

# FINAL JORDAN RIVER COMPREHENSIVE MANAGEMENT PLAN AND RECORD OF DECISION

PREPARED FOR

Utah Department of Natural Resources  
Division of Forestry, Fire & State Lands



JANUARY 2017





# **FINAL JORDAN RIVER COMPREHENSIVE MANAGEMENT PLAN AND RECORD OF DECISION**

Prepared for:

**Utah Division of Forestry, Fire & State Lands**

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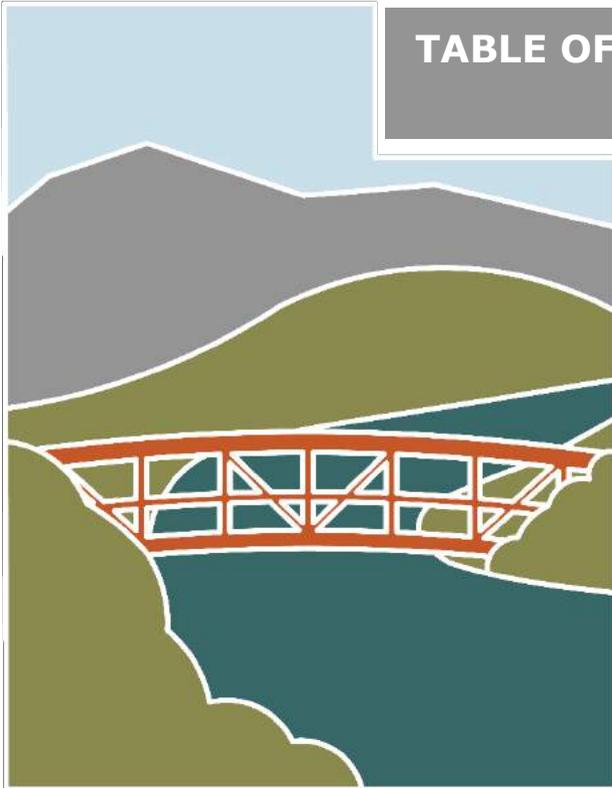
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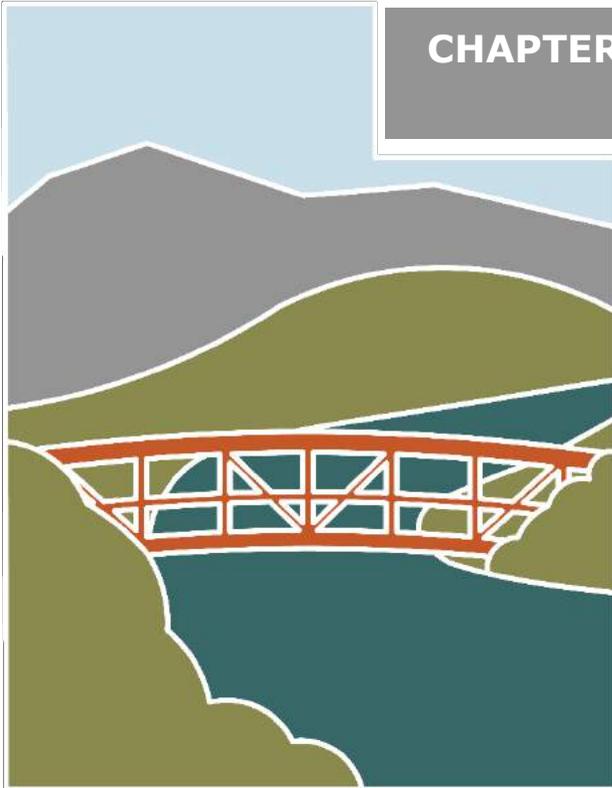
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**ABBREVIATIONS**

BMP	best management practices
CFR	Code of Federal Regulations
cfs	cubic feet per second
CWA	Clean Water Act
DO	dissolved oxygen
DSPR	Utah Division of State Parks and Recreation
DWQ	Utah Division of Water Quality
DWR	Utah Division of Wildlife Resources
DWRe	Utah Division of Water Resources
DWRi	Utah Division of Water Rights
<i>E. coli</i>	<i>Escherichia coli</i>
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FFSL	Utah Division of Forestry, Fire & State Lands
GIS	geographic information systems
I-15	Interstate 15
I-215	Interstate 215
JRC	Jordan River Commission
JRCMP	Jordan River Comprehensive Management Plan
JRNAF	Jordan River Natural Areas Forum
m	meter
NFIP	National Flood Insurance Program
NPS	National Park Service
NRHP	National Register of Historic Places
OE	observed expected
OHWM	ordinary high water mark

PDF	portable document format
RDCC	Resource Development Coordinating Committee
SHPO	State Historic Preservation Office
SWReGAP	Southwest Regional Gap Analysis Project
TDS	total dissolved solids
TMDL	total maximum daily load
UDEQ	Utah Department of Environmental Quality
UDOT	Utah Department of Transportation
UDSH	Utah Division of State History
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WWTP	wastewater treatment plant

## CHAPTER 1 – INTRODUCTION



### 1.1 Project Vision and Goals

The Utah Department of Natural Resources Division of Forestry, Fire & State Lands (FFSL) has developed the 2017 Jordan River Comprehensive Management Plan (JRCMP) to prescribe sovereign land management goals and objectives for the Jordan River and to ensure that all uses on, beneath, or above the bed of the Jordan River are regulated to protect navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality (Public

Trust values) pursuant to Utah Administrative Code R652-2. The Jordan River is a sovereign land body that flows through Utah, Salt Lake, and Davis Counties (Figure 1.1). Primary management responsibility for the river’s resources lies with FFSL pursuant to Title 65A of the Utah Code, which governs management of all state lands within the jurisdiction of FFSL. Utah Code 65A-2-1 states that “[t]he division [of Forestry, Fire and State Lands] shall administer state lands under comprehensive land management programs using multiple-use, sustained-yield principles.” Briefly stated, the overarching management objectives of FFSL are to protect and sustain the Public Trust resources and to provide for reasonable beneficial uses of those resources consistent with their long-term protection and conservation.

FFSL’s vision for this Jordan River planning process is as follows:

*The State of Utah, through the Equal Footing doctrine, has fee title ownership of the bed and banks of Jordan River. FFSL has direct management jurisdiction over lands lying below the top of bank (i.e., ordinary high water mark) of navigable bodies of water at statehood. FFSL recognizes the importance of the Jordan River ecosystem and its natural, cultural, recreational, and aesthetic amenities, including those resource values and uses that extend beyond its banks and affect or are affected by actions on sovereign lands. Accordingly, FFSL considers it imperative that management of the Jordan River include coordination in planning and actions by other agencies with jurisdictional and management responsibility over these resources.*

*The Jordan River is a valuable ecosystem of statewide importance. Sustainable management in the context of multiple use of the Jordan River will ensure that the ecological health (e.g., water quality, bank stability, riparian zones, aquatic organisms, wildlife, and wetlands), scenic attributes, and recreation opportunities (e.g., bird watching, biking, and boating) are maintained into the future. FFSL will coordinate, as necessary, to ensure that the management of this resource is based on a holistic view—including the use of adaptive management, as necessary—to ensure long-term sustainability. Responsible stewardship of the Jordan River’s resources will provide a lasting benefit to the Public Trust.*



# Introduction

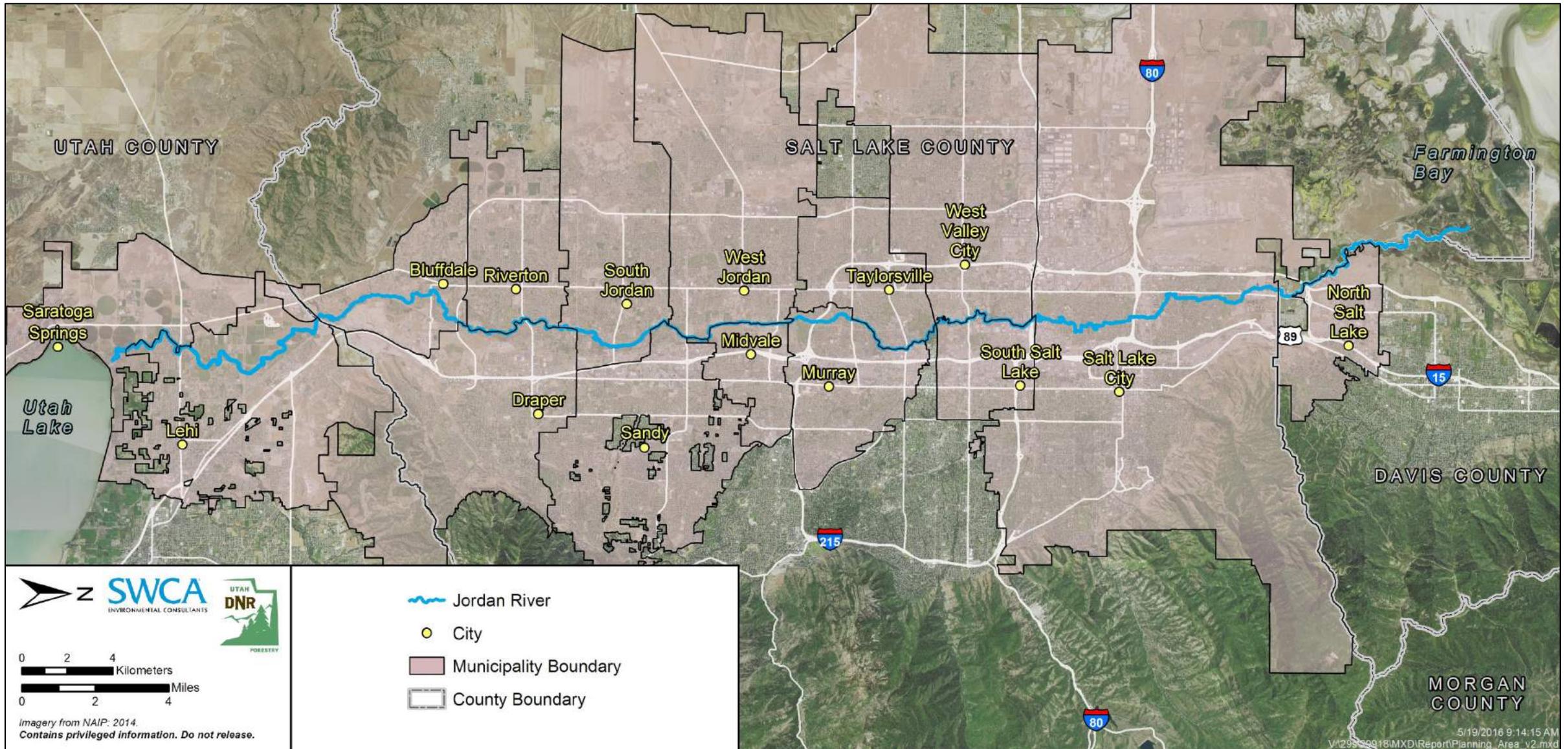


Figure 1.1. Jordan River planning area map.

To meet our land management mandates, FFSL’s overarching goal of the JRCMP process is to ensure that we maintain clear and consistent guidance on the management of Jordan River resources. Specifically, the objectives for the JRCMP process are as follows:

- Create the first comprehensive management plan for Jordan River sovereign lands (i.e., the planning area).
- Ensure that sovereign lands management remains consistent with Public Trust obligations.
- Incorporate principles of multiple-use while conserving natural and cultural resources.
- Integrate existing information, data, and scientific research that have been developed on the Jordan River into clear and consistent management practices.
- Coordinate with Utah Department of Natural Resource divisions, Utah Department of Environmental Quality (UDEQ) divisions, and other government entities regarding management, permitting, maintenance, planning, and research on the Jordan River.

### ***Drafting the Plan***

A review of existing information and of written management practices for the Jordan River was conducted to inform the development of the JRCMP. This review ensured that the JRCMP would build on previously compiled data sources and current management strategies instead of “reinventing the wheel.” See Appendix A for a summary of primary documents, information, and management practices used in this planning process. Chapter 4, Literature Review, is a complete list of sources used in the plan. Throughout the JRCMP, colored boxes called “Further Reading” are used to refer the reader to other Jordan River–related documents or websites.

In addition to existing data, development of the JRCMP relied on feedback from the public, municipalities, and other stakeholders, as per Utah Administrative Code R652-90-600. Technical information, comments, and land use information, for example, were obtained during planning

meetings or through the project website and were incorporated into the JRCMP. For a summary of the public involvement process and a summary of FFSL’s responses to public comments, see Appendices B. Several individuals from consulting firms were involved in preparing the JRCMP, including the project manager, deputy project manager, planners, resource specialist, graphic designers, technical editors, and formatters. A list of these individuals is provided in Appendix C.

Other state agencies and local governments contributed to the development of the JRCMP by providing data, insight into management and jurisdictional roles, and oversight of content. Representatives from these entities formed the JRCMP planning team. A list of planning team members involved in finalizing the JRCMP is provided in Table 1.1.

**Table 1.1.** Jordan River Comprehensive Management Plan Planning Team

First Name	Last Name	Representing	Title
Laura	Ault	FFSL	Sovereign Lands Program Manager
Carl	Adams	UDEQ Division of Water Quality	Manager, Watershed Protection Section
Laura	Hanson	Jordan River Commission	Executive Director
Matt	Howard	Utah Division of Wildlife Resources	Habitat Biologist
Bill	James	Utah Division of Wildlife Resources	Energy Development and National Environmental Policy Act Coordinator
Ty	Hunter	Utah Division of State Parks and Recreation	Parks Program Manager
Chris	Merritt	State Historic Preservation Office	Deputy State Historic Preservation Officer
Tyler	Murdock	Salt Lake City, Parks and Public Lands	Project Coordinator
Dennis	Pay	Jordan River Commission’s Technical Advisory Committee	South Salt Lake Engineer

## Introduction

First Name	Last Name	Representing	Title
Rachel	Shilton	Utah Division of Water Resources	Engineer
Ben	Stireman	FFSL	Sovereign Lands Analyst
Bob	Thompson	Salt Lake County	Watershed Section Co-Manager
Laura	Vernon	FFSL	Sovereign Lands Planner and JRCMP Project Lead
Brandon	Weston	Utah Department of Transportation	Environmental Program Manager
Chuck	Williamson	Utah Division of Water Rights	Stream Alteration Specialist

The JRCMP is intended to be revised approximately every 10 years. However, the plan can be updated or amended more frequently as issues arise during implementation, as rules or statutes change, or to accommodate new data. The revision process is, by administrative code, open to the public for comment.

### **How to Use the Plan**

The JRCMP is intended to provide easy access to data, river use class information, and best management practices (BMPs) to assist stakeholders in planning and implementing projects that may affect Jordan River sovereign lands. This introductory chapter provides an overview of the regulatory environment and sets the stage for the management plan and how it applies to different management scenarios, including a description of the authorizing and permitting processes. The mapbook at the end of this chapter (Figure 1.7 [maps 1–20]) provides an accessible visual reference of the river’s use classes as described in Utah Administrative Code R652-70-200. Chapter 2 summarizes the existing conditions of the river and focuses on ecosystem, water, and community resources. This, in combination with public involvement, provides

the basis for Chapter 3, which discusses desired future conditions, management goals and objectives, and BMPs that may apply to ongoing management and permitting decisions for projects proposed by state government agencies, local governments, stakeholders, and private entities. Chapter 4 provides a list of literature cited for the plan.

Information in the JRCMP is supported by three online resources: 1) a JRCMP interactive portable document format (PDF), 2) a JRCMP Esri story map, and 3) a geographic information system (GIS) spatial data viewer. All of these resources are found on the FFSL website and provide supplemental formats with which to view the JRCMP, understand the regulatory context behind the JRCMP, and visualize available data used to make management decisions. Although the interactive PDF will remain the same until the plan is updated, both the Esri story map and GIS spatial data viewer can be modified as new data and other information are available for the Jordan River. These three online resources are discussed further below.

1. Interactive PDF: This electronic document viewable in Adobe Reader is identical to a hard copy of the JRCMP; however, this format provides the reader with hyperlinks to additional reading, a nimble Table of Contents to navigate from one section to another, and the ability to make electronic notes in the document and print copies without concern for browser or word processing differences.

## COLOR THEORY

The colors in the JRCMP logo are also used in the plan to help distinguish between the different chapters, resource sections, and appendices.

Record of Decision,  
Contents, Introductions,  
Literature Cited, Appendices

Ecosystem

Water

Community

2. Esri story map: This format combines the text and graphics in the plan with geospatial data to create maps that guide users along the Jordan River and provide important information such as river use classes and current conditions. This map is static but does allow the user to zoom in to a specific area of interest. The Esri story map is organized by tabs and includes background and resource information. Along the left side of each tab is a bar that includes a selection of text and graphics taken from the JRCMP.
3. GIS spatial data viewer: To see all GIS spatial data compiled and catalogued for the JRCMP, users can use this GIS data viewing tool without support from GIS professionals or a background in this field. To better understand current conditions, users can turn data layers (there are over 50) on and off, which allows a unique perspective and virtual tour of the Jordan River. Combining existing authorization locations, river use class, and stream alteration permit information can help municipalities plan the next utility crossing or bank restoration project. Similarly, combining habitat data, river access locations, and navigational hazards can allow boaters to prepare for their next float trip down the Jordan River. GIS data layers are found in colored boxes throughout the plan.

## 1.2 Ownership, Regulatory, and Management Context

### ***Jordan River Bed Ownership***

Because the Jordan River was navigable at statehood in 1896, by virtue of the Equal Footing Doctrine, the State of Utah owns the bed of the river. There may be exceptions to this rule in certain locations where unique title issues are present. Nothing in the plan is intended to represent an adjudication of ownership of any particular tract. The plan is created for FFSL's planning purposes, and FFSL recognizes that certain title and boundary questions may have to be addressed on a case-by-case basis in the future. The bed of the Jordan River is generally

considered by the State of Utah to be "sovereign land," however. The Utah State Legislature defines *sovereign land* as "those lands lying below the ordinary high water mark [OHWM] of navigable bodies of water at the date of statehood and owned by the state by virtue of its sovereignty" (Utah Code 65A-1-1). As noted in this definition, the state's ownership extends to the OHWM; however, knowing exactly where the OHWM was located at statehood is problematic. For this reason, and because the OHWM has not been mapped continuously along the Jordan River, as part of a permit authorization process, a case-by-case demarcation of the OHWM may be required.

### ***Jordan River Sovereign Land Boundaries***

The boundary of a sovereign river is intrinsically more difficult to define than that of a sovereign lake. This difficulty arises because rivers are more susceptible to movement and shifts in location over time. A thorough examination of the laws of water boundaries, particularly as they pertain to rivers, is complex and beyond the scope of this management plan. However, there are a few basic concepts that are important to understand in the management of rivers as sovereign lands.

Most rivers naturally meander over time unless human-made or natural barriers exist to prevent such movement. As the course of the river changes over time, natural and artificial processes of erosion, reliction, avulsion, and accretion may affect landownership. Generally, the gradual processes of accretion, reliction, and erosion change the property boundaries between private and public ownership. An adjacent upland landowner may obtain title to any dry land added by accretion or reliction and/or may lose title to dry land eroded and now covered by water.

For the purposes of sovereign land management, state ownership of the riverbed generally follows the movement of the river over time as it naturally meanders through erosion, reliction, and accretion processes. However, landownership remains fixed by sudden avulsive events. Avulsive events can result from natural occurrences such as flash floods or from human-made causes such as channel straightening or artificial channel relocation. In such cases, because of ownership and boundary concerns, FFSL may be interested in exchanging or acquiring riverbed land.

Currently, FFSL is not planning to initiate a boundary settlement process for the Jordan River similar to those processes currently underway at Utah Lake and Bear Lake. FFSL has settled boundaries with some adjacent upland landowners on a case-by-case basis and plans to continue with this approach as boundary issues along the Jordan River may arise.

### ***The Public Trust over Sovereign Lands***

The Public Trust Doctrine is a legal principle derived from English common law. It provides that Public Trust lands, waters, and living resources in a state are held by the state in trust for the benefit of all people (Slade et al. 1997). It establishes a right of the public to fully enjoy Public Trust resources for a variety of public uses. The doctrine also establishes the responsibilities of the states when managing Public Trust assets (Slade et al. 1997). In general, Public Trust waters consist of the navigable waters in a state, whereas Public Trust lands are the lands beneath those waters up to the OHWM. The living resources (e.g., fish, plants, and wildlife) inhabiting these lands and water are also subject to the Public Trust Doctrine (Slade et al. 1997).

The roots of the Public Trust Doctrine date back to the Institutes of Justinian and the accompanying Digest, compiled in the sixth century, which collectively formed Roman civil law. Under Roman law, the air, sea, shores of the sea, and running waters were held in common by all citizens. The rights of fishing, navigation, and public use of the banks of a river or shore were common to all (Slade et al. 1997). These principals of Roman civil law were adopted, for the most part, by English common law, which recognized public rights in all tidewaters (i.e., navigable waters) and the lands beneath. English common law, in turn, became the law of the 13 original states (Slade et al. 1997).

The Equal Footing Doctrine is the principle of United States constitutional law that mandates that new states be admitted to the Union as equals to the original 13 states. The Equal Footing Doctrine perpetuated the Public Trust Doctrine from the 13 original states to each of the 37 new states. As each new state entered the Union, it received in trust those lands beneath navigable waters and the waters themselves in trust for the citizens of the new state (Slade et al. 1997).

The State of Utah recognizes and declares that the bed and banks of navigable waters within the state are owned by the state and are among the basic resources of the state, and that there exists, and has existed since statehood, a Public Trust over and upon these waters. The Jordan River is included in this category of navigable waters and is therefore managed by FFSL for public benefit consistent with the Public Trust Doctrine.

Historically, the common law rights in Public Trust lands and waters were directly related to navigation, fishing, and commerce. As society has changed and evolved, the public's use of trust lands and waters has changed. The Public Trust Doctrine has evolved from preserving the public's right to use trust lands and waters for navigation, fishing, and commerce to include recreation, environmental protection, and the preservation of scenic beauty (Slade et al 1997).

### ***Jordan River Management***

The Utah State Legislature has designated FFSL as the executive authority for the management of sovereign lands in Utah, including the Jordan River. Because the precise location of the OHWM at the time of statehood is not known for the entire Jordan River, FFSL generally manages the river from the top of the riverbank to the top of the opposite riverbank. The top-of-bank-to-top-of-bank management boundary along the entire river allows FFSL to provide consistent management of this state sovereign land.

