more often!

Carol Sweeney (Salt Lake City, Utah)

Comment 20

This is a beautiful body of water, and I think it should be readily enjoyed by everyone, including those who are not in motorized boats. This could be accomplished by making a wake-free zone. I am also a rower on the Utah Crew team and I love to practice and race on this gorgeous body of water, but this is made difficult when wakes are present.

Undisclosed Name and Address

Comment 21

Please make the Rock Cliff arm permanently wake free. This would create more equal access and foster the growing interest in rowing clubs, sailing and other non-motorized craft activity. It would certainly make the reservoir more accessible and much safer if this change is made.

Jeff Unruh (Salt Lake City, Utah)

Comment 22

To whom it may concern: as a rower, it's important to me to have wake-free water to race on. Especially in a lightweight, unstable single sculling boat, the presence of motorboat wake is disruptive at best (and can be dangerous at worst). The Jordanelle is much closer than any currently wake-free bodies of water, and having a wake-free arm would be incredibly beneficial to rowing associations in the Salt Lake area.

Meredith Wade (Salt Lake City, Utah)

Comment 23

Would very much like to see the Rock Cliff arm become a wake-free zone. Beautiful body of water, but those of us who paddle and row need a spot that is safe and enjoyable.

Thank you for all the work you are putting in to this. My kids row for Utah Crew, and our whole family loves small boats--which means we really appreciate the effort to create places for us to enjoy the water, just as faster boats do.

Mitchell Wade (Salt Lake City, Utah)

Comment 24

I am writing to express my support for the expansion of the wake-free area to include 3 miles from the Rock Cliffs launch area on Jordanelle Reservoir.

I am a former US National Team rower and have recently moved to Utah. The potential for the growth of rowing in Utah is unlimited (it is exploding all over the country) and with it comes quite a bit of economic and community gain to the local area. Rowing tends to bring in people from the greater mid-west and western states for racing events, as well as provides opportunities for junior rowers to go to college on scholarships (esp. girls). along with the increased opportunities for rowing, there are many other human-powered water sports that are also growing (Stand up paddle boarding, kayaking, etc.) that contribute greatly to the community as a whole.

I believe that a wakeless area expansion would enable the park to serve more users of the reservoir and that those uses are extremely positive for the greater park city community. Park City Rowing Academy and the growing number of masters (adult) rowers that are using the reservoir all support this expansion.

Suzanne Walther (Orem, Utah)

Comment 25

I am a rower and rowing coach in Salt Lake City, UT. The Rock Cliff arm of the Reservoir has been a favorite location for longer "Head Race" style training work, and both formal and informal racing.

As rowing grows in the local community (Crews from Waterford High School, Utah Crew which encompasses all Valley teenage students, Park City Rowing Academy, Great Salt Lake Rowing open to all rowers, and Huntsman Cancer Institute Crew all row in the near vicinity), it would be nice to see adaptations in local recreation areas that support rowing as well as other non-motorized water recreation and athletic endeavors.

In many parts of North America, rowing activities and regattas provide substantial economic boosts to the host cities and organizations. The Jordanelle provides a near-perfect race course for both Sprint Races (2 kilometers) and Head Races (5 kilometers). One current drawback to the area is the frequent presence of heavy wake from power boaters and water skiers.

Racing, training and educational activities would all benefit from an expansion of the wake-less region in the Rock Cliff arm of the reservoir to a distance of 3-5 km from the launch ramp. This expansion would still leave the main portion of the reservoir available to power boaters and water-skiers, while providing the non-motorized watercraft population with a fair opportunity to derive recreational benefits from the reservoir.

As the Rock Cliff area is seeking ways to stay financially sustainable, it may be worth exploring ways in which supporting non-motorized recreation in the Rock Cliff arm can help offset costs associated with the area.

Sonia Witte (Great Salt Lake Rowing, Utah Crew, Salt Lake City, Utah)

Comment 26

Dear Management Team: This is to voice my enthusiastic support for making the Rock Cliff Arm of the Jordanelle Reservoir permanently "Wake Free." This would make it safe for high school crew teams (in which my children participate), canoes, sculling, fishing and abundant water fowl viewing, while leaving a majority of the reservoir available for enjoyment with motorized watercraft. This would seem like a fair balance of public uses.

Joseph Yost (Salt Lake City, Utah)

Response to Comments 12 – 26

Thank you for your comments. The issue of creating a wake-free zone in the Rock Cliff arm of Jordanelle Reservoir falls within the scoping process, which took place from November 2010 to Spring 2011. The public was given the

opportunity to provide input during the Fall of 2010 that was then used by the Coordination Team as described in Chapter 2 of the RMP. Unfortunately, this opportunity was not introduced during this time and therefore was never discussed or analyzed during the scoping process or in the EA. However, on page 4-27 of the RMP, Table 4-2 states, under Category C – Wakeless/No Watercraft Zone, that State Parks and Reclamation can evaluate and/or expand the wakeless zones. Coordination with State Parks on this issue is encouraged.

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