### ***Multiple-Use Approach***

FFSL administers state lands using multiple-use, sustained-yield principles as required by Utah Code 65A-2-1 and Utah Administrative Code R652-90-800. There is no particular hierarchy of uses on sovereign lands. FFSL recognizes that protection of **navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality** must be given due consideration and balanced against the need for, justification of, or benefit from any proposed use (Utah Administrative Code R652-2-200). Implementation of multiple-use policies must avoid substantial impairment of the Public Trust. As a trustee, FFSL must strive for an appropriate balance among compatible and competing uses on the Jordan River.

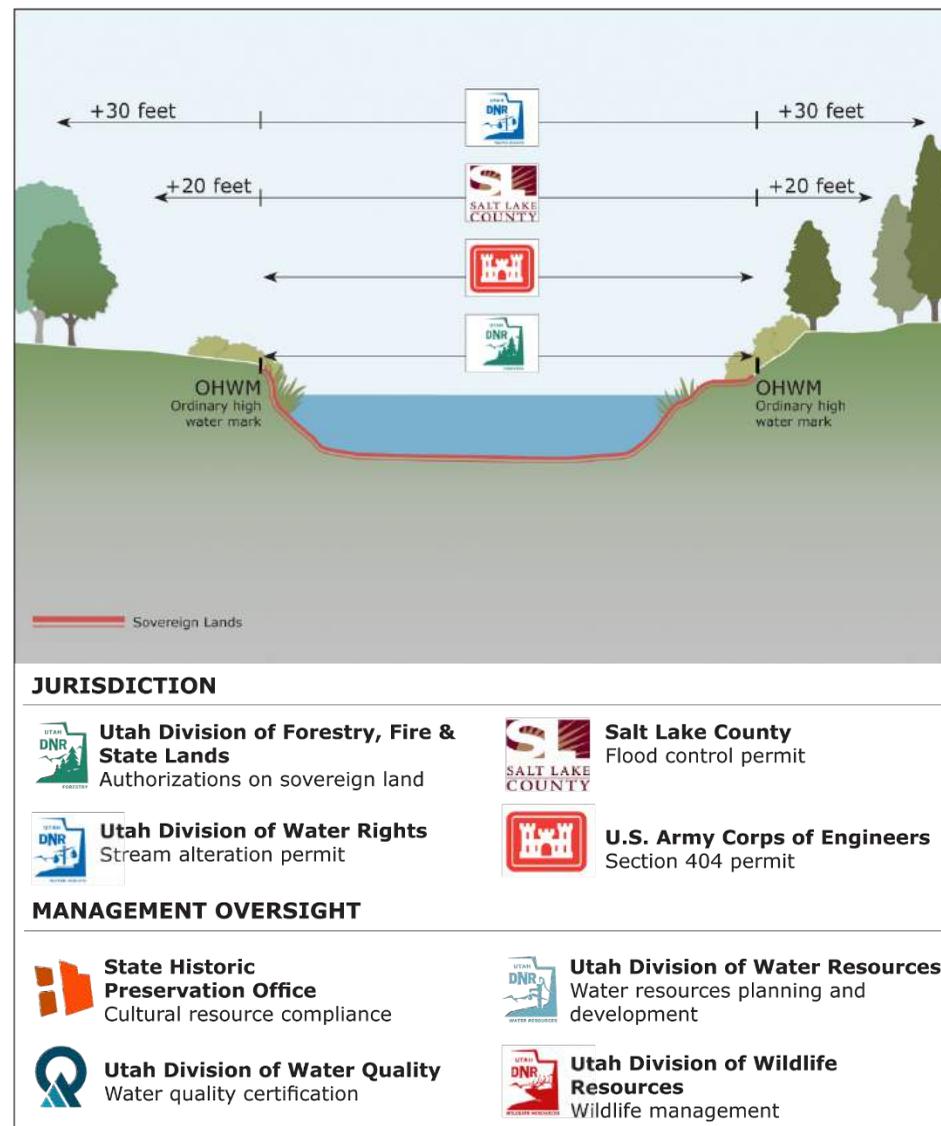
### 1.3 Current Department of Natural Resources Management Responsibilities

#### Utah Division of Forestry, Fire & State Lands

The State of Utah claims fee title ownership of the bed of the Jordan River. FFSL has direct management jurisdiction from top of bank to top of bank of the river (Figure 1.2) and manages the river under the Public Trust Doctrine for the use and enjoyment by the public. To ensure effective implementation of Utah’s multiple-use approach, FFSL strives to assure public access to navigable waters for commerce, navigation, fishing, swimming, and recreational boating, while also working to preserve these lands in their natural state. The Jordan River, an important resource in its own right, connects Utah Lake with Great Salt Lake, two waterbodies also considered state sovereign lands. Holistic management of these three waterbodies is recommended.

#### Utah Division of Wildlife Resources

Title 23 of the Utah Code establishes the Utah Division of Wildlife Resources (DWR) and the Wildlife Board and sets forth their duties and powers. Utah Code 23-14-1 states that “The Division of Wildlife Resources is the wildlife authority for Utah and is vested with the functions, powers, duties, rights and responsibilities provided in this title and other law.” The section goes on to state that “Subject to the broad policy making authority of the Wildlife Board, the Division of Wildlife Resources shall protect, propagate, manage, conserve and distribute protected wildlife throughout the state.”



**Figure 1.2.** Jordan River cross section showing agency management jurisdiction for the river.

### ***Utah Division of State Parks and Recreation***

Title 79-4 of the Utah Code establishes the Utah Division of State Parks and Recreation (DSPR) and the Board of Parks and Recreation and sets forth their responsibilities. Under Utah 79-4-802, the DSPR has the discretion to give grants to local governments and state agencies for riverway enhancement projects with funds appropriated by the Utah State Legislature for that purpose. Grants for riverway enhancement projects must be for rivers or streams that are impacted by high-density populations or are prone to flooding, and these grants must include a plan to provide employment opportunities for youth, including at-risk youth.

### ***Utah Division of Water Rights***

The Utah Division of Water Rights (DWRi) regulates the appropriation and distribution of water in the state of Utah, pursuant to Title 73 of the Utah Code. The State Engineer, who is the director of DWRi, gives approval for the diversion and use of any water, regulates the alteration of natural streams such as the Jordan River, and has the authority to regulate dams to protect public safety. All projects within twice the width of the Jordan River up to 30 feet are regulated by DWRi under the Stream Alteration Program (see Figure 1.2). DWRi has authority to regulate dam safety and inspects the Utah Lake outlet dam. FFSL does not adjudicate water rights in Utah, and nothing in the plan is intended to regulate or affect any vested water right. When FFSL requests a person obtain a permit for a water diversion structure or other encroachment on sovereign land, it is exercising authority only as a property owner.

### ***Utah Division of Water Resources***

The mission of the Utah Division of Water Resources (DWRe) and the Board of Water Resources is to direct the orderly and timely planning, conservation, development, protection, and preservation of Utah's water resources used to meet the beneficial needs of Utah citizens. DWRe conducts studies, investigations, and planning for water use within the Jordan River watershed.

## **1.4 Other State and Local Entities**

### ***Utah Division of Water Quality***

The UDEQ Division of Water Quality (DWQ) and the Utah Water Quality Board are responsible for maintaining, protecting, and enhancing the quality of Utah's surface and groundwater resources. Title 19, Chapter 5 of the Utah Code charges the board and division to develop programs for the prevention and abatement of water pollution. The board is also responsible for establishing water quality standards throughout the state; enforcing technology-based, secondary treatment effluent standards, or other more stringent discharge limits to meet instream standards; reviewing plans, specifications, and other data relative to wastewater disposal systems and municipal separate stormwater systems; and establishing and conducting a continuing planning process for control of water pollution. DWQ is in the process of completing a total maximum daily load (TMDL) report for the Jordan River. DWQ also administers the Water Quality Certification Program under Section 401 of the Clean Water Act (CWA) and the Nonpoint Source Management Program under Section 319 of the CWA.

### ***Utah Department of Transportation***

The Utah Department of Transportation (UDOT) adheres to state and federal environmental laws and regulations when designing and implementing transportation projects such as bridges that cross the Jordan River. Although there are no specific guidelines or regulations associated with the Jordan River, UDOT recognizes the importance of maintaining environmental quality for citizens of Utah and implements measures to minimize harm to the environment.

### ***Utah State Historic Preservation Office***

The Utah State Historic Preservation Office (SHPO) within the Utah Division of State History (UDSH) provides comment and guidance to agencies needing to comply with cultural resource compliance actions. For state agencies, Utah Code 9-8-404 requires those agencies to take into

account their actions on historic properties and provide the Utah SHPO an opportunity to comment on those actions. Section 106 of the National Historic Preservation Act (codified in 36 Code of Federal Regulations [CFR] 800) applies similarly in cases where there is a federal undertaking (money, land, permitting, etc.), but that federal agency is required to consult with SHPO. Generally, for both state and federal actions, a historic property is something over 50 years old, retains integrity, and is eligible for, or listed on, the National Register of Historic Places (NRHP). The Utah SHPO does not have regulatory authority over state or federal projects, but instead offers advice and comment on a proposed undertaking to hopefully avoid or minimize effects to a historic property. Under federal statute, the Utah SHPO is the central clearinghouse for historical and archaeological information for Utah, including federal, state, and private lands. Architectural information is available freely to the public; however, archaeological site information is protected by federal law (Archaeological Resources Protection Act) and state law (Government Records Access and Management Act), whereby only approved archaeologists can view the sensitive information. Outside the formal compliance process, the Utah SHPO can provide advice on how to manage historic properties and can offer potential funding opportunities in certain cases.

### ***Jordan River Commission***

The Jordan River Commission (JRC) was created by an Interlocal Cooperation Agreement in August 2010 to facilitate regional implementation of the *Blueprint Jordan River* (Envision Utah 2008); to serve as a technical resource to local communities; to raise public awareness of Jordan River-related issues and opportunities; and to provide a forum for coordination of planning, restoration, and responsible development along the Jordan River corridor. The commission is a governmental entity that operates much like a non-profit in that most projects it undertakes are funded by grants or donations. The commission has no regulatory or maintenance authority of the Jordan River or trail and is a purely advisory body.

### ***Jordan River Watershed Council***

The Jordan River Watershed Council was created in 1978 to address area-wide water quality and pollution problems and to oversee the centralization of wastewater treatment facilities in the Salt Lake Valley. The Jordan River Watershed Council became inactive in 1998, but it has since been reactivated. It comprises federal, state, municipal, and county government representatives, along with eight different public and special interest stakeholder groups. It is dedicated to the ecological and economic sustainability of the Jordan River watershed through the promotion of stakeholder involvement.

### ***Local Government***

Cities and counties with property abutting the Jordan River have important management responsibilities, are river stakeholders, and are partners with FFSL in ongoing and future projects. Local government performs functions related to public safety, education, recreation, and weed management among other initiatives. The Salt Lake County government in particular provides flood control and floodplain management services through its jurisdiction.

### ***General Public***

FFSL manages the Jordan River for the Public Trust resources, and feedback from the public is always welcome. Community involvement (e.g., service projects involving restoration or education) is encouraged, assuming efforts are coordinated with and approved by FFSL.

## **1.5 Federal Agencies**

### ***U.S. Army Corps of Engineers***

Under Section 404 of the CWA, the U.S. Army Corps of Engineers (USACE) is responsible for regulating placement of fill material in the nation's waters, including the Jordan River (see Figure 1.2). USACE's management responsibilities under the CWA are to protect the nation's aquatic resources from unnecessary adverse impacts.

### ***U.S. Fish and Wildlife Service***

The U.S. Fish and Wildlife Service (USFWS) is responsible for protecting flora and fauna, including fish and migratory birds; complying with the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act; and protecting threatened, endangered, and candidate species found in and near the Jordan River as required by the Endangered Species Act. Programs within the USFWS also addresses contaminants by conducting scientific investigations to document and remedy contaminant-related problems for fish and wildlife and by monitoring long-term contaminant trends, among other services.

### ***National Park Service***

Although no National Park Service (NPS) land exists adjacent to the Jordan River, NPS contributes facilitation and planning expertise to projects along the Jordan River through the Rivers, Trails, and Conservation Assistance Program.

### ***U.S. Environmental Protection Agency***

The U.S. Environmental Protection Agency (EPA) jointly administers the CWA Section 404 permit program with USACE. EPA also has direct regulatory responsibilities for the Superfund Program under the Comprehensive Environmental Response, Compensation, and Liability Act and provides oversight on all delegated CWA programs.

### ***Federal Emergency Management Agency***

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP), which is fundamental to reducing flood losses. In the case of this program, *floodplain management* is defined to include all actions that states and communities can take to minimize damage to new and existing buildings and infrastructure. As is the case with the Jordan River, communities incorporate NFIP requirements into their zoning codes, subdivision ordinances, and/or building codes or adopt special-purpose floodplain management ordinances.

The NFIP requirements apply to areas mapped as the 100-year flood on Flood Insurance Rate Maps issued by FEMA. Local officials, e.g., Salt Lake County, are responsible for administering and enforcing local floodplain management regulations within their jurisdiction (see Figure 1.2).

## **1.6 County and Municipal Zoning**

The Jordan River is an urban waterway bordering 15 municipalities and three counties. Each municipality and county entity along the Jordan River has the authority to authorize land uses up to the OHWM. However, the biological and physical systems of the Jordan River do not observe physical property boundaries. Management decisions made by FFSL regarding the river will affect and are affected by the land uses and associated activities on adjacent lands. As population growth and urban infrastructure expansion continue along the Wasatch Front, a range of land uses will continue to occur and change. Development in and around the Jordan River will continue to place increasing pressures on the river corridor. The priority for FFSL's management of the riverbed is to continue protecting and sustaining the Public Trust resources of the Jordan River while recognizing that local governments need to provide services to their constituents, including transportation, utilities, and other infrastructure that may have an impact on the natural environment. For these reasons, it is important to understand the types of land uses and projects authorized by each entity's general plan and zoning ordinance. Given the impact on developments within floodplains, coordination regarding riparian overlays and development patterns is an ongoing discussion for the wellbeing of adjacent residents and for the river.

The JRCMP is considered within the context of other guiding and regulatory tools for the surrounding environment and local situations. The plan recognizes FFSL's commitment to maintaining environmental quality for citizens of Utah and specifically to minimizing impacts to the environment used by current and future generations. The JRCMP and FFSL have no authority over regulations on any land along the river. The information provided here is intended to summarize the current and planned conditions and how they inform the JRCMP and to summarize decisions made by FFSL for the Jordan River.

The counties and municipalities use their own land use zoning designations to indicate the allowed uses for properties adjacent to the Jordan River. In addition to the current zoning maps and ordinances, future land use maps and general plans portray expected and anticipated uses, which may differ from the current zoning and/or existing land uses in place. A summary of the current zoning for land uses within each county is provided in the following sections.

## **Utah County**

Utah County contains approximately 8 miles of the Jordan River corridor. Of this, 100% is within the municipal jurisdictions of Saratoga Springs and Lehi. Utah County owns land along the corridor but is not the regulating entity.

Saratoga Springs currently has seven different zones along the river corridor. Three are residential (Low [R-3], Medium [R-10], and High Density [R-14]), and the remaining four are Agricultural (A), Mixed Use (MU), Planned Community (PC), and Regional Commercial (RC) (Saratoga Springs 2012).

Lehi City has a range of uses and zones along the river corridor. Six zones cover the corridor: Agricultural (A-1 and A-5), Residential Agriculture (RA-1), Residential (R-1-15), Resort Community (RC), and Transitional Holding (TH-5). The RC zone covers the Thanksgiving Point area, whereas the TH-5 zone is primarily used for annexation areas where no water is dedicated or planned to be provided by the city. Properties annexed into Lehi City within the TH zone are anticipated to comply with the general plan designation (Lehi City 2013, 2014).

Lehi's General Plan Land Use Map indicates Very Low Density Residential, Resort Community, Business Park, and Public Facilities as uses along the corridor, which correspond with the current zoning. Additionally, much of the river corridor and adjacent wetlands are given the designation of Environmentally Sensitive Areas (Lehi 2013).

Following a thorough outreach process with adjacent property owners, Lehi adopted a Riparian Corridor Overlay Zone in March 2016 to provide an open space buffer between the river and

adjacent development (Lehi City 2016). The Jordan River Protection Overlay Zone implements a buffer that ranges from 100 to 800 feet from the riverbank, with the distance varying primarily based on geographical features such as wetlands and topography. Uses and buildings permitted within the overlay zone are limited to those with low impact on the river. Single-family homes and other primary structures are not allowed in the overlay zone. No permanent buildings are allowed within 50 feet of the top of the riverbank.

## **Salt Lake County**

Salt Lake County contains approximately 34 miles of the river corridor. Land use planning and zoning along the river are under the control of 13 different governmental entities: Salt Lake County and 12 municipalities. A range of land uses and zoning occurs adjacent to the river, with over 95% under municipal authority.

Salt Lake County oversees the land use of only a few small portions of the river, within Millcreek Township near 3900 South, and on the north end of the river on the west bank. The north end is zoned Agricultural, whereas the area near 3900 South is a mix of Agricultural and Residential (Salt Lake County 2013).

Municipalities with jurisdiction over adjacent land uses are as follows:

- Salt Lake City
- South Salt Lake City
- West Valley City
- Taylorsville City
- Murray City
- Midvale City
- West Jordan City
- Sandy City
- South Jordan City
- Draper City
- Riverton City
- Bluffdale City

In 2013, the Salt Lake County Surveyor's Office collaborated with the JRC to produce a comprehensive compilation of the different municipal and county zoning designations along the entire length of the river within county boundaries (Salt Lake County 2013). An aggregated zoning nomenclature was crafted with nine general zoning categories (listed below). All are present along the length of the river within Salt Lake County, with residential uses dominating.

- Commercial
- Residential
- Mixed Use
- Agriculture
- Open Space
- Industrial
- Institutional
- Public Facilities
- Public Lands

An interactive map of the zoning is available through Salt Lake County's online mapping portal (Salt Lake County 2013). Additionally, the zoning can be viewed in the Jordan River development mapbook, a compilation of 47 maps classifying the zoning of parcels to an approximately 1/4-mile extent to either side of the Jordan River (JRC 2013a).

### ***Davis County***

Depending on fluctuations of Great Salt Lake, between 9 and 12 miles of the Jordan River are within the boundaries of Davis County where the mouth of the river flows into Great Salt Lake. Regulation of land uses is under the purview of Davis County and North Salt Lake City on the east bank of the river only, with the exception of a small portion on the south edge of Davis County where it adjoins Salt Lake County. Within North Salt Lake, most of the land is zoned as Natural Open Space (NOS), with sections of Manufacturing-Distribution (MD) and General Commercial (CG) along the southern portion of the river within city boundaries (City of North Salt Lake; Davis County 2011).

The portions regulated by Davis County are primarily wetlands, with a section of the Legacy Nature Preserve abutting the Jordan River to the north of the North Salt Lake municipal boundary. County zoning is divided between Agriculture and Farm Industry (A-5) and General Manufacturing (M-1). The M-1 section is directly south of the Interstate 215 (I-215) interchange where the roadway meets up with the Legacy Parkway and then Interstate 15 (I-15) to the east.

The *Davis County Shorelands Comprehensive Land Use Master Plan* (Sear-Brown and Bio West 2001), one of the county's guiding documents, identifies four land use types along the Jordan River:

1. Managed Open Space (land primarily held in ownership by the Duck Club)
2. Nature Preserves (current Legacy Nature Preserve and agricultural land within North Salt Lake; mitigation for the construction of the Legacy Parkway highway)
3. Business Park
4. Preserved Open Space

### **1.7 Utah Division of Forestry, Fire & State Lands Authorization Processes**

FFSL is the executive authority for the management of sovereign lands and is required to prescribe standards and conditions for the authorization and development of surface resources on sovereign lands. Authorizations (easements, general permits, and rights-of-entry) issued by FFSL must be in compliance with the Public Trust Doctrine and adhere to multiple-use, sustained-yield principles. Each authorization (easement, general permit, or right-of-entry) must also comply with this JRCMP. Figure 1.3 demonstrates FFSL's most commonly used authorization processes (processes are subject to change depending on the proposed activity and permit), and Figure 1.4 provides a standard authorization checklist. FFSL's authorization processes are governed by applicable laws. Unpermitted actions violate state laws and are subject to a civil penalty.

## Types of Authorizations

### EASEMENTS

An easement (Utah Administrative Code R652-40) across the Jordan River may be issued by FFSL for bridges, above- and below-grade utility lines, or pipelines. Easement fees are based on determined rates, which may include linear rate or appraised value. Easements are granted for no more than a term of 30 years and are subject to a 20-day review by the state's Resource Development Coordinating Committee (RDCC).

### GENERAL PERMITS

General permits are issued for public or private use of sovereign lands. Public use may include roads, bridges, recreation areas, dikes, or flood control structures. Private use may include agricultural uses that are constructed adjacent to upland private property. General permits are issued for no more than 30 years and are subject to a 20-day review by the RDCC.

### RIGHTS-OF-ENTRY

A right-of-entry permit (Utah Administrative Code R652-41) allows non-exclusive, non-permanent, or occasional commercial or non-commercial use of sovereign lands for a short-term period of generally no more than 1 year. Right-of-entry permits are generally issued for filming, commercial recreation ventures, research, organized events, and non-commercial ventures lasting more than 15 days.

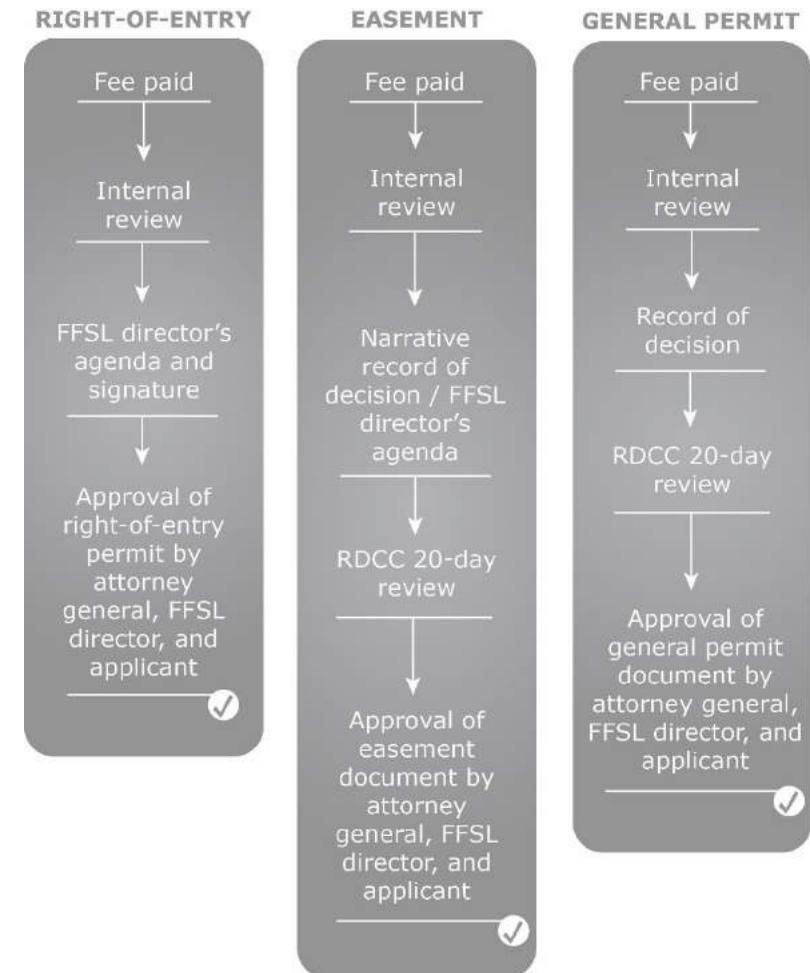


Figure 1.3. Authorization process diagram.

1. Applicant information
2. Project location and access (UTM or township, range, section)
3. Project information
  - A) Narrative
  - B) Design sets
  - C) Revegetation plan
  - D) Maintenance and monitoring plan
4. Site impact analysis
5. Other regulatory approvals
6. Certificate of insurance
7. Supplemental forms/questionnaires
8. Applicant signature

Figure 1.4. Application checklist.

### 1.8 River Use Class System and Maps

Sovereign lands are classified in Utah Administrative Code R652-70-200 based on their current and planned uses. Table 1.2 illustrates the five classes used to guide management and use on the Jordan River. River use classes are applied to specific locations along the Jordan River based on multiple parameters, including municipal and county zoning adjacent to the Jordan River, existing authorizations, environmental factors, and established deed restrictions or conservation easements. Table 1.2 also describes the specific parameters used to designate sovereign land use classes along the Jordan River. The distribution of river use classes by segment in percentages is found in Chapter 2, Table 2.1.

Table 1.2. Classification of Sovereign Lands along the Jordan River

River Use Class	Description	Example along the Jordan River	Percentage Based on Acreage of each Class	Parameters
<b>Class 1</b>	Manage to protect existing resource use options	Existing FFSL utility easement	12%	Areas with existing authorizations In some cases established, permanent structures without a current easement from FFLS
<b>Class 2</b>	Manage to protect potential resource use options	Areas adjacent to existing FFSL utility where clustering of future projects is beneficial	14%	Buffer areas around existing authorization with the goal of clustering future uses Areas zone for development without a trail, landscaped parks, or golf course
<b>Class 3</b>	Manage as open for consideration of any use provided that there is no net loss of wildlife habitat, navigation, and water quality by the project or compensated for with mitigation	Reaches of the river adjacent to the Utah Off-High Vehicle training facility	28%	Areas zoned agricultural Areas zoned for development with a trail, landscaped park, or golf course
<b>Class 5</b>	Manage to protect potential resource preservation options	Rose Park Golf Course	42%	Areas zoned open space Environmental factors (e.g., scour, extensive 100-year floodplain, wetlands)
<b>Class 6</b>	Manage to protect existing resource preservation uses	Legacy Nature Preserve	5%	Local, county, state, or federal conservation protection Restoration and mitigation sites Parcels holding conservation easements

Note: Class 4 (manage for resource inventory and analysis) is not applied to the Jordan River.

Examples of how specific uses and classes were assigned to a river system based on current and potential use are found on Figures 1.5 and 1.6, respectively. For example, permitted bridges and utilities (items 1 and 12 on Figure 1.5) are considered Class 1 reaches of the river because they are authorized as an existing use. Reaches between Class 1 areas, if it makes sense to concentrate future utilities and infrastructure, are reserved as Class 2 areas. Segments of the river not developed but that have potentially low impact uses (item 4 on Figure 1.5) that are not zoned specifically as open space are considered Class 3 areas. Finally, reaches of the river associated with zoned open space (item 5 on Figure 1.5) and afforded legal conservation protection (item 9 on Figure 1.5) are considered Class 5 and Class 6 areas, respectively.

Where Table 1.2 illustrates the five river use classes, Figure 1.7—a mapbook of the Jordan River made up of 20 individual maps—shows the reader the specific locations of these five river use classes along the Jordan River along its entire stretch from Utah County to Davis County. Note: Some river use class locations, e.g., Class 1, can be difficult to see because of their width and the scale at which the mapbook is made. For the most accurate view of all river use class locations, please use the GIS spatial data viewer available on the FFSL website.

### Further Reading

*Best Practices for Riverfront Communities* (JRC 2013b)

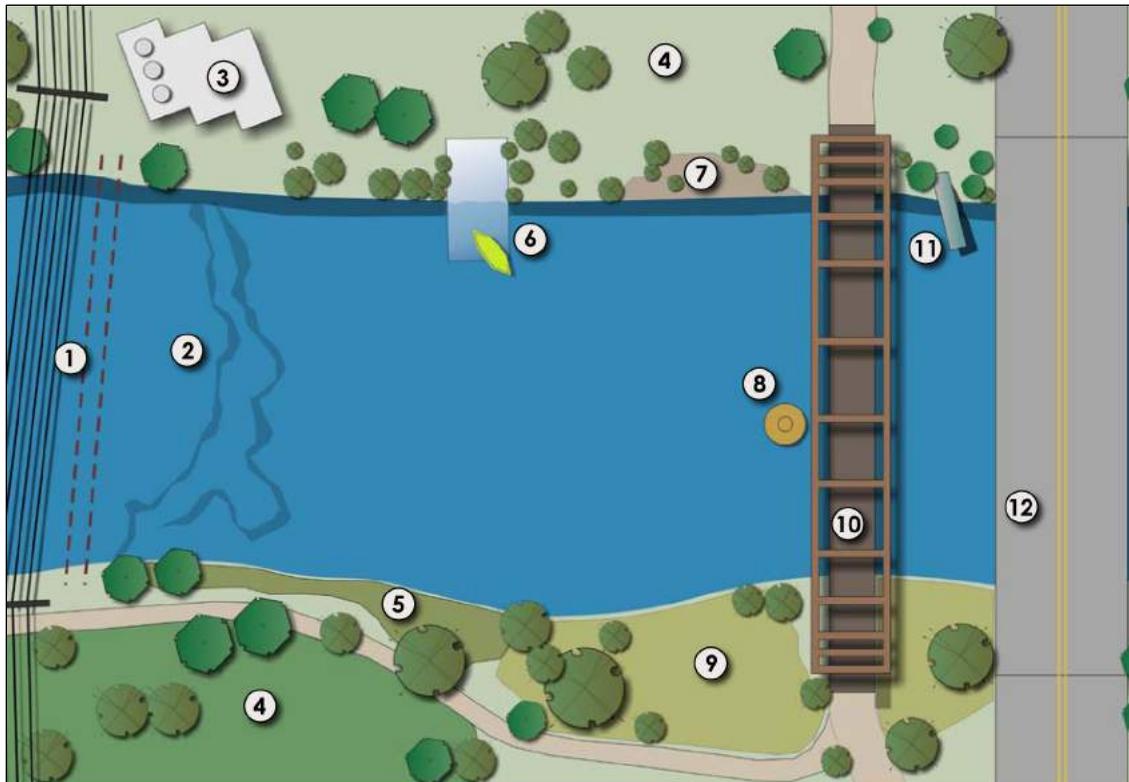
*Blueprint Jordan River* (Envision Utah 2008)

*Jordan River Parkway: An Alternative* (Urban Technology Associates 1971)

Three Creeks and Jordan River Corridor Surveys (iUTAH 2016)

### Geographic Information System Data Layers

River Use Classes, JRC Zoning, Saratoga Springs Zoning, JRC Open Space, Political Boundaries, FFSL Authorizations, DWRi Stream Alteration Permits, JRCMP River Segments, Stakeholder Comments, Photographs



**Legend**

- |  |                                 |
|--|---------------------------------|
| 1. Above-ground and below-ground utilities | 7. Erosion mitigation           |
| 2. Navigational hazard                     | 8. Water quality equipment      |
| 3. Industrial use                          | 9. Mitigation/protected habitat |
| 4. Municipal park                          | 10. Historic structure          |
| 5. Restoration/open space                  | 11. Outfall                     |
| 6. Portage/ramp/dock/launch                | 12. Road/bridge                 |



**Legend**

- |  |   |  |
|--|---|--|
| <b>Class 1</b><br>Manage to protect existing resource use  | <b>Class 3</b><br>Open management but with conditions               | <b>Class 6</b><br>Manage to protect existing resource preservation |
| <b>Class 2</b><br>Manage to protect potential resource use | <b>Class 5</b><br>Manage to protect potential resource preservation |  |

**Figure 1.5.** Jordan River plan view showing conceptual river uses.

**Figure 1.6.** Jordan River plan view showing conceptual river use classes.

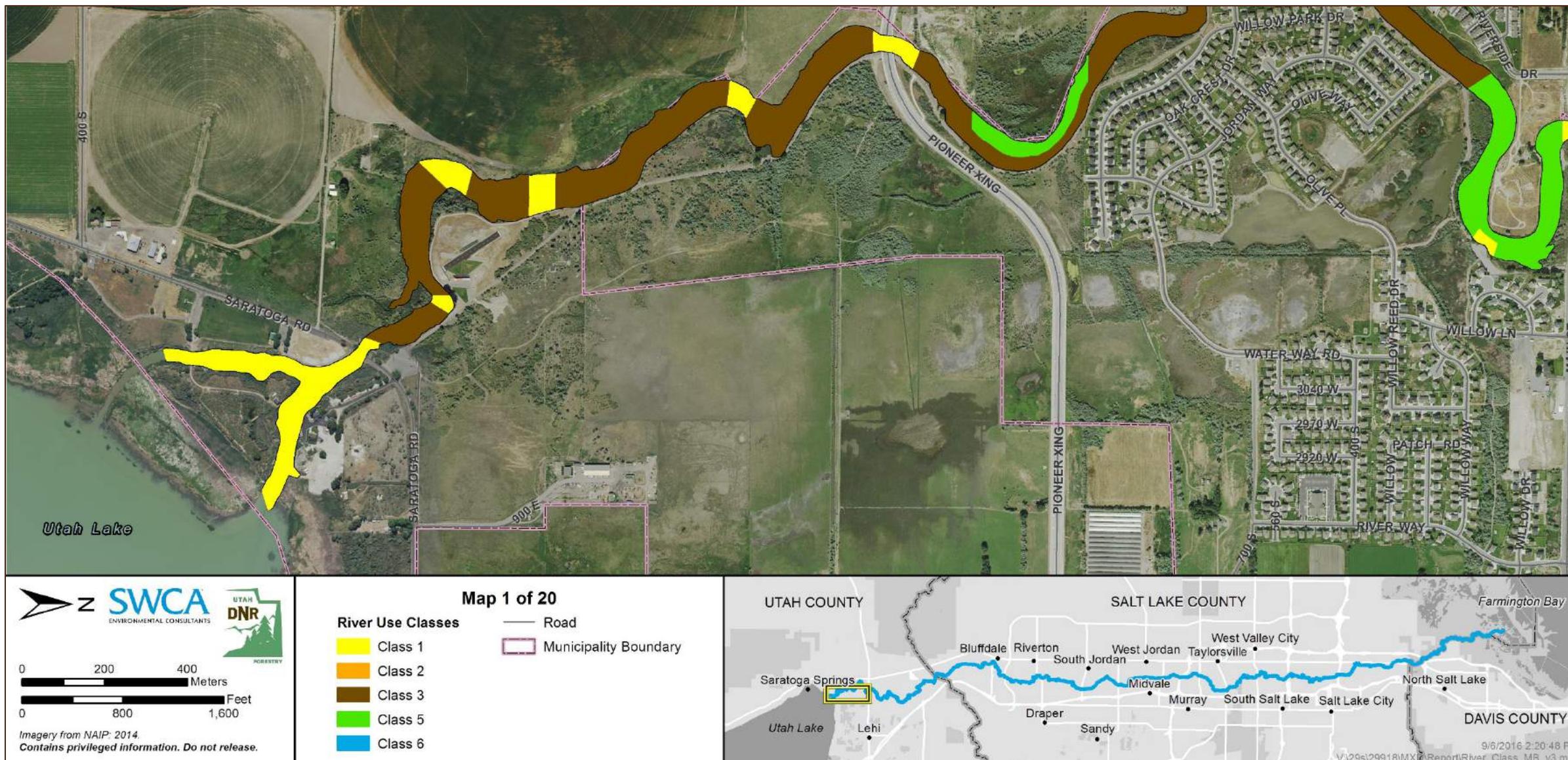
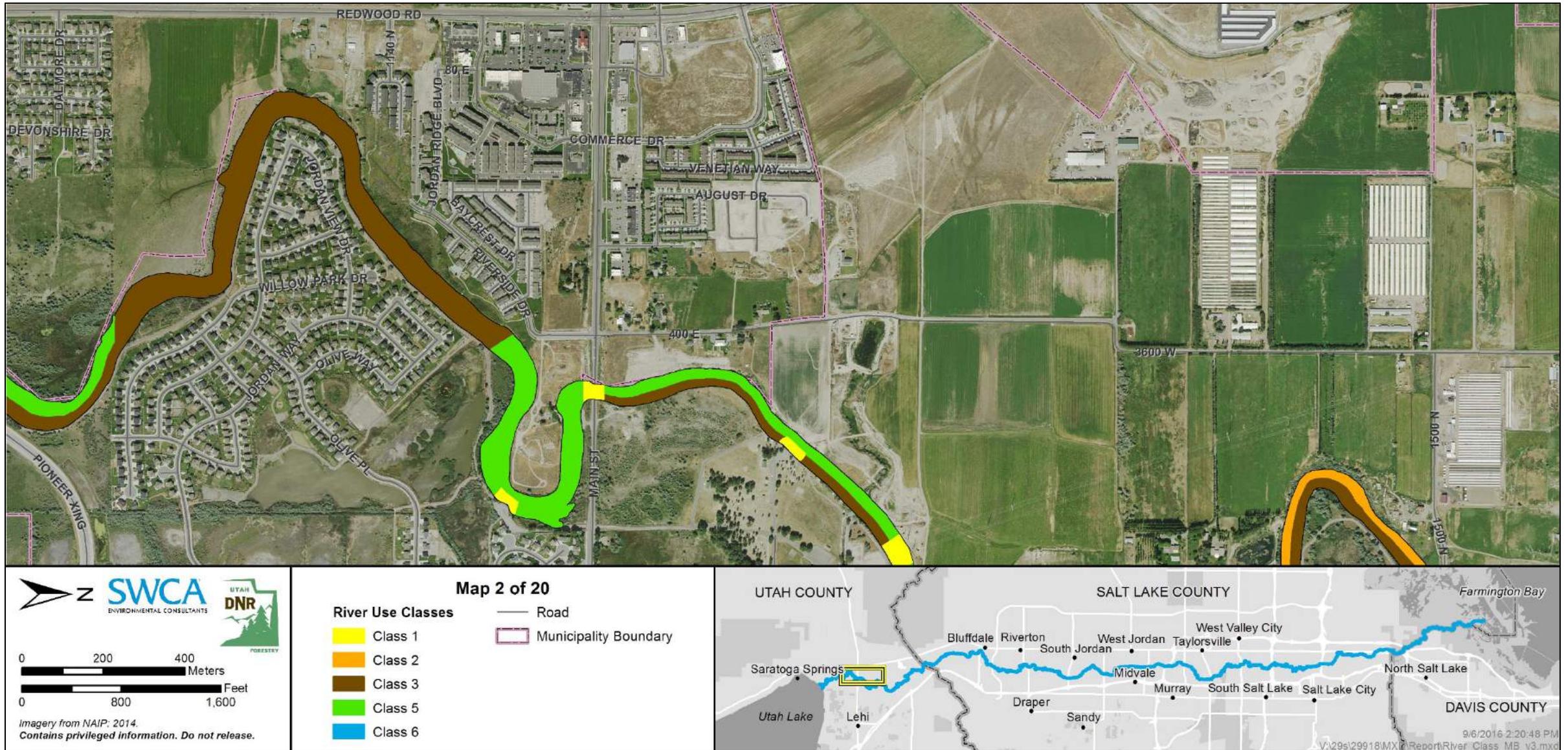


Figure 1.7. River use classes for the Jordan River, map 1.

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**Figure 1.7.** River use classes for the Jordan River, map 2.

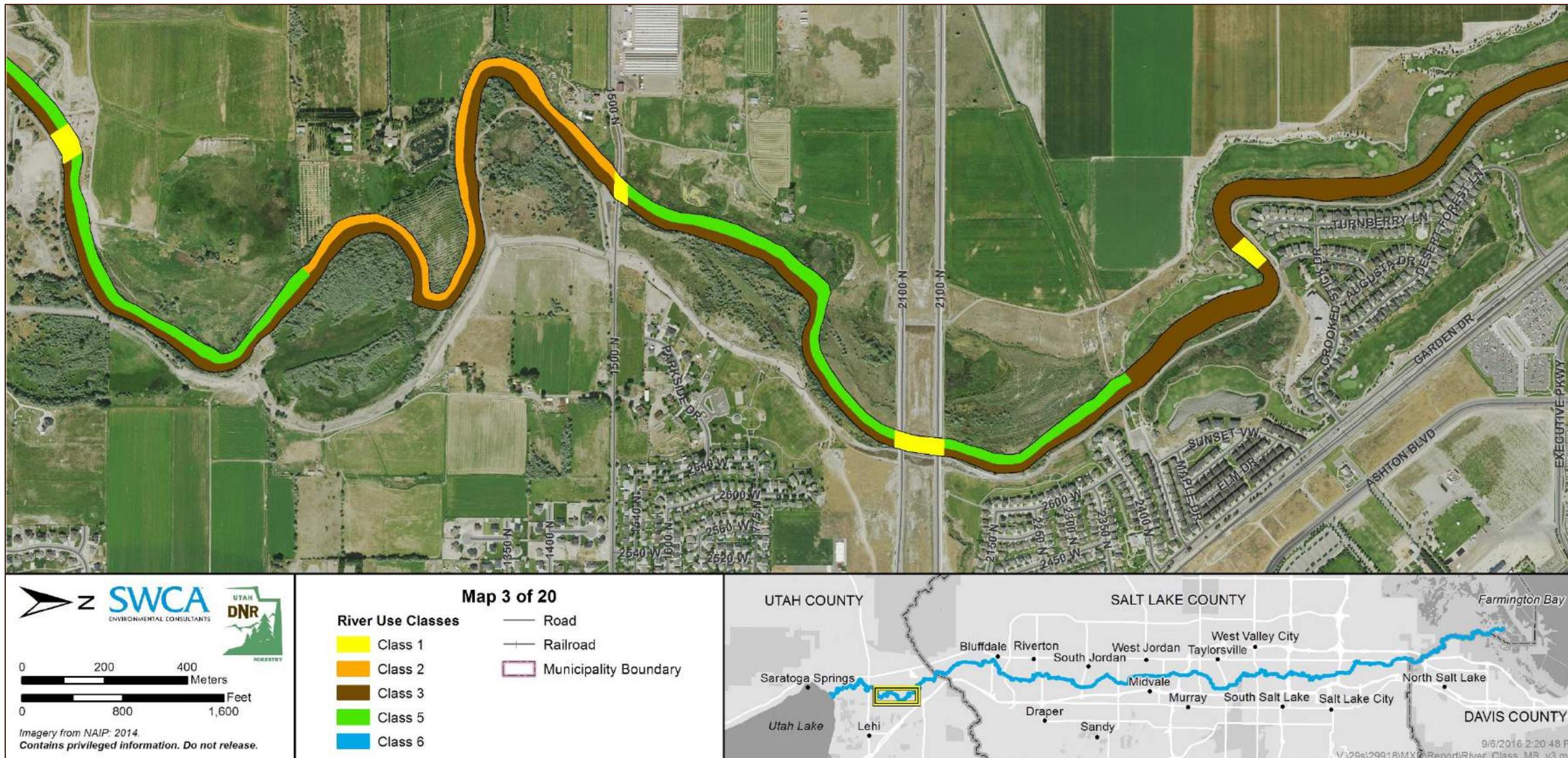


Figure 1.7. River use classes for the Jordan River, map 3.

Introduction

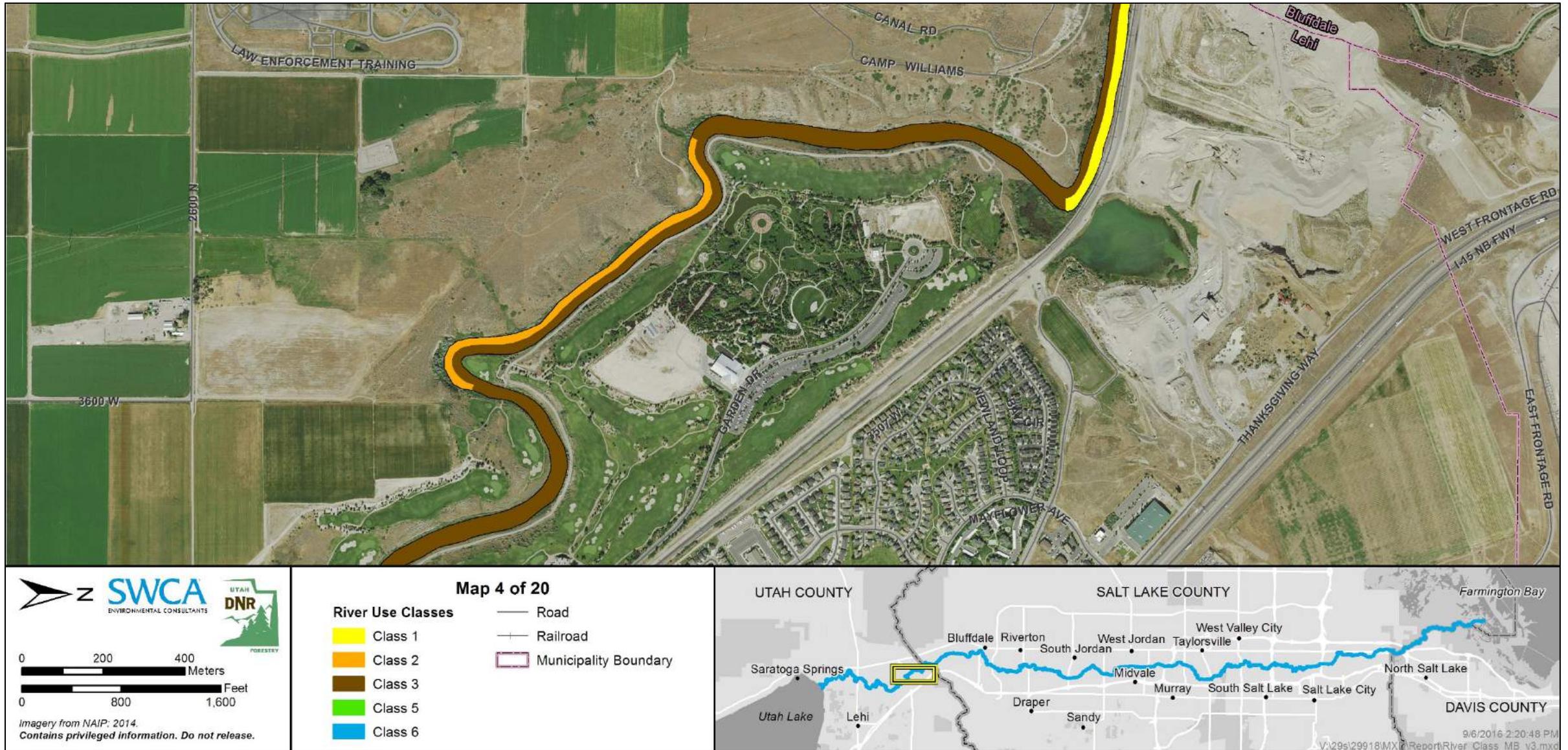


Figure 1.7. River use classes for the Jordan River, map 4.

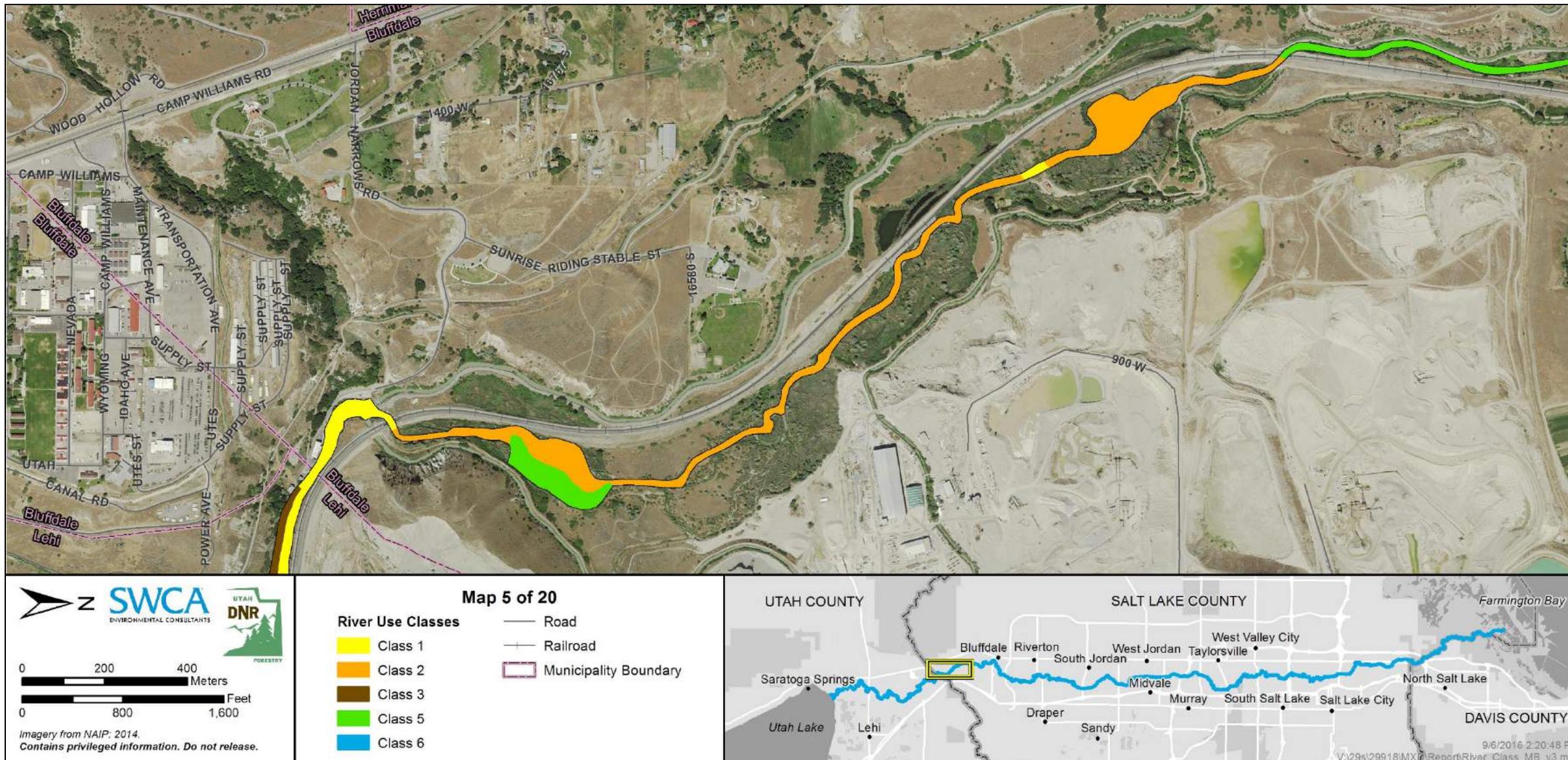


Figure 1.7. River use classes for the Jordan River, map 5.

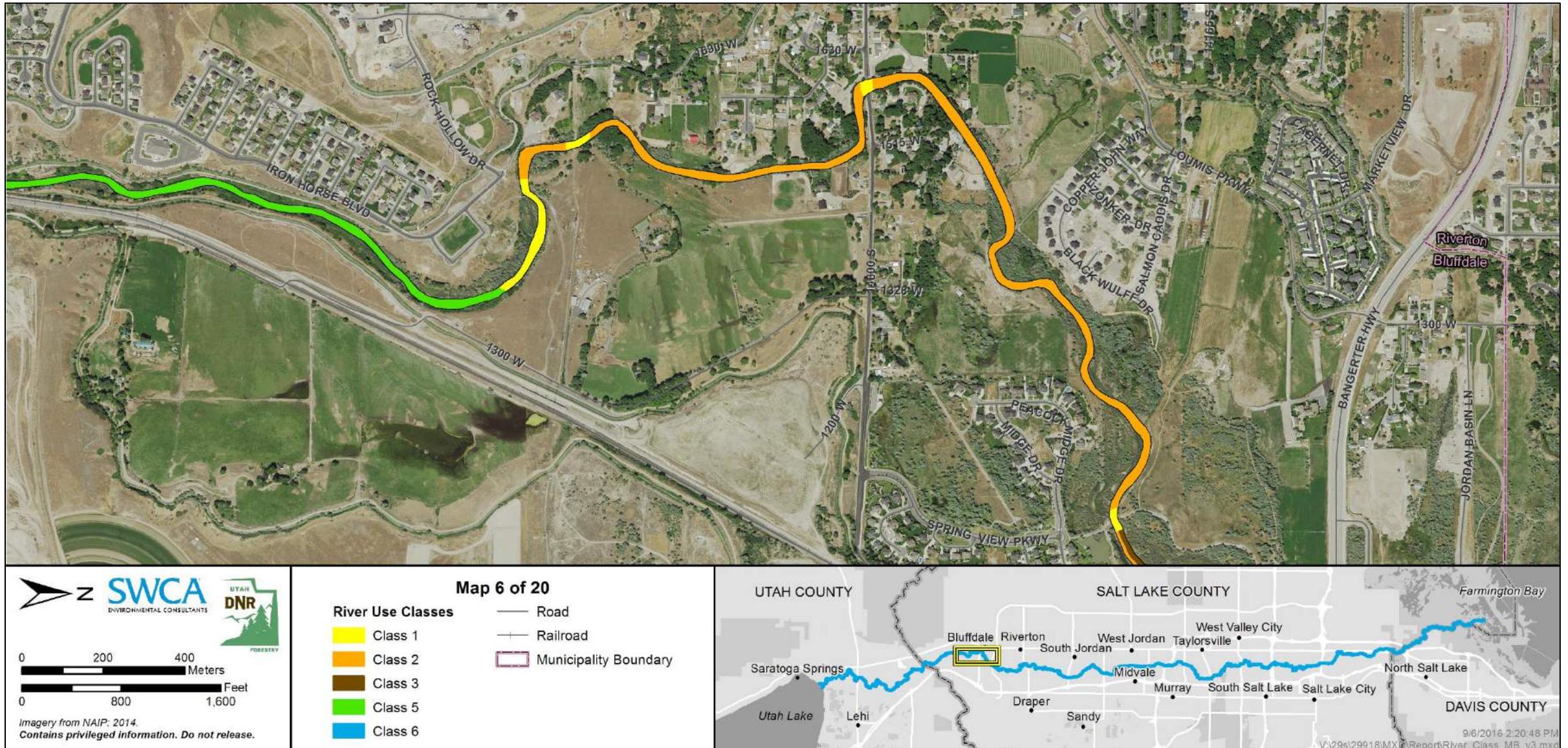


Figure 1.7. River use classes for the Jordan River, map 6.

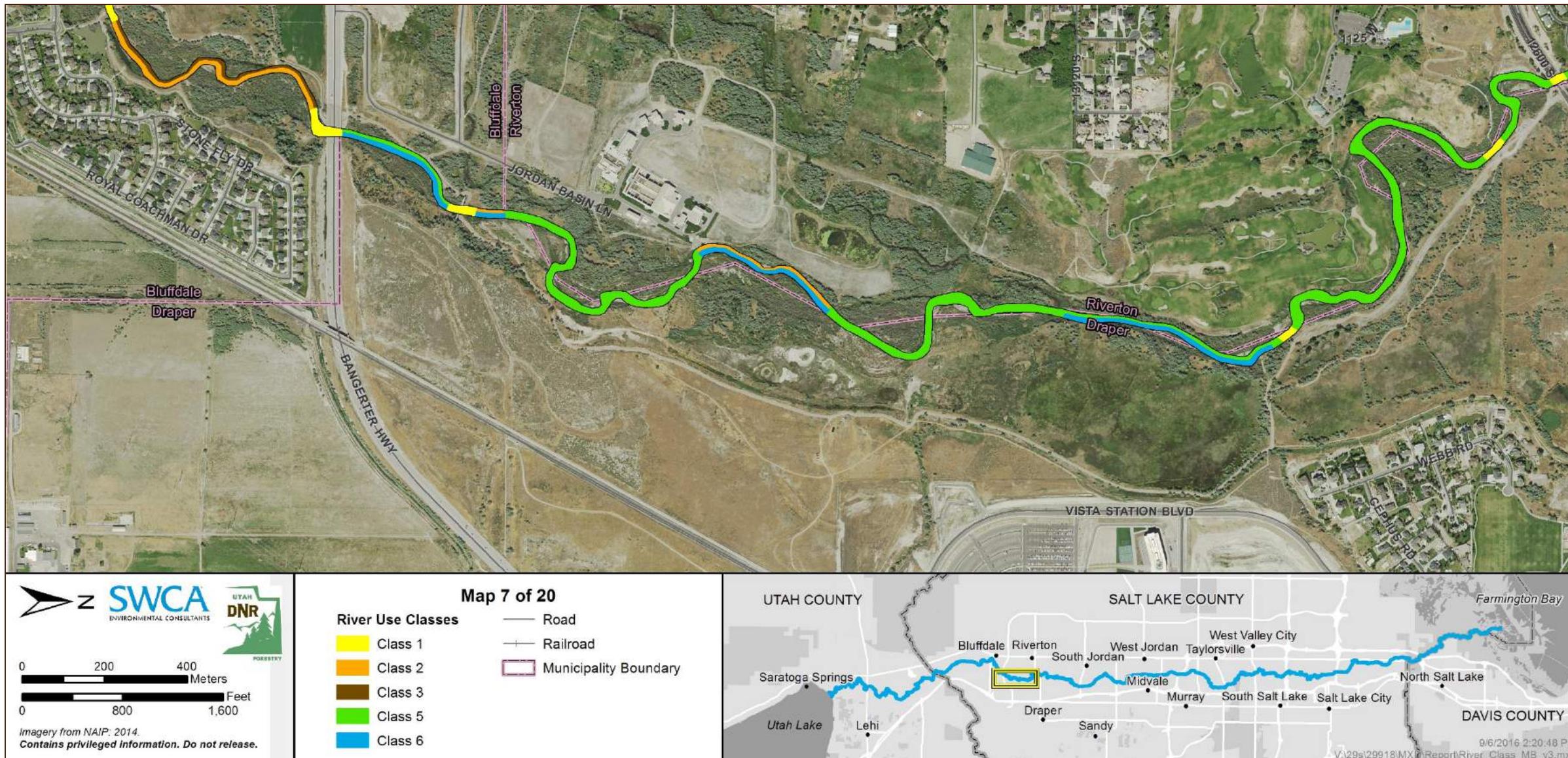


Figure 1.7. River use classes for the Jordan River, map 7.

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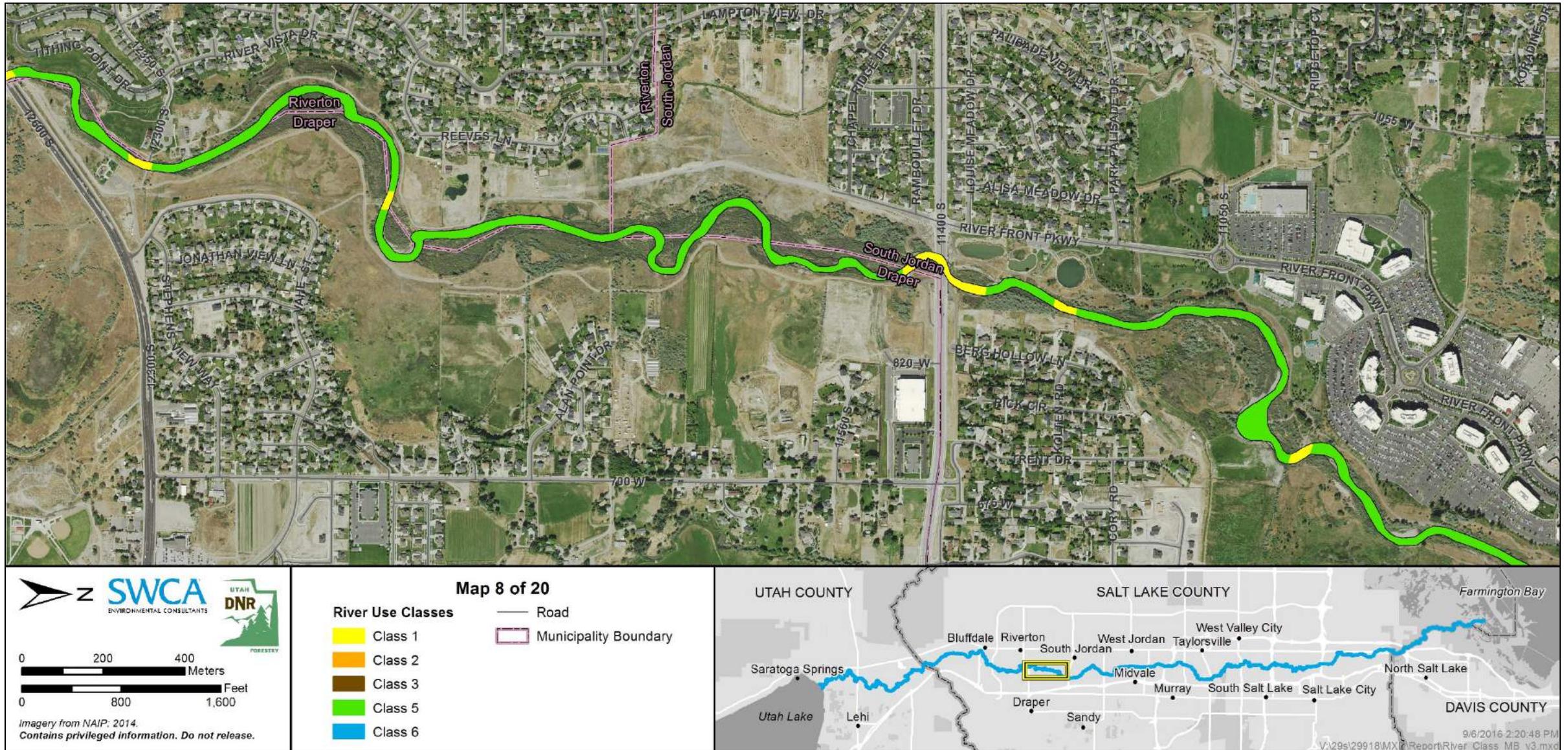


Figure 1.7. River use classes for the Jordan River, map 8.

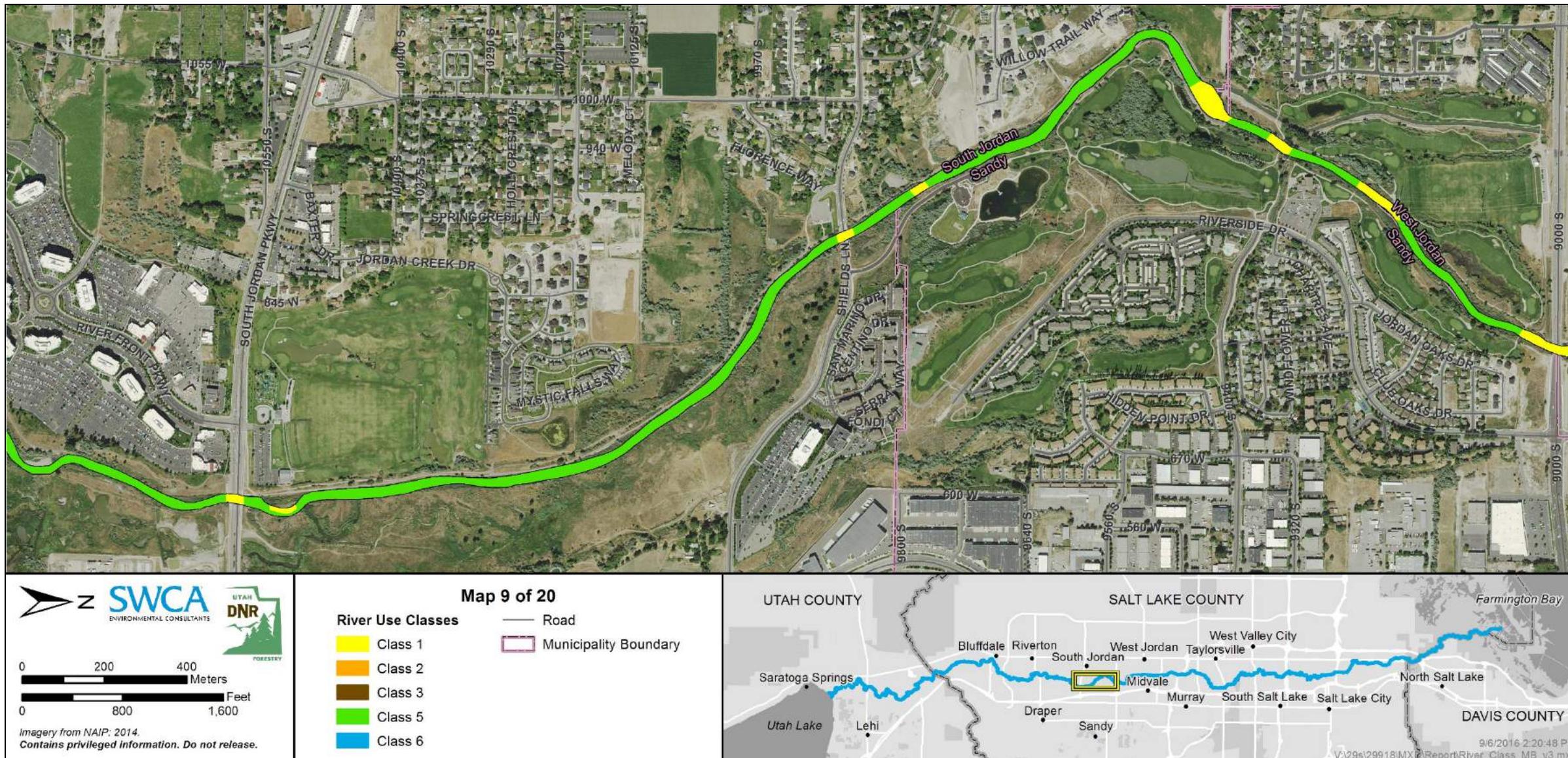
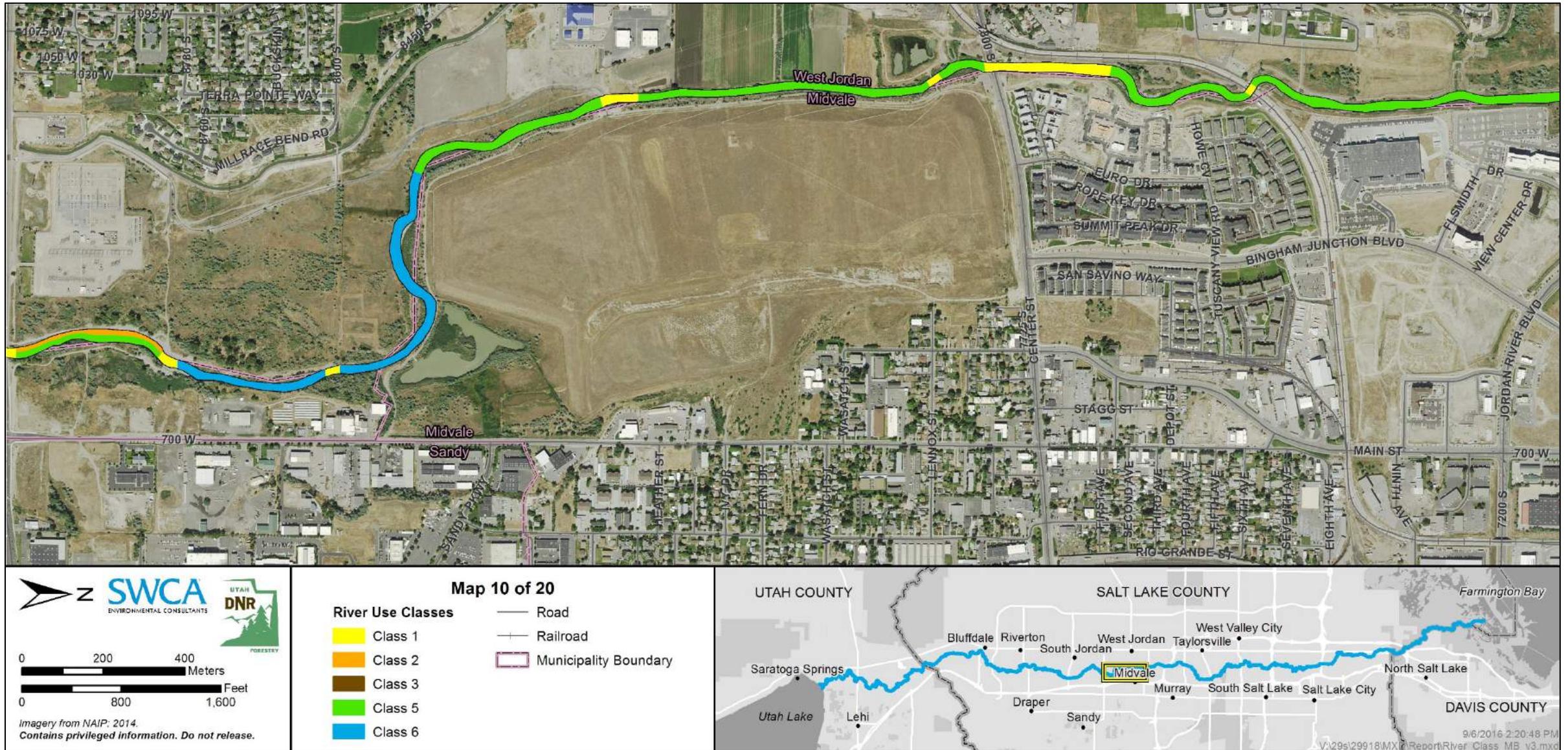


Figure 1.7. River use classes for the Jordan River, map 9.

# Introduction



**Figure 1.7.** River use classes for the Jordan River, map 10.

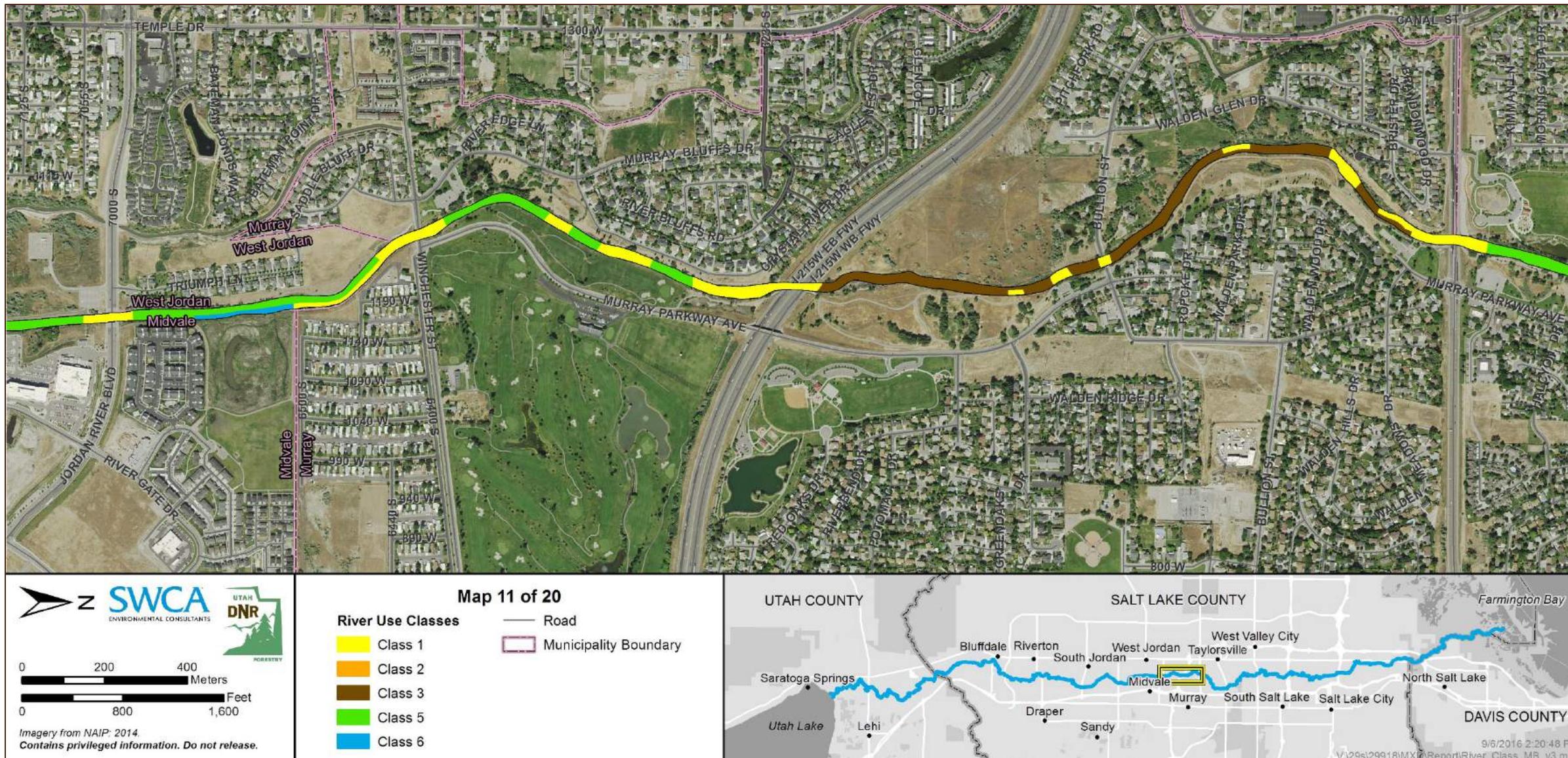


Figure 1.7. River use classes for the Jordan River, map 11.

# Introduction



**Figure 1.7.** River use classes for the Jordan River, map 12.

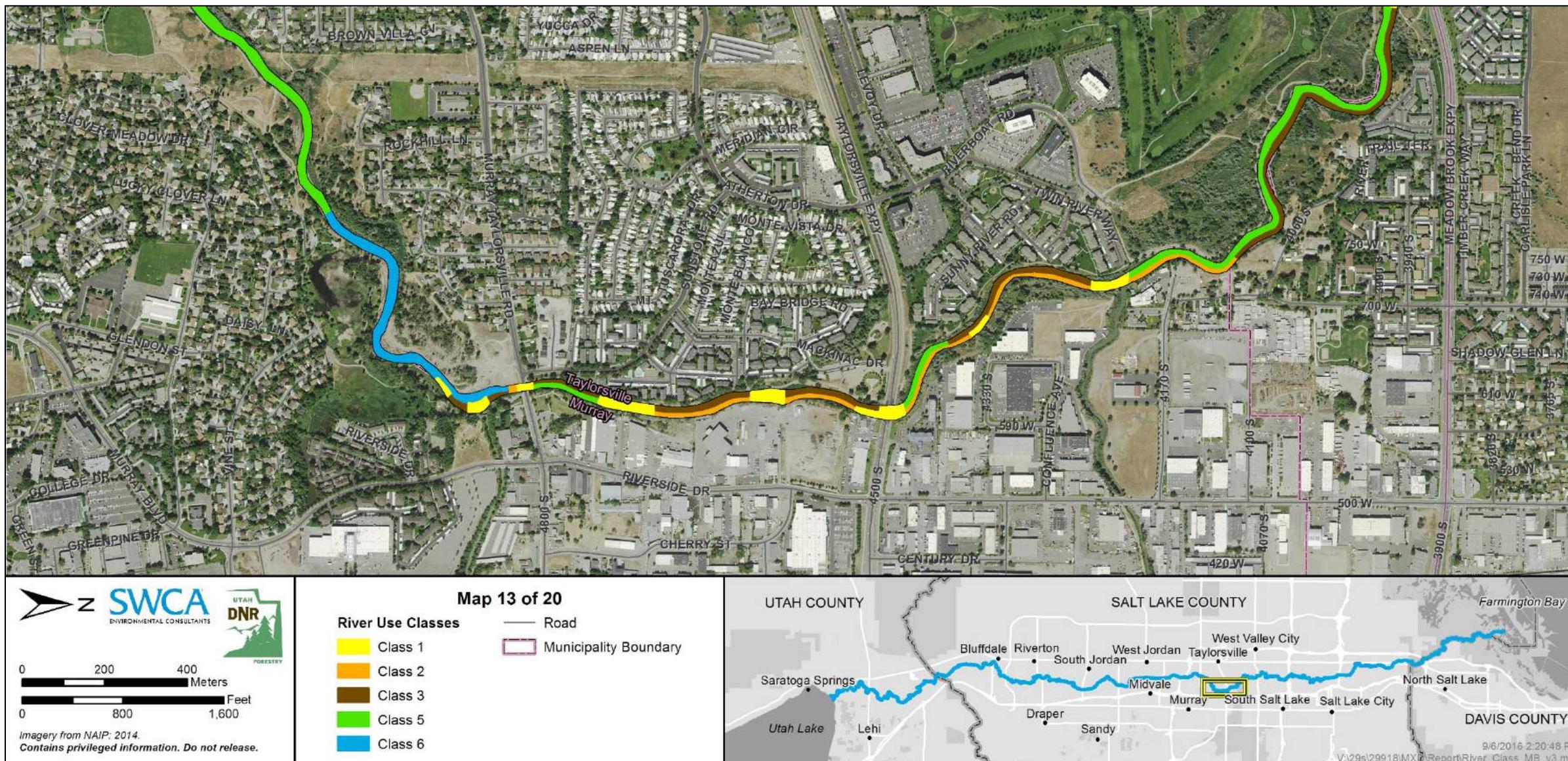
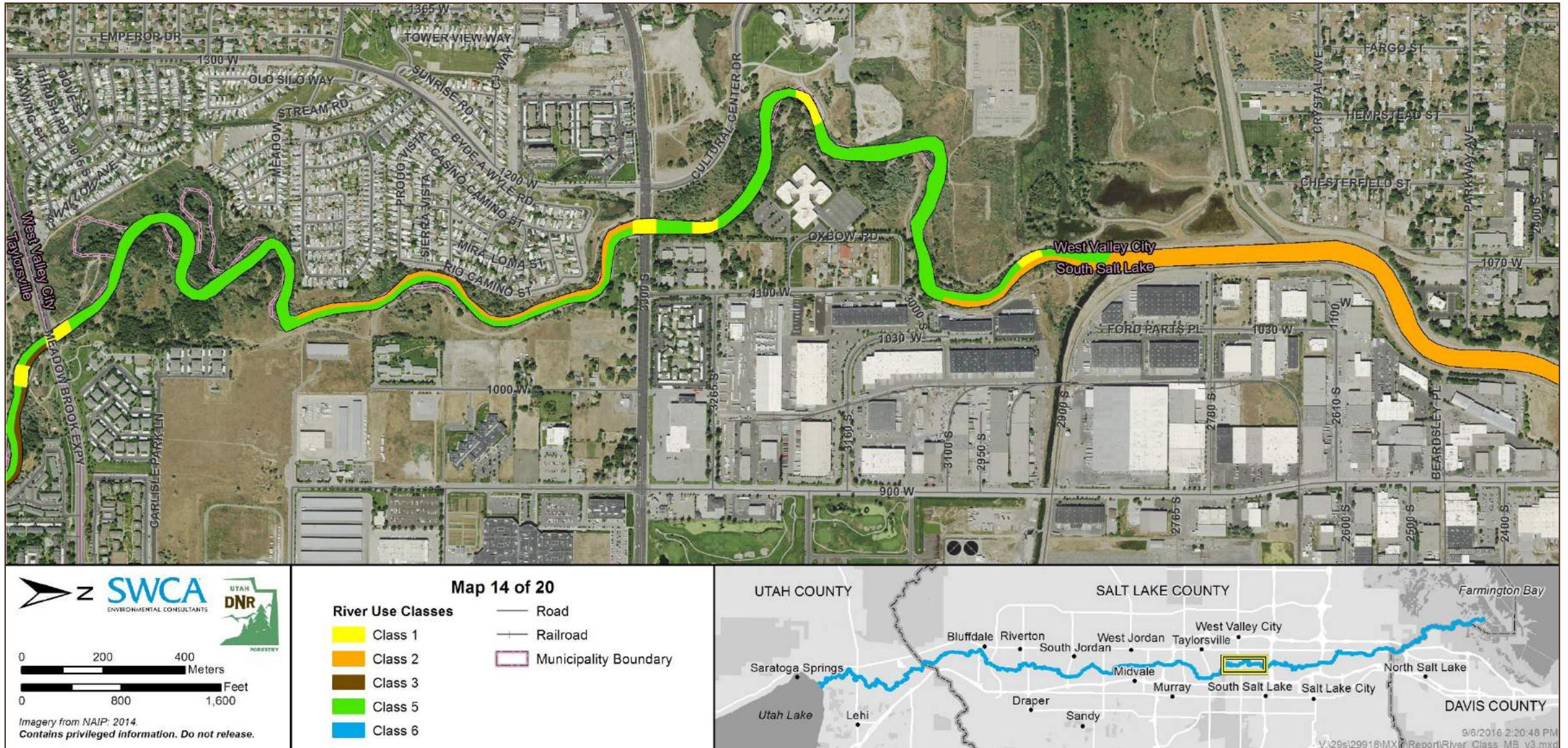


Figure 1.7. River use classes for the Jordan River, map 13.

# Introduction



**Figure 1.7.** River use classes for the Jordan River, map 14.

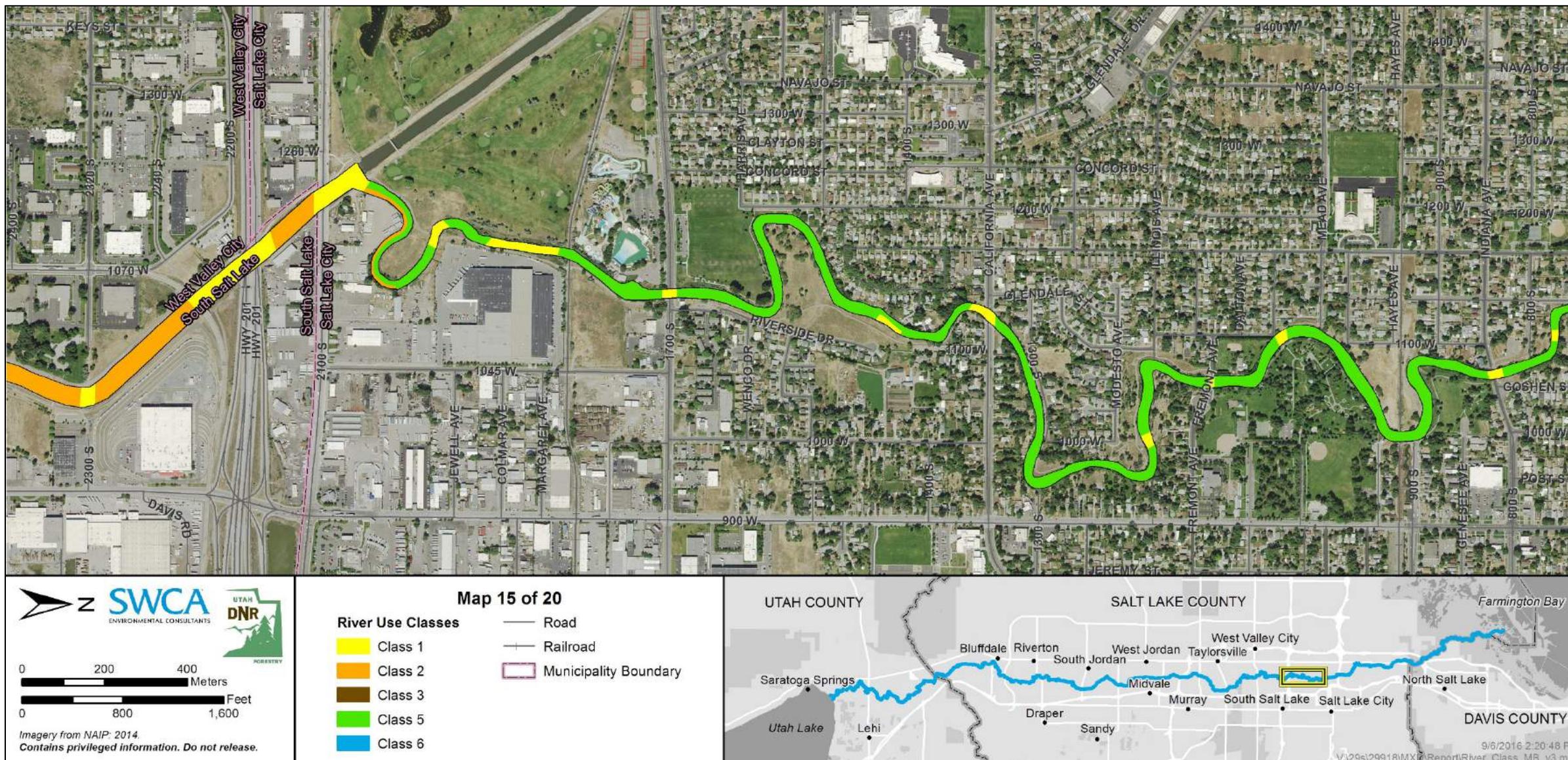
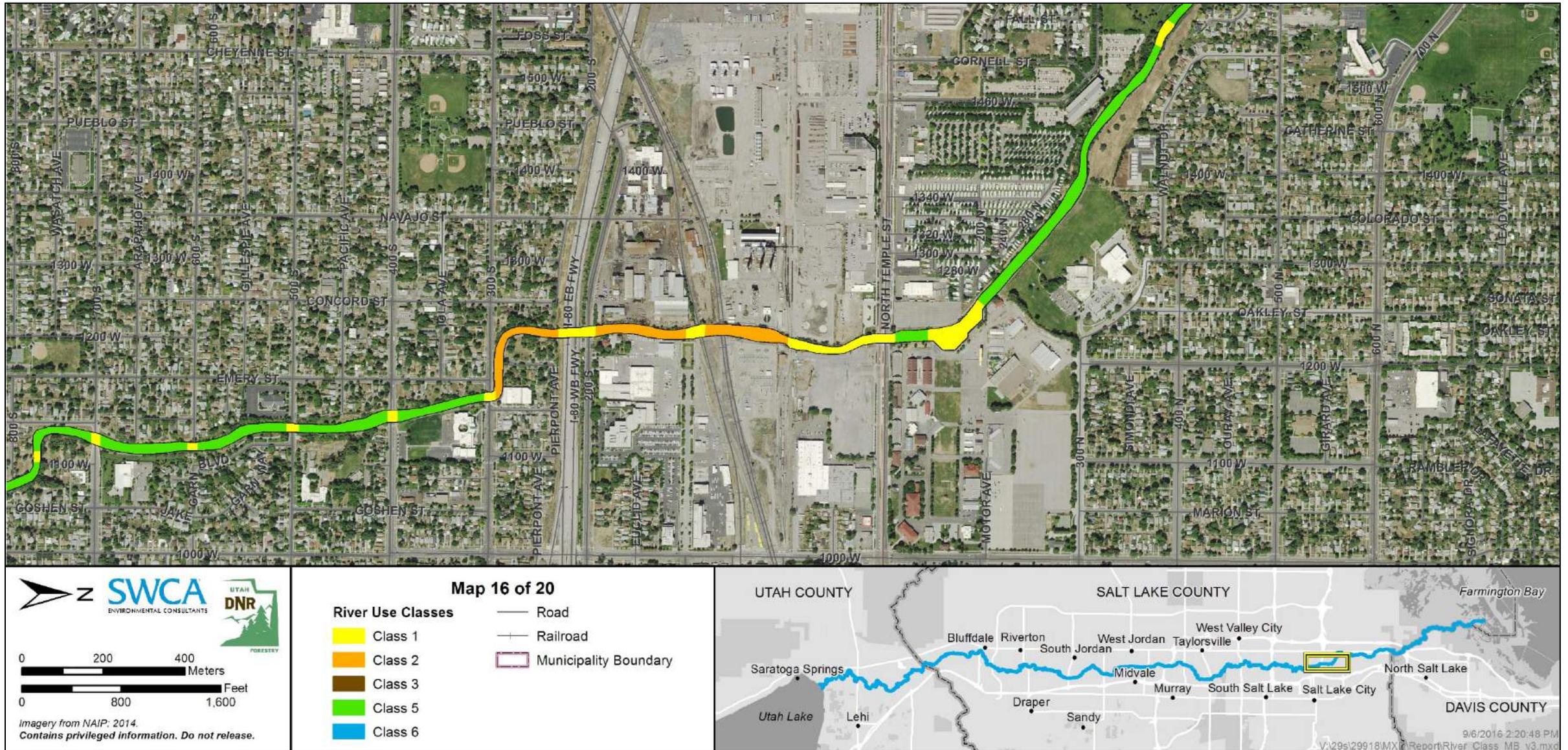


Figure 1.7. River use classes for the Jordan River, map 15.

# Introduction



**Figure 1.7.** River use classes for the Jordan River, map 16.



Figure 1.7. River use classes for the Jordan River, map 17.

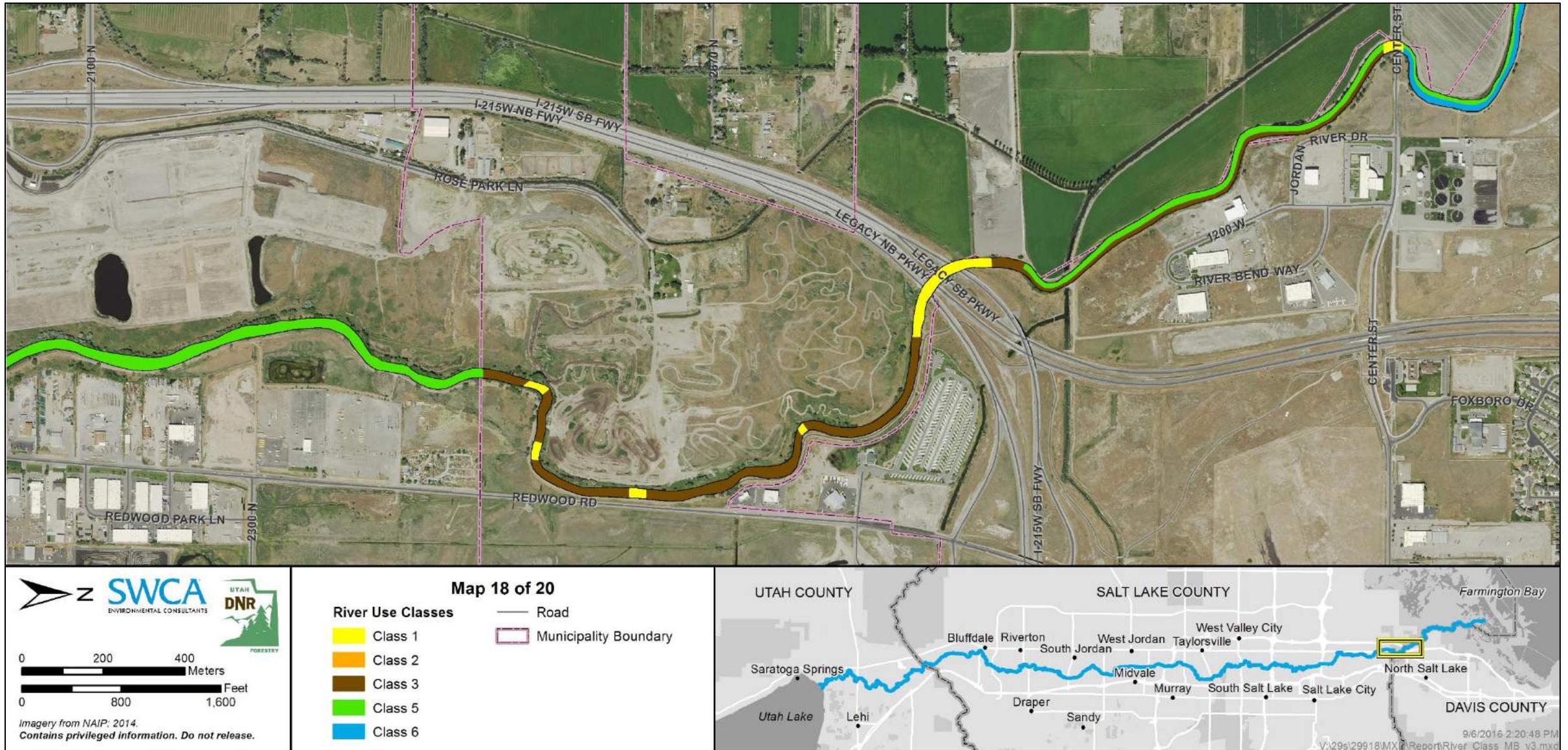


Figure 1.7. River use classes for the Jordan River, map 18.

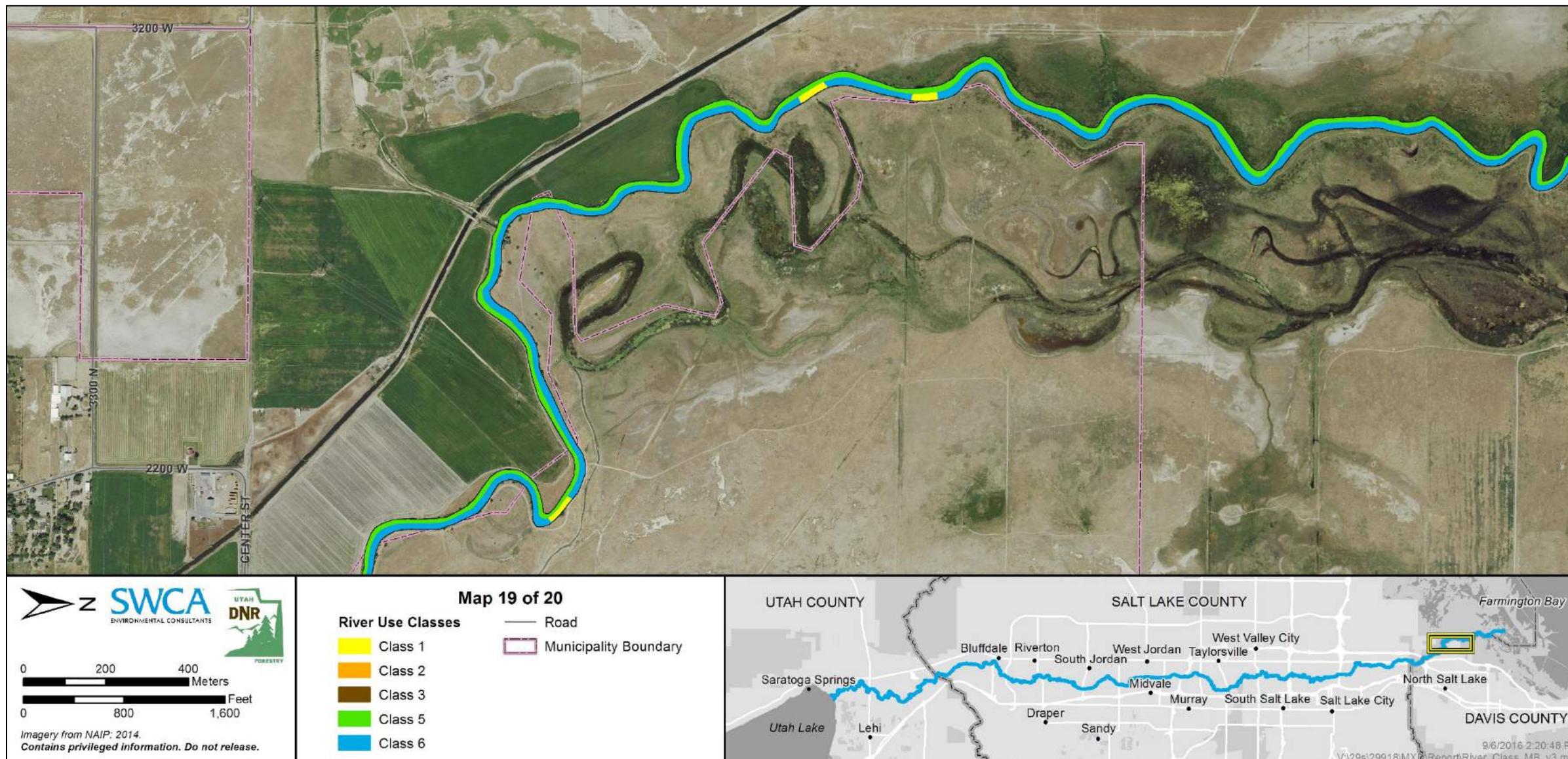


Figure 1.7. River use classes for the Jordan River, map 19.

# Introduction

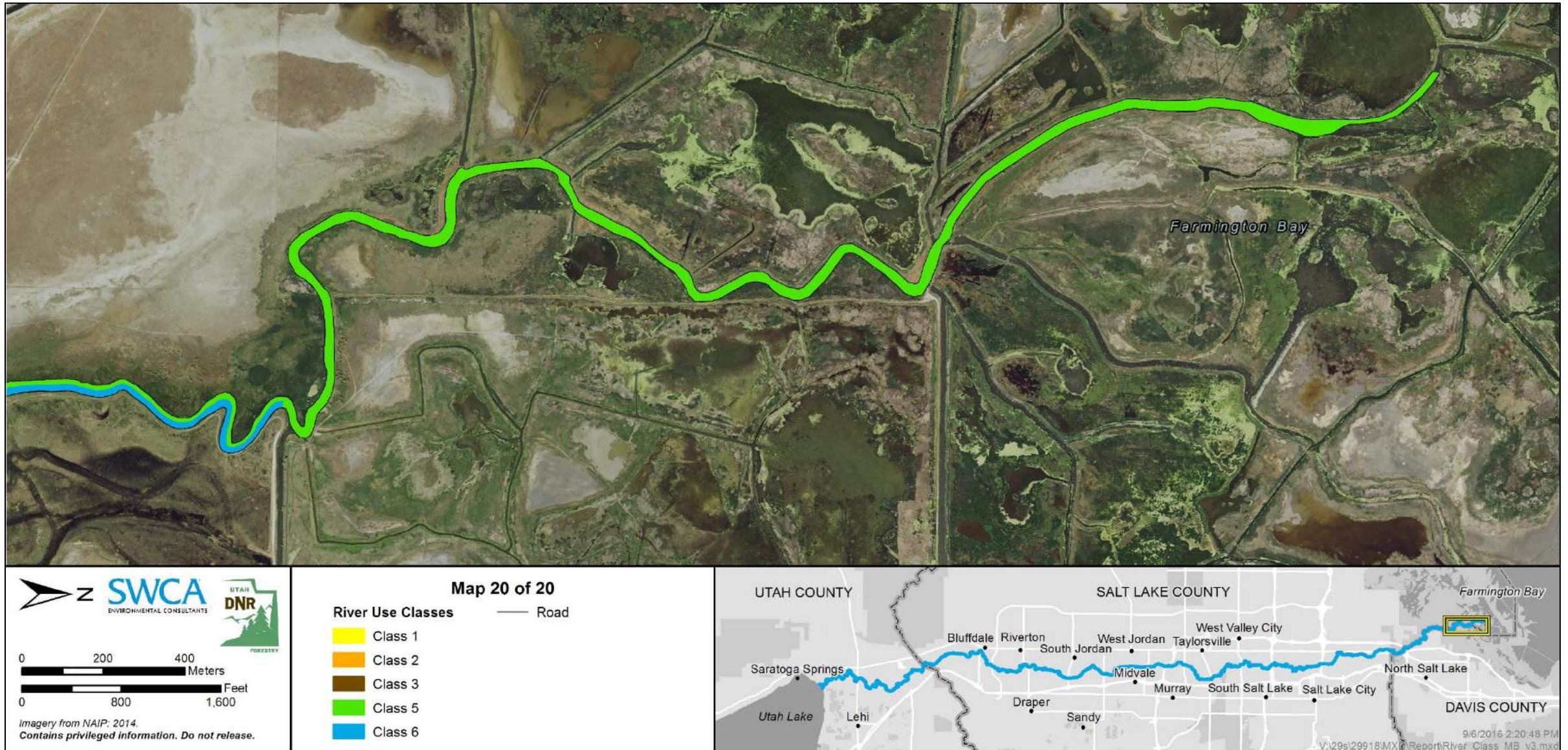
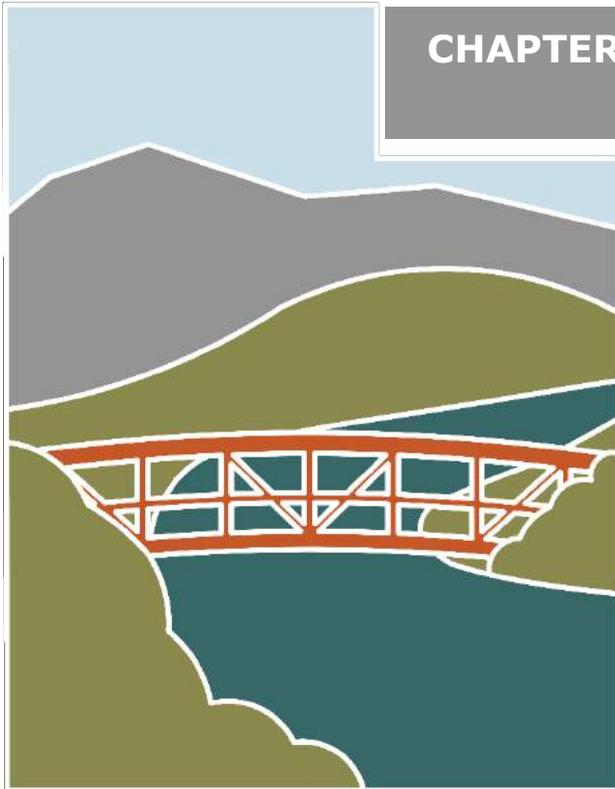


Figure 1.7. River use classes for the Jordan River, map 20.



### 2.1 Introduction

The Jordan River has arguably been a focal point for humans since their initial arrival in the Salt Lake and Utah Lake Valleys thousands of years ago. Approximately 50 miles long, the Jordan River corridor connects Utah Lake to Great Salt Lake. Over time, the river has provided irrigation, transportation, food and water, building materials, and recreation, as well as sewer and other community and ecosystem services.

In an excerpt from “Our Changing World” published in the *Audubon News* (1949),

C.W. Lockerbie recounts homesteading along the Jordan River in 1890:

*The Jordan River carried much more water then, consequently had a broader and more sharply defined channel than today. The banks on the undercut slope were generally vertical and unvegetated, while the opposite sites was covered with sand bar willow from the [main] stream edge back over the reclaimed channel to the valley floor. But before reaching the valley level, there often was a terrace on which grew an apparently different type of willow. Today in many places one cannot tell from a short distance where the river channel is located and the former sand bars are now mud bars, which support a thick growth of cattails, a plant I never saw on the Jordan*

*in the 90s. Factors contributing to this change are: impounding of all Utah County’s spring run-off in Utah Lake, to be diverted through various irrigation projects about the south end of Salt Lake Valley; the diversion of nearly all the Salt Lake County streams to city water mains or irrigation canals; the construction of a succession of dams along the river which retards the current and permits silting along most of its course; and the Surplus Canal which has been deepened below 21st South so that there is too little water current to keep the channel washed out.*

Conditions along the Jordan River have changed dramatically as a result of natural processes and human habitation. Under current conditions, vegetation communities, flow regimes, channel location, and water quality are different from what they were 1,000, 100, or even 10 years ago. Figure 2.1 illustrates a snapshot in time and demonstrates how a growing Salt Lake City in 1891 is beginning to encroach on the Jordan River and its floodplain. Figure 2.2 shows flooding near 800 South and 500 West in Salt Lake City, which likely happened with greater frequency until construction of the Surplus Canal and protective levees. As described by Lockerbie, the Jordan River was put to use, and Figures 2.3 and 2.4 illustrate construction of a dam near the Jordan Narrows and a water wheel, respectively. Finally, Figures 2.5 and 2.6 demonstrate what a difference 80 years can make and depict the North Temple bridge in 1933 and 2013, respectively. To offset many of the impacts and modifications to the Jordan River that have occurred over time, there is considerable stakeholder interest in restoration. Figure 2.7 depicts recent bank restoration and revegetation with native species. Unfortunately, unpermitted disposal of fill material on Jordan River sovereign lands continues, as illustrated in Figure 2.8. Recognition of the value of the larger Jordan River corridor and watershed to the community is implicit in this management plan, although it focuses specifically on FFSL’s mandate to manage state sovereign lands associated with this resource.



### HISTORIC JORDAN RIVER



**Figure 2.2.** Flooding near 800 South and 500 West in Salt Lake City. Used by permission, Utah State Historical Society.



**Figure 2.3.** Construction of a dam near the Jordan Narrows. Used by permission, Utah State Historical Society.



**Figure 2.4.** Water wheel on the Jordan River. Used by permission, Utah State Historical Society.

JORDAN RIVER THROUGH TIME



**Figure 2.5.** North Temple bridge in 1933. Used by permission, Utah State Historical Society.



**Figure 2.6.** North Temple bridge in 2013.

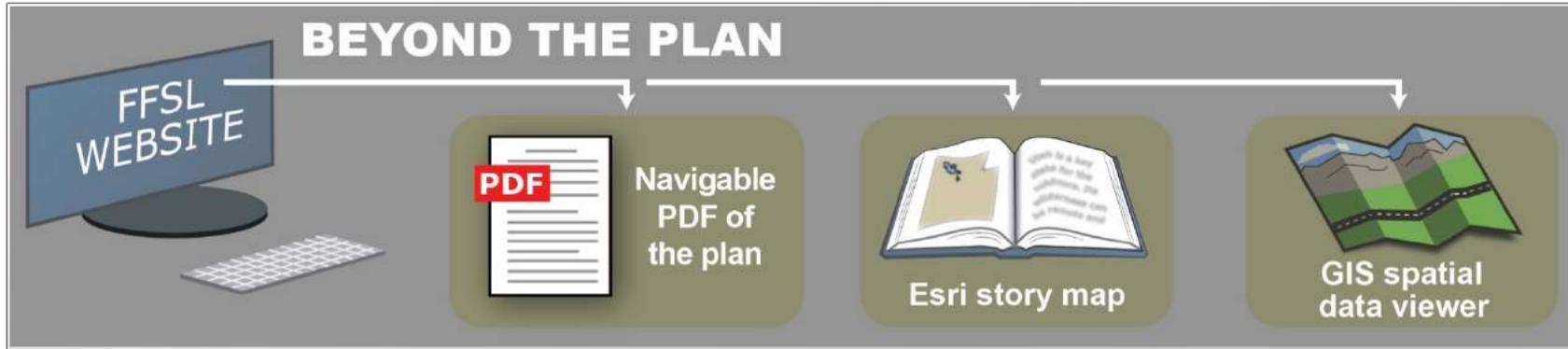
**EXAMPLES OF CURRENT SOVEREIGN LAND CONDITION**



**Figure 2.7.** Recent bank restoration along the Jordan River and revegetation with native species.



**Figure 2.8.** Unpermitted disposal of fill material along the Jordan River.



Finally, as an organizational construct, the Jordan River has been broken into eight segments, A through H, beginning at Utah Lake and terminating at Great Salt Lake. The eight river segments are shown on the GIS spatial data viewer on the FFSL website. These segments correspond to DWQ’s assessment units, which are currently used for water quality management. These segments also correspond to political boundaries, e.g., the boundary between Segments A and B at the Jordan

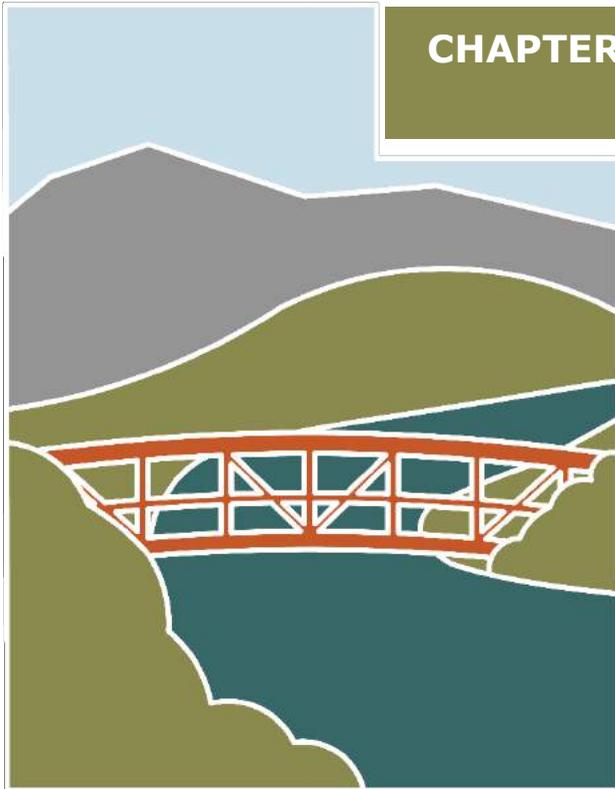
This chapter provides a description of current conditions on Jordan River sovereign lands and is based on the best available and relevant data; FFSL recognizes that a management document like this cannot be a complete inventory of all information, and gaps in our understanding of the Jordan River exist. Where applicable, the JRCMP calls out additional reading under each specific section in “Further Reading” boxes. For example, stakeholders who wish to know more about important habitats can reference the *Utah Comprehensive Wildlife Conservation Strategy* (DWR 2005a), whereas readers interested in water quality can review the *Jordan River Total Maximum Daily Load Water Quality Study – Phase 1* (Cirrus Ecological Solutions, LC [Cirrus] and Stantec Consulting Inc. [Stantec] 2013).

Information in this chapter is provided because it offers a perspective on developing management goals and objectives and in that sense is more relevant than other available information. As new data appear and management strategies change, the JRCMP can be updated in response. Planning documents like this typically provide comprehensive maps illustrating the resources and data presented. Because of the length of the Jordan River, the amount of resources, and the number of data layers, including a mapbook for each resource is too great for the planning document itself. Instead, these data are included in two online formats on the FFSL website: 1) an Esri story map, and 2) GIS spatial data viewer. Both formats are discussed in detail in Chapter 1.

Narrows is approximately the Utah-Salt Lake County line. The boundary of Segments G and H is the Salt Lake-Davis County line. There are also differences in river slope and adjacent land use that correspond roughly to segment breaks. That said, FFSL management decisions are more closely associated with river use classes than river segments, as described in Chapter 1. Ultimately, river segments provide a format to discuss similarities and differences in river condition, use, and local government programs, e.g., weed control and restoration. Table 2.1 illustrates the distribution of river use classes by segment in percentages.

**Table 2.1.** River Use Class Percentages by River Segment

Segment	Class 1	Class 2	Class 3	Class 5	Class 6
A	38%	17%	81%	14%	0%
B	4%	30%	0%	4%	0%
C	11%	9%	1%	24%	28%
D	14%	0%	4%	8%	15%
E	13%	38%	4%	11%	1%
F	9%	6%	0%	11%	0%
G	7%	0%	3%	11%	0%
H	5%	0%	6%	16%	56%



## 2.2 Ecosystem Resources

Ecosystem resources in the Jordan River planning area are discussed in two sections: Wildlife Habitat and Wildlife Species.

### Wildlife Habitat

#### INTRODUCTION

For the purposes of the plan, the term *habitat* refers to wildlife habitat. Wildlife habitat is a complex mix of plant and animal communities, water, geography, elevation, and other environmental components that provide food and cover

for individual species. A system such as the Jordan River and its adjacent lands and tributaries can provide wildlife species with a corridor where they can find food and cover. A healthy river corridor can also provide migration routes for wildlife to move through contiguous habitats and move between fragmented habitats.

This section discusses wildlife habitats, vegetation, and restoration. Vegetation is a critical element of wildlife habitat because healthy plant communities support the ecological integrity of habitats. Restoration is the primary management activity for improving and rehabilitating impaired habitats.

#### HABITATS

Generally speaking, Jordan River sovereign lands contain many of the high-priority key habitats for species of greatest conservation need according to the *Utah Comprehensive Wildlife Conservation Strategy* (DWR 2005a). These key habitats include lowland riparian, wetland, wet meadow, open water (standing), and open water (flowing). Identification of these key habitats

allows river stakeholders to prioritize conservation and restoration focus areas. However, to create a broader understanding of the landscape context and what DWR considers to be threats to habitats, the JRCMP uses Southwest Regional Gap Analysis Project (SWReGAP) data to define the variety of cover types through which the Jordan River flows. It should be noted that SWReGAP data are intended to be used at a scale of 1:100,000 and may be less accurate for linear subjects like the Jordan River. Using this readily available mapping data, vegetation was classified using the major land cover types predicted to occur in the planning area. Land cover types are defined as recurring groups of biological communities found in similar physical environments and influenced by similar ecological process, such as fire or flooding (U.S. Geological Survey [USGS] National GAP Analysis Program 2005). Similar land cover types were then grouped together into more generic habitats, resulting in seven terrestrial and aquatic wildlife habitats (Table 2.2). Habitat cover percentages were calculated using SWReGAP data based on the cumulative length of the adjacent habitat types along the east and west banks of the river.

**Table 2.2.** Habitat Types and Percentages in the Planning Area

Habitat Type	Percentage of the Planning Area
Aquatic (DWR key habitat)*	N/A
Wetland (DWR key habitat)	4%
Annual grassland	< 1%
Agriculture	22%
Developed (open space to low intensity and medium to high intensity)	52%
Shrubland	< 1%
Riparian (DWR key habitat)	21%

\* Aquatic habitat is the approximately 50-mile-long Jordan River and is comparable to DWR’s open water habitat.

Physical features and characteristic species of the seven planning area habitats are described and illustrated below (Figures 2.9 through 2.15).

**AQUATIC**

**Physical features**

Consists of the approximately 50-mile-long Jordan River.  
Comprises the riverine portion of the planning area.

**Plant species**

Submerged aquatic vegetation includes fineleaf pondweed (*Stuckenia filiformis*), sago pondweed (*Stuckenia pectinata*), longleaf pondweed (*Potamogeton nodosus*), and spiral ditchgrass (*Ruppia cirrhosa*). Floating vegetation includes duckweeds (*Lemna* spp.).

**Mammal species**

Muskrat (*Ondatra zibethicus*) and North American beaver (*Castor canadensis*).

**Bird species**

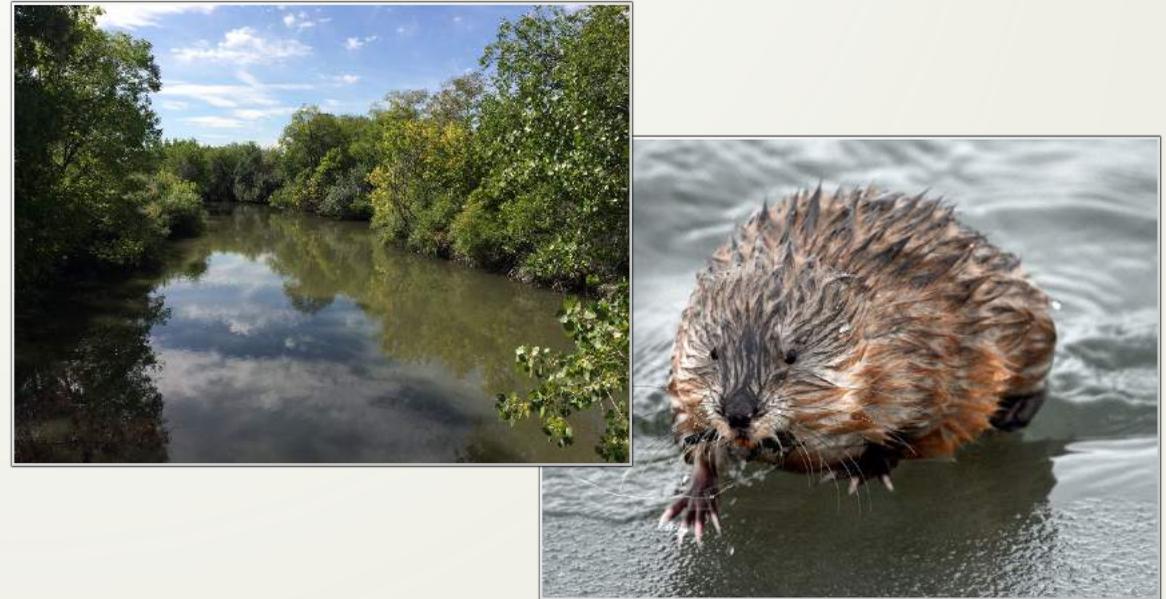
Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), gadwall (*Anas strepera*), American wigeon (*Anas americana*), northern shoveler (*Anas clypeata*), northern pintail (*Anas acuta*), redhead (*Aythya americana*), ring-necked duck (*Aythya collaris*), common goldeneye (*Bucephala clangula*), common merganser (*Mergus merganser*), pied-billed grebe (*Podilymbus podiceps*), double-crested cormorant (*Phalacrocorax auritus*), American white pelican (*Pelecanus erythrorhynchos*), great blue heron (*Ardea herodias*), snowy egret (*Egretta thula*), black-crowned night-heron (*Nycticorax nycticorax*), white-faced ibis (*Plegadis chihi*), American coot (*Fulica americana*), osprey (*Pandion haliaetus*), California gull (*Larus californicus*), ring-billed gull (*Larus delawarensis*), belted kingfisher (*Megaceryle alcyon*), Forster's tern (*Sterna forsteri*), Caspian tern (*Hydroprogne caspia*), barn swallow (*Hirundo rustica*), bank swallow (*Riparia riparia*), cliff swallow (*Petrochelidon pyrrhonota*), and northern rough-winged swallow (*Stelgidopteryx serripennis*).

**Fish species**

Carp (*Cyprinus* spp.), redbreast shiner (*Richardsonius balteatus*), speckled dace (*Rhinichthys osculus*), Utah chub (*Gila atraria*), Utah sucker (*Catostomus ardens*), black bullhead (*Ameiurus melas*), channel catfish (*Ictalurus punctatus*), white bass (*Morone chrysops*), largemouth bass (*Micropterus salmoides*), green sunfish (*Lepomis cyanellus*), and bluegill (*Lepomis macrochirus*).

**Reptile and amphibian species**

Common slider (*Pseudemys scripta*), western (boreal) toad (*Anaxyrus* [syn. *Bufo*] *boreas*), western chorus frog (*Pseudacris triseriata*), American bullfrog (*Rana catesbeiana*), and tiger salamander (*Ambystoma tigrinum*).



**Figure 2.9.** Aquatic habitat and characteristic species.

## WETLAND

### Physical features

Covers approximately 4% of the length of the planning area.

Includes emergent marsh, wet meadow, and shrubby wetlands.

May occur in depressions in the landscape and along slow-moving areas of the river.

### Plant species

Common emergent and floating vegetation includes bulrushes (*Schoenoplectus acutus*, *S. americanus*, and *S. pungens*), broadleaf cattail (*Typha latifolia*), arctic rush (*Juncus arcticus* var. *balticus*), pondweeds (*Potamogeton* spp.), knotweeds (*Polygonum* spp.), duckweeds, common reed (*Phragmites australis*), and reed canarygrass (*Phalaris arundinacea*).

Shrubby wetland areas typically dominated or co-dominated by willow species (*Salix* spp.), mainly narrowleaf willow (*S. exigua*). If an herbaceous layer is present, it is usually dominated by graminoids (grasses, sedges, and rushes).

### Mammal species

Muskrat, common raccoon (*Procyon lotor*), and western jumping mouse (*Zapus princeps*).

### Bird species

Canada goose, mallard, northern shoveler, cinnamon teal (*Anas cyanoptera*), green-winged teal (*Anas crecca*), ruddy duck (*Oxyura jamaicensis*), great blue heron, snowy egret, black-crowned night-heron, white-faced ibis, American coot, killdeer, American avocet, black-necked stilt (*Himantopus mexicanus*), Franklin's gull (*Leucophaeus pipixcan*), California gull, ring-billed gull, Virginia rail (*Rallus limicola*), northern harrier (*Circus cyaneus*), spotted sandpiper (*Actitis macularius*), Forster's tern, northern rough-winged swallow, barn swallow, cliff swallow, bank swallow, marsh wren (*Cistothorus palustris*), common yellowthroat (*Geothlypis trichas*), song sparrow (*Melospiza melodia*), savannah sparrow (*Passerculus sandwichensis*), red-winged blackbird (*Agelaius phoeniceus*), and yellow-headed blackbird (*Xanthocephalus xanthocephalus*).

### Fish species

Mosquitofish (*Gambusia affinis*), fathead minnow (*Pimephales promelas*), and green sunfish.

### Reptile and amphibian species

Western chorus frog, Woodhouse's toad (*Anaxyrus woodhousii*), spadefoot toads (*Scaphiopus* spp. and *Spea* spp.), and western garter snake (*Thamnophis elegans*).



**Figure 2.10.** Wetland habitat and characteristic species.

**ANNUAL GRASSLAND**

**Physical features**

Covers less than 1% of the length of the planning area.

**Plant species**

Dominated by introduced annual grass species such as cheatgrass (*Bromus tectorum*), other brome species (*Bromus* spp.), and oat species (*Avena* spp.).

**Mammal species**

Rock squirrel (*Otospermophilus variegatus*), mule deer (*Odocoileus hemionus*), northern pocket gopher (*Thomomys talpoides*), meadow vole (*Microtus pennsylvanicus*), western spotted skunk (*Spilogale gracilis*), red fox (*Vulpes vulpes*), coyote (*Canis latrans*), and sagebrush vole (*Lemmiscus curtatus*).

**Bird species**

Killdeer (*Charadrius vociferus*), ring-necked pheasant (*Phasianus colchicus*), California quail (*Callipepla californica*), northern harrier, American kestrel (*Falco sparverius*), western kingbird (*Tyrannus verticalis*), horned lark (*Eremophila alpestris*), vesper sparrow (*Pooecetes gramineus*), green-tailed towhee (*Pipilo chlorurus*), spotted towhee (*Pipilo maculatus*), western meadowlark (*Sturnella neglecta*), and brewer's blackbird (*Euphagus cyanocephalus*).

**Reptile species**

Western yellow-bellied racer (*Coluber constrictor mormon*), wandering western garter snake (*Thamnophis elegans vagrans*), Great Basin gopher snake (*Pituophis catenifer deserticola*), and Great Basin rattlesnake (*Crotalus viridis lutosus*).



**Figure 2.11.** Annual grassland habitat and characteristic species.

## AGRICULTURE

### Physical features

Covers approximately 22% of the length of the planning area.

### Plant species

Areas of grasses, legumes, or grass-legume mixtures planted for the production of seed or hay crops, or planted for livestock grazing.

### Mammal species

Western harvest mouse (*Reithrodontomys megalotis*), deer mouse (*Peromyscus maniculatus*), mule deer, mountain cottontail (*Sylvilagus nuttallii*), and striped skunk (*Mephitis mephitis*).

### Bird species

Canada goose, white-faced ibis, sandhill crane (*Grus canadensis*), killdeer, Franklin's gull, California gull, ring-billed gull, ring-necked pheasant, wild turkey (*Meleagris gallopavo*), turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), rough-legged hawk (*Buteo lagopus*), American kestrel, Eurasian collard-dove (*Streptopelia decaocto*), mourning dove (*Zenaida macroura*), western kingbird, black-billed magpie (*Pica hudsonia*), American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*), western meadowlark, brewer's blackbird, barn swallow, American robin (*Turdus migratorius*), and horned lark.

### Reptile and amphibian species

Great Basin spadefoot (*Spea intermontana*), western yellow-bellied racer, western garter snake, Great Basin gopher snake, and Great Basin rattlesnake.



**Figure 2.12.** Agriculture habitat and characteristic species.

DEVELOPED

**Physical features**

Covers approximately 52% of the length of the planning area.

Includes SWReGAP land cover classifications for open space to low intensity development and medium to high intensity development.

Developed, open space to low intensity includes areas with a mixture of constructed materials and vegetation, with impervious surfaces accounting for < 20% to 49% of total cover. This habitat includes open spaces, golf courses, preserves, parks, natural areas, parkways, gardens, and single-family housing units.

Developed, medium to high intensity includes areas with a mixture of constructed materials and vegetation, with impervious surfaces accounting for 50% to 100% of total cover. This habitat includes single-family housing units; apartment complexes; and commercial, industrial, and disturbed areas.

**Plant species**

Dominated by turf grass species and landscape or ornamental trees and shrubs. Common weed species include field bindweed (*Convolvulus arvensis*), black medic (*Medicago lupulina*), puncturevine (*Tribulus terrestris*), lambsquarter (*Chenopodium album*), common mallow (*Malva neglecta*), and cheatgrass.

**Mammal species**

Common raccoon, striped skunk, mule deer, deer mouse, little brown bat (*Myotis lucifugus*), rock squirrel, northern pocket gopher, brown (Norway) rat (*Rattus norvegicus*), black rat (*Rattus rattus*), and house mouse (*Mus musculus*).

**Bird species**

Canada goose, mallard, American coot, killdeer, California gull, California quail, red-tailed hawk, Cooper's hawk (*Accipiter cooperi*), Eurasian collard-dove, rock pigeon (*Columba livia*), black-chinned hummingbird (*Archilochus alexandri*), broad-tailed hummingbird (*Selasphorus platycercus*), downy woodpecker (*Picoides pubescens*), northern flicker (*Colaptes auratus*), American robin, house finch (*Haemorhous mexicanus*), black-capped chickadee (*Poecile atricapillus*), mourning dove, Woodhouse's scrub-jay (*Aphelocoma woodhouseii*), black-billed magpie, American crow, European starling (*Sturnus vulgaris*), black-headed grosbeak (*Pheucticus melanocephalus*), bullock's oriole (*Icterus bullockii*), song sparrow, American goldfinch (*Spinus tristis*), lesser goldfinch (*Spinus psaltria*), and house sparrow (*Passer domesticus*).

**Amphibian species**

Woodhouse's toad.



Figure 2.13. Developed habitat and characteristic species.

## SHRUBLAND

### Physical features

Covers less than 1% of the length of the planning area.

### Plant species

Dominated or co-dominated by basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and rabbitbrush [rubber rabbitbrush (*Ericameria nauseosa*) and yellow rabbitbrush (*Chrysothamnus viscidiflorus*)]. Other shrubs include shadscale saltbush (*Atriplex confertifolia*), spiny hopsage (*Grayia spinosa*), and greasewood (*Sarcobatus vermiculatus*). The herbaceous layer is typically composed of western wheatgrass (*Pascopyrum smithii*) and annual grasses like cheatgrass. The invasive forb hoary cress (*Cardaria draba*) is also common.

### Mammal species

Common raccoon, striped skunk, mule deer, deer mouse, little brown bat, rock squirrel, northern pocket gopher, brown (Norway) rat, black rat, and house mouse.

### Bird species

California quail, ring-necked pheasant, red-tailed hawk, mourning dove, black-chinned hummingbird, western kingbird, Woodhouse's scrub-jay, black-billed magpie, vesper sparrow, savannah sparrow, green-tailed towhee, spotted towhee, lazuli bunting (*Passerina amoena*), brewer's blackbird, yellow-breasted chat (*Icteria virens*), and horned lark.

### Reptile and amphibian species

Western garter snake and Woodhouse's toad.



**Figure 2.14.** Shrubland habitat and characteristic species.

**RIPARIAN**

**Physical features**

Covers approximately 21% of the length of the planning area.

Commonly occurs as a mosaic of multiple vegetation types that are dominated by trees and have a diverse shrub component.

Disturbance-driven system that requires annual to episodic flooding.

**Plant species**

Dominant native trees include boxelder (*Acer negundo*), peachleaf willow (*Salix amygdaloides*), and cottonwoods (e.g., *Populus fremontii*). Introduced tree species such as Siberian elm (*Ulmus pumila*), Russian olive (*Elaeagnus angustifolia*), and salt cedar (*Tamarix ramosissima*) are also common.

Shrubs include native and introduced willows, *Salix exigua* and *Salix fragilis*, respectively; Woods' rose (*Rosa woodsii*); and skunkbush sumac (*Rhus trilobata*). Herbaceous layers are often dominated by annual and perennial grasses, and mesic forbs, sedges (*Carex* spp.), and rushes (*Juncus* spp.) may also be present.

**Mammal species**

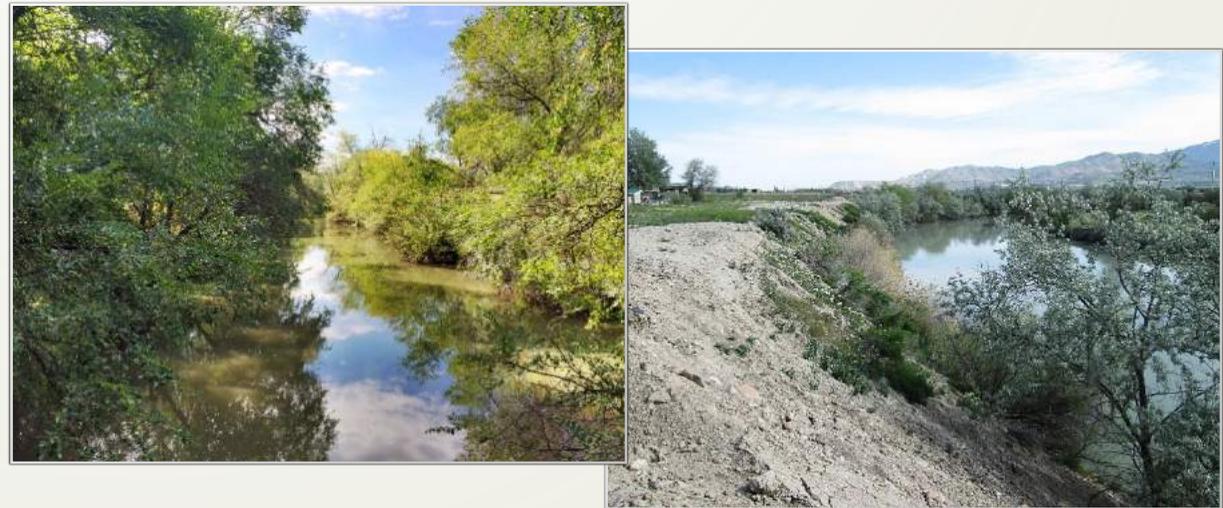
Long-tailed vole (*Microtus longicaudus*), vagrant shrew (*Sorex vagrans*), long-tailed weasel (*Mustela frenata*), American beaver, little brown bat, and American mink (*Mustela vison*).

**Bird species**

Wood duck (*Aix sponsa*), double-crested cormorant, great blue heron, black-crowned night-heron, snowy egret, red-tailed hawk, Cooper's hawk, Eurasian collard-dove, mourning dove, great horned owl (*Bubo virginianus*), western screech-owl (*Megascops kennicottii*), downy woodpecker, northern flicker, black-chinned hummingbird, flycatchers, black-billed magpie, common raven, tree swallow (*Tachycineta bicolor*), American robin, hermit thrush (*Catharus guttatus*), cedar waxwing (*Bombycilla cedrorum*), yellow warbler (*Setophaga petechia*), yellow-rumped warbler (*Setophaga coronata*), warbling vireo (*Vireo gilvus*), western tanager (*Piranga ludoviciana*), lazuli bunting, black-headed grosbeak, song sparrow, dark-eyed junco (*Junco hyemalis*), bullock's oriole, American goldfinch, lesser goldfinch, and bald eagle (*Haliaeetus leucocephalus*).

**Reptile and amphibian species**

Western garter snake, tiger salamander, western (boreal) toad, Woodhouse's toad, boreal frog, and American bullfrog.



**Figure 2.15.** Riparian habitat and characteristic species.

## Habitat Location and Condition

Habitats in the planning area are described and listed by river segment in Figure 2.16. Using a cross section of the river, Figure 2.17 shows specific aquatic and riverbank habitats and characteristics along the Jordan River. The condition and quality of habitat in the planning area can be negatively affected through habitat degradation, fragmentation, and loss. Such impacts can stem from development, the introduction or spread of invasive species, the presence of noise and light, and pollution (e.g., sewage and sedimentation). Hence, habitat in the planning area has been altered from its pre-settlement condition. In general, gradual urbanization has fragmented habitat and decreased the riparian corridor width along the river. In addition, invasive species and human disturbances have been introduced to river habitats. Over time, habitats in the planning area were altered through the draining and filling of wetlands, channelization and dredging of the river, and the degradation of water quality (National Audubon Society 2000). More recently, a concerted effort has been taken to protect and restore wildlife habitat associated with the Jordan River. Two examples are the Legacy Nature Preserve in Davis County and the Galena/Soo'nkahni Property in Salt Lake County. Both of these are examples of habitat restored and/or enhanced as part of CWA mitigation, and they are both now set aside in perpetuity. Other examples of smaller mitigation sites and parcels with conservation easement also occur throughout the planning area.

## VEGETATION

A major “structural” component of habitat is vegetation. Vegetation is often classified by layers such as grasses, forbs, shrubs, and trees. Together, a mosaic of these kinds of plants provides the structure upon which different wildlife species depend. Vegetation in the planning area can also be categorized in terms of native or desirable species, special-status species, and invasive and noxious weeds. These categories are not necessarily mutually exclusive but are the focus of management decisions such as restoration, regulations, and weed treatment, respectively. The amount and distribution of plant species can be influenced by disturbance; the proximity of disturbance to the river; and seed dispersal by wildlife, water, wind, and recreation activities.

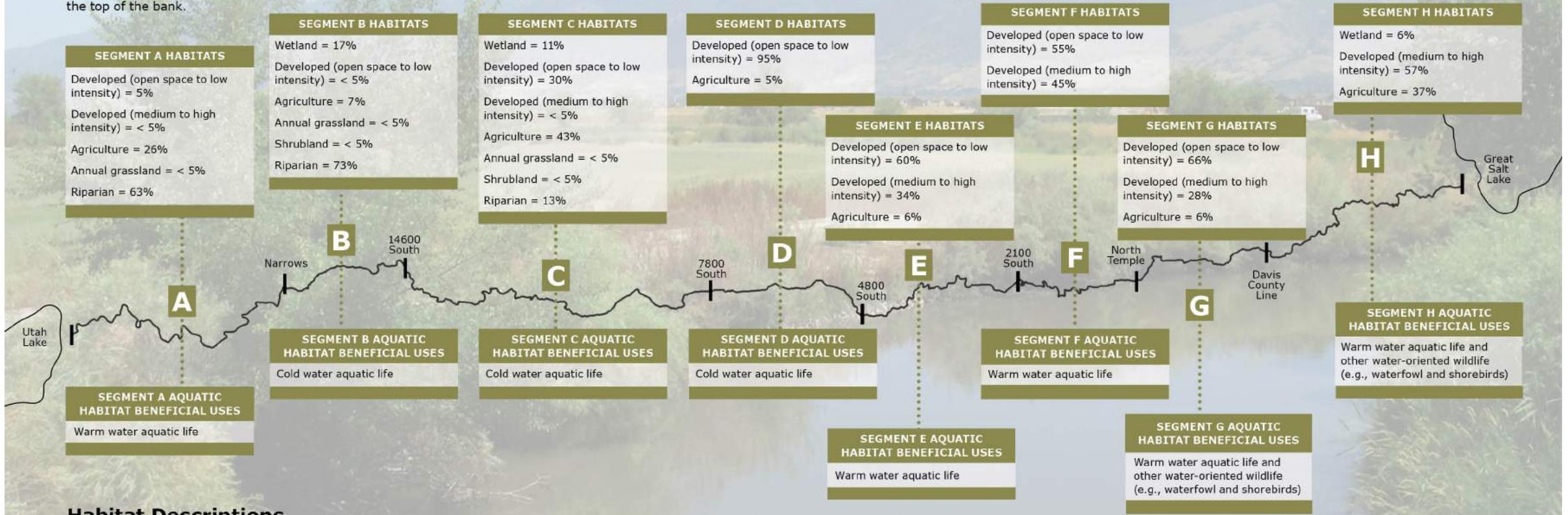
## Native Plant Species

A native plant is one that occurs naturally in a particular region, habitat, or ecosystem without direct or indirect human intervention (The United States National Arboretum 2006). Native plant communities provide a range of ecological functions such as increased native wildlife habitat and species diversity, erosion control, flood moderation, water filtration, and development and enrichment of soil. Table 2.3 lists recommended aquatic and wetland, riparian tree, shrub, forb, and grass species native to the planning area, along with their wetland indicator status. The wetland indicator status of a plant reflects the likelihood of its presence in a wetland. This list was developed by restoration practitioners and has been used in restoration projects along the Jordan River. It should serve as a guide when planning restoration or revegetation projects; it is not meant to be exhaustive and does not reflect current seed or plant stock availability.

# JORDAN RIVER – HABITAT

The term *habitat* refers to the environment, natural or otherwise disturbed, in which an animal or plant lives. Southwest Regional Gap Analysis Project (SWReGAP) data were used to define habitats within the planning area and through which the Jordan River flows. The percentages listed below provide the user with a general idea of the habitat that is adjacent to the Jordan River based on the understanding that sovereign lands only extend to the top of the bank.

Habitat information can be used to better understand the general condition and characteristics of each river segment, and can be used when planning restoration projects, setting wildlife habitat enhancement goals, or minimizing impacts. Aquatic habitat-related beneficial uses shown below refer to those fisheries (i.e., cold or warm water) and other water-oriented wildlife (e.g., waterfowl) identified and protected as a use of the Jordan River.



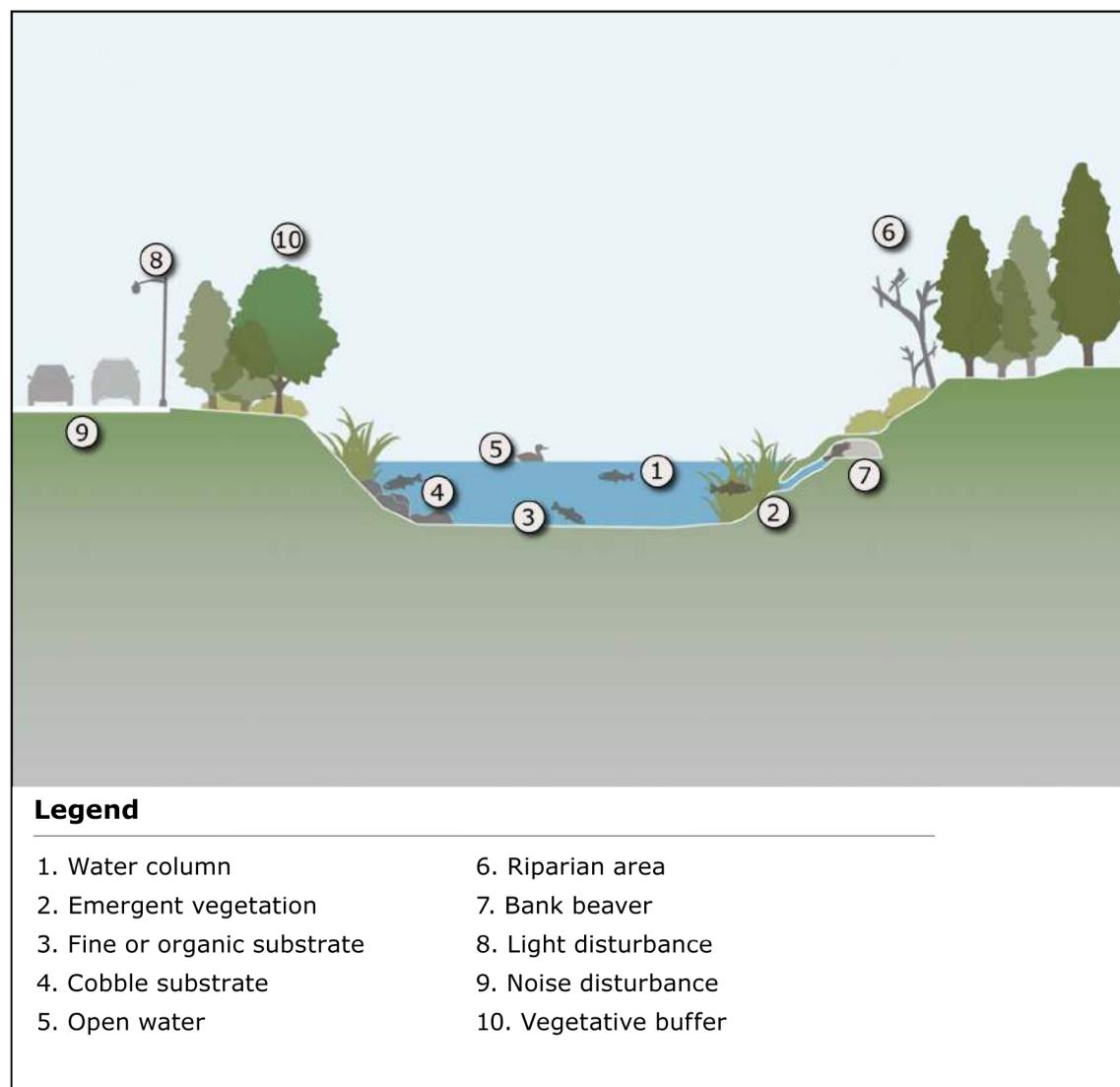
## Habitat Descriptions

**Wetland:** Emergent marsh and wet meadow habitat.  
**Agriculture:** Grasses and mixed crops planted for seed, hay, or grazing.  
**Annual Grassland:** Dominated by upland annual grasses.  
**Shrubland:** Dominated by upland shrub species.

**Riparian:** Dominated by trees with a diverse shrub component adjacent to the Jordan River.  
**Developed (open space to low intensity):** < 50% impervious surface interspersed with landscaped vegetation. Areas adjacent to the Jordan River may provide a narrow band of wildlife habitat.  
**Developed (medium to high intensity):** > 50% impervious surface interspersed with landscaped vegetation. Areas adjacent to the Jordan River may provide a narrow band of wildlife habitat.

**Table 2.3.** Native Plant Recommendations for the Planning Area and their Wetland Indicator Status

Common Name	Scientific Name	Wetland Indicator Status*
<b>AQUATIC AND WETLAND SPECIES</b>		
Duckweed species	<i>Lemna</i> spp.	OBL
Longleaf pondweed	<i>Potamogeton nodosus</i>	OBL
Spiral ditchgrass	<i>Ruppia cirrhosa</i>	OBL
Bulrush species	<i>Schoenoplectus</i> spp.	OBL
Fineleaf pondweed	<i>Stuckenia filiformis</i>	OBL
Sago pondweed	<i>Stuckenia pectinata</i>	OBL
Cattail species	<i>Typha</i> spp.	OBL
<b>RIPARIAN TREE SPECIES</b>		
Box elder	<i>Acer negundo</i>	FACW
Narrowleaf cottonwood	<i>Populus angustifolia</i>	FACW
Fremont cottonwood	<i>Populus fremontii</i>	FACW
Black cottonwood	<i>Populus trichocarpa</i>	FACW
Peachleaf willow	<i>Salix amygdaloides</i>	FACW
Whiplash willow	<i>Salix lasiandra</i>	FACW
<b>SHRUB SPECIES</b>		
Big sagebrush	<i>Artemisia tridentata</i>	FACU
Fourwing saltbush	<i>Atriplex canescens</i>	UPL
Black hawthorn	<i>Crataegus douglasii</i>	FAC
Rubber rabbitbrush	<i>Ericameria nauseosa</i>	UPL
Broom snakeweed	<i>Gutierrezia sarothrae</i>	NI
Chokecherry	<i>Prunus virginiana</i>	FAC
Skunkbush sumac	<i>Rhus trilobata</i>	FACU



**Figure 2.17.** Jordan River cross section showing aquatic and riverbank habitats and characteristics along the Jordan River.

Common Name	Scientific Name	Wetland Indicator Status*
Golden currant	<i>Ribes aureum</i>	FAC
Woods' rose	<i>Rosa woodsii</i>	FACU
Sandbar willow	<i>Salix exigua</i>	FACW
Greasewood	<i>Sarcobatus vermiculatus</i>	FAC
Silver buffaloberry	<i>Shepherdia argentea</i>	FACU
<b>FORB SPECIES</b>		
White sagebrush	<i>Artemisia ludoviciana</i>	FACU
Milkweed species	<i>Asclepias</i> spp.	Varies by species
Hairy false goldenaster	<i>Chrysopsis villosa</i>	NI
Rocky Mountain beeplant	<i>Cleome serrulata</i>	NI
Blanket flower species	<i>Gaillardia</i> spp.	FACU
Lewis flax	<i>Linum lewisii</i>	NI
<b>GRASS SPECIES</b>		
Saltgrass	<i>Distichlis spicata</i>	FAC
Common spikerush	<i>Eleocharis palustris</i>	OBL
Arctic rush	<i>Juncus arcticus</i>	FACW
Western wheatgrass	<i>Pascopyrum smithii</i>	FAC
Sandberg bluegrass	<i>Poa secunda</i>	FACU
Nuttall's alkaligrass	<i>Puccinellia nuttalliana</i>	FACW
Alkali sacaton	<i>Sporobolus airoides</i>	FAC
Sand dropseed	<i>Sporobolus cryptandrus</i>	FACU

\* UPL = upland (almost never occurs in wetlands); FACU = facultative upland (usually occurs in non-wetlands, but may occur in wetlands); FACW = facultative wetland (usually occurs in wetlands); FAC = facultative (occurs in wetlands and non-wetlands); OBL = obligate (almost always occurs in wetlands); NI = non-indicator (USACE 2016).

### Special-Status Plant Species

Special-status species are species for which state or federal agencies afford an additional level of protection by law, regulation, or policy. The presence of potential habitat for special-status plant species was determined by comparing individual species habitat requirements to the SWReGAP land cover types predicted to occur in the planning area and to local elevation.

Utah County has three federally listed plant species, Salt Lake County has one federally listed plant species, and Davis County has no federally listed plant species (DWR 2015a). Table 2.4 provides a list of special-status plant species known to occur in Utah and Salt Lake Counties and indicates whether potential habitat for these species occurs in the planning area.

**Table 2.4.** Special-Status Plant Species and their Potential to Occur in the Planning Area

Common and Scientific Name	Status	Habitat	County	Potential to Occur in the Planning Area
Deseret milkvetch <i>Astragalus desereticus</i>	Threatened	In open sagebrush and pinyon-juniper communities on steep slopes with sandy-gravelly soils derived from the Moroni Formation.	Utah	None; suitable habitat not present.
Clay phacelia <i>Phacelia argillacea</i>	Endangered	On barren, precipitous hillsides in sparse mountain brush and pinyon-juniper communities with fine-textured soils and shale fragments derived from the Green River Formation.	Utah	None; suitable habitat not present. Plant is only known to occur in Spanish Fork Canyon.
Ute ladies'-tresses <i>Spiranthes diluvialis</i>	Threatened	In moist to wet meadows; along streams; in abandoned stream meanders; near lake shores, seeps, and springs; and in loamy or sandy soils that are typically mixed with gravel.	Salt Lake and Utah	Low in Salt Lake County; historical occurrences. Low to moderate in Utah County.

Source: DWR (2015a, 2015b).

## Introduced, Invasive, and Noxious Weed Species

A weed is any plant that is not desired in a particular location and may be introduced, invasive, and/or noxious. Weedy plant species terminology and definitions are provided in Figure 2.18.

As defined by Title 4, Chapter 17 of the Utah Noxious Weed Act, a *noxious weed* is, “any plant the commissioner determines to be especially injurious to public health, crops, livestock, land, or other property” (Utah Code 4-17-2). Invasive plant species, including most noxious weeds, are early successional species that possess numerous adaptations for rapid colonization and spread in disturbed habitats. These adaptations include high reproductive rates; rapid germination and growth; and annual life histories in which the plant grows, flowers, sets seed, and dies in a single season. Noxious plant species may also have superior abilities to use soil and water resources, possess allelopathic mechanisms to suppress competing species, and have been removed from their native predators and pathogens in their new environment (Coombs et al. 2004; Mack et al. 2000; Sperry et al. 2006). These factors can result in a shift in the plant community toward dominance of non-native, invasive plant species (Mack et al. 2000). In general, non-native and invasive plants do not provide the same habitat function as native plants. In addition, non-native or invasive species can outcompete native vegetation, resulting in a reduction of plant diversity and a decrease in overall habitat physical structure and function.

Two invasive and one noxious weed species of particular concern in the planning area are common reed (*Phragmites australis*), Russian olive (*Elaeagnus angustifolia*), and saltcedar (*Tamarix ramosissima*). Concerns about these specific species include fire safety, the high potential for spreading, impeded access to the river, degradation to wildlife habitat, and impairment of the viewshed. Brief descriptions of these three species are provided in Figure 2.19.

### INTRODUCED, INVASIVE, AND NOXIOUS WEED SPECIES



#### Introduced weed species

A species living outside of its native range because of deliberate or accidental transport by human activities.



#### Invasive weed species

An introduced plant species that adversely affects native species, habitats, or ecosystems.



#### Noxious weed species

An introduced, invasive plant species that has been designated as injurious to native species, habitats, ecosystems, crops, or the health of humans or livestock.

**Figure 2.18.** Weedy plant species terminology and definitions.

Common reed, also known as *Phragmites*, is of particular concern to stakeholders in the planning area. Common reed occurs in all segments of the river; however, infestations of common reed were noted in Segments C and G during the public comment process.

## Ecosystem Resources

Other introduced, invasive, and/or noxious weed species are present in the planning area but are not discussed in detail in this management plan because they generally occur above the top of bank (i.e., ordinary high water mark) (Table 2.5). Two species in particular are hoary cress (*Cardaria draba*) and puncturevine (*Tribulus terrestris*). Hoary cress is a noxious weed that quickly establishes in disturbed areas and can be difficult to control because of its extensive and deep root system. Puncturevine (also known as “goathead” because of its spikey seed capsule) occurs along the Jordan River to the detriment of cyclists. The Jordan River Commission facilitates a biological control program using weevils to reduce puncturevine along the Jordan River Parkway.

**Table 2.5.** Other Introduced, Invasive, and/or Noxious Weed Species Present in the Planning Area

Common Name	Scientific Name
Common ragweed	<i>Ambrosia artemisiifolia</i>
Burdock	<i>Arctium minus</i>
Cheatgrass	<i>Bromus tectorum</i>
Hoary cress (whitetop)	<i>Cardaria draba</i>
Bull thistle	<i>Cirsium vulgare</i>
Field bindweed	<i>Convolvulus arvensis</i>
Houndstongue	<i>Cynoglossum officinale</i>
Common teasel	<i>Dipsacus fullonum</i>
Quackgrass	<i>Elymus repens</i>
Pepperweed	<i>Lepidium sp.</i>
Purple loosestrife	<i>Lythrum salicaria</i>
Yellow sweetclover	<i>Melilotus officinalis</i>
Puncturevine (goathead)	<i>Tribulus terrestris</i>
Mullein	<i>Verbascum thapsus</i>
Cocklebur	<i>Xanthium strumarium</i>

## WEED SPECIES OF PARTICULAR CONCERN IN THE PLANNING AREA

### Russian olive (*Elaeagnus angustifolia*)

Russian olive is an invasive species originally from Europe that has been used as an ornamental tree in the United States. The fruits can be a valuable food source, and the tree often provides habitat for birds and wildlife. It grows well in meadows, pasturelands, and along waterways. Reproduction is from seed and rootstock, and thick stands can develop if left unchecked (Belliston et al. 2004). Russian olive often outcompetes native vegetation, altering the plant community structure and reducing wildlife habitat for some species (Zouhar 2005). It avoids drought stress by tapping into groundwater. Additionally, some have suggested that Russian olive can alter nutrient cycling and stream hydrology (Tu 2003). Russian olive is a common invasive tree throughout Utah, Salt Lake, and Davis Counties.

### Common reed (*Phragmites australis*)

Common reed is an invasive, large perennial rhizomatous grass, or reed, forming monotypic stands in wetland areas. It is common in alkaline and brackish environments, and can also thrive in highly acidic wetlands. Growth is greater in fresh water, but it may be outcompeted in these areas by other species. It can survive in stagnant waters where the sediments are poorly aerated by providing the underground parts of the plant with a relatively fresh supply of air from the air spaces in the aboveground stems and rhizomes. The buildup of litter from the aerial shoots within stands prevents or discourages other species from germinating and becoming established. The rhizomes and adventitious roots themselves form dense mats that discourage annual and perennial native establishment. Killing frosts may knock the plants back temporarily but can ultimately increase stand densities by stimulating bud development (Colorado State University 2000).

### Saltcedar (*Tamarix ramosissima*)

Saltcedar, also known as tamarisk, is an aggressive, woody noxious plant that has become established over a million acres of the western United States. Saltcedar crowds out native stands of riparian and wetland vegetation. It increases the salinity of surface soil, rendering the soil inhospitable to native plant species, and avoids drought stress by tapping into groundwater. Saltcedar provides generally lower wildlife habitat value, but can provide vital shade in hot, arid climates. These plants can widen floodplains by clogging stream channels and increase sediment deposition because of the abundance of saltcedar stems in dense stands (Colorado State University 2000). This species is a Class C declared noxious weed in Utah. Class C weeds are found extensively throughout Utah and are thought to be beyond control. Statewide efforts are aimed at containment of smaller infestations (Utah Weed Control Association 2015).



**Figure 2.19.** Weed species of particular concern in the planning area.

### RESTORATION

Human encroachment on a river corridor can have a negative impact on the natural functionality of the waterway and its surrounding habitat. Negative impacts from human encroachment near the Jordan River specifically include increased water and air pollution, land use changes, erosion, a reduction in species diversity, and the proliferation of invasive species. The restoration of species diversity and habitats can combat the negative effects of these impacts and provide important ecosystem services to the surrounding areas and the waterway itself. Restoring native plant diversity and improving habitats throughout the Jordan River corridor can reduce erosion and flooding hazards, increase pollination for urban and agricultural environments, reduce water pollution, benefit wildlife, and improve visual aesthetics. It can also increase the river's aesthetic appeal and create recreational opportunities for the general public.

In addition to restoring native plant diversity and improving habitats, restoration activities should also focus on the physical river channel itself. As development continues around and across the Jordan River, more of the waterway is isolated from its floodplain and forced through impervious channels. This can heighten the risk of flooding and cause costly scour damage downstream during periods of high flow. Erosional damage to the riverbanks not only hinders responsible development near the river, but it can also cause dangerous navigational hazards to boaters and other recreationists. Along with erosional effects, sediment loads and deposition caused by increasing development can have an adverse effect on aquatic species, damaging fragile fish and aquatic invertebrate habitats. Restoring riverbanks and channels with more permeable and natural design methods reduces erosion and flood risk while at the same time increasing habitat quality and recreational opportunity.

### Areas of Focus

Restoration focus areas are vegetation, streambank stability, and instream habitat (Figure 2.20). An overarching focus area could be the naturalization of Jordan River flows. Because of human encroachment and the highly managed nature of the Jordan River for flood control, drinking water, irrigation, water rights, and pollution, a return to a hydrograph with high spring runoff driven by melting snow is unlikely in the near future.

Figure 2.21 illustrates the primary restoration concerns and an overview of restoration locations by river segment. Figure 2.22 illustrates the conceptual difference between a degraded riverbank with limited habitat value, limited stability, and invasive species and a restored riverbank with native vegetation communities that improve habitat and river function. Figure 2.23 provides a plan view example of a restoration project completed by Salt Lake City along the Jordan River intended to improve native vegetation and streambank conditions.



### Vegetation

Invasive plant species such as *Phragmites* form large monocultures that displace native plants and reduce habitat quality for wildlife. They can be introduced to the river system with a new disturbance or by seed spread through trail users or animals. Not only do invasive species degrade habitat, they also decrease the aesthetic value of the river as a recreational resource. Revegetation with desirable, native plant species provides structured plant communities for quality wildlife habitat and bank stability. Controlling invasive species and revegetating with native plants are major goals of restoration efforts along the Jordan River.



### Streambank

Increasing development along the river has created areas with significant bank erosion. Impermeable surfaces result in more runoff and increase scour along the banks of the river. In many locations, vertical cut banks are present that cannot support vegetation, making them more likely to erode. The lowering of the channel bottom has also caused major undercutting in places and significantly decreased bank stability. Physically restoring banks and channels using natural design methods while maintaining connections to floodplains and riparian areas is crucial to restoring a variety of habitats along the river.



### Instream

Many serious navigational hazards along the river were identified during the public involvement phase of this planning effort. These include abandoned bridge pylons, low bridges, exposed utility lines, and head dams. These hazards can create dangerous situations for recreational boaters and fishermen and can modify river processes (e.g., sediment transport) that impact conditions within the river. Instream restoration ranging from removing navigational hazards to placing structures in the channel to dissipate velocity and energy can result in reduced bank erosion and improved habitat for aquatic species. Instream restoration should account for flow, substrate, sinuosity, and slope, among other factors, in the highly modified and urban Jordan River system.

## Further Reading

*Applied River Morphology* (Rosgen 1996; not available online)

*Jordan River Stability Study* (CH2M Hill 1992)

National Resources Conservation Service Stream Restoration website (National Resources Conservation Service 2016)

Sample seed mix from completed restoration projects (see Jordan River Project Portal website)

*Stream Corridor Restoration: Principles, Processes, and Practices* (The Federal Interagency Stream Restoration Working Group 2001)

*The Jordan River Natural Conservation Corridor Report* (National Audubon Society 2000)

*The Practical Streambank Bioengineering Guide* (National Resources Conservation Service 1998)

## Geographic Information System Data Layers

Habitat Types, SWReGAP, Soil Types, Weeds, Salt Lake County Restoration Projects

**Figure 2.20.** Restoration focus areas along the Jordan River.

# JORDAN RIVER – RESTORATION

Restoration on the Jordan River is a management priority for the Utah Division of Forestry, Fire & State Lands because it protects, restores, or enhances all five services identified for consideration under the Public Trust: navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality. Restoration also allows the Utah Division of Forestry, Fire & State Lands to build partnerships among multiple state, county, and local stakeholders. Many entities are engaged in restoration activities along the Jordan River, including removing navigational hazards, enhancing fish and wildlife habitat, increasing recreation opportunities, protecting community amenities such as the Jordan River Trail, and implementing measures to improve water quality. Restoration projects can be categorized into vegetation, instream, and streambank improvements, although many projects include more than one aspect. Examples of existing restoration sites, proposed restoration sites, and specific restoration concerns by segment are illustrated in the diagram below.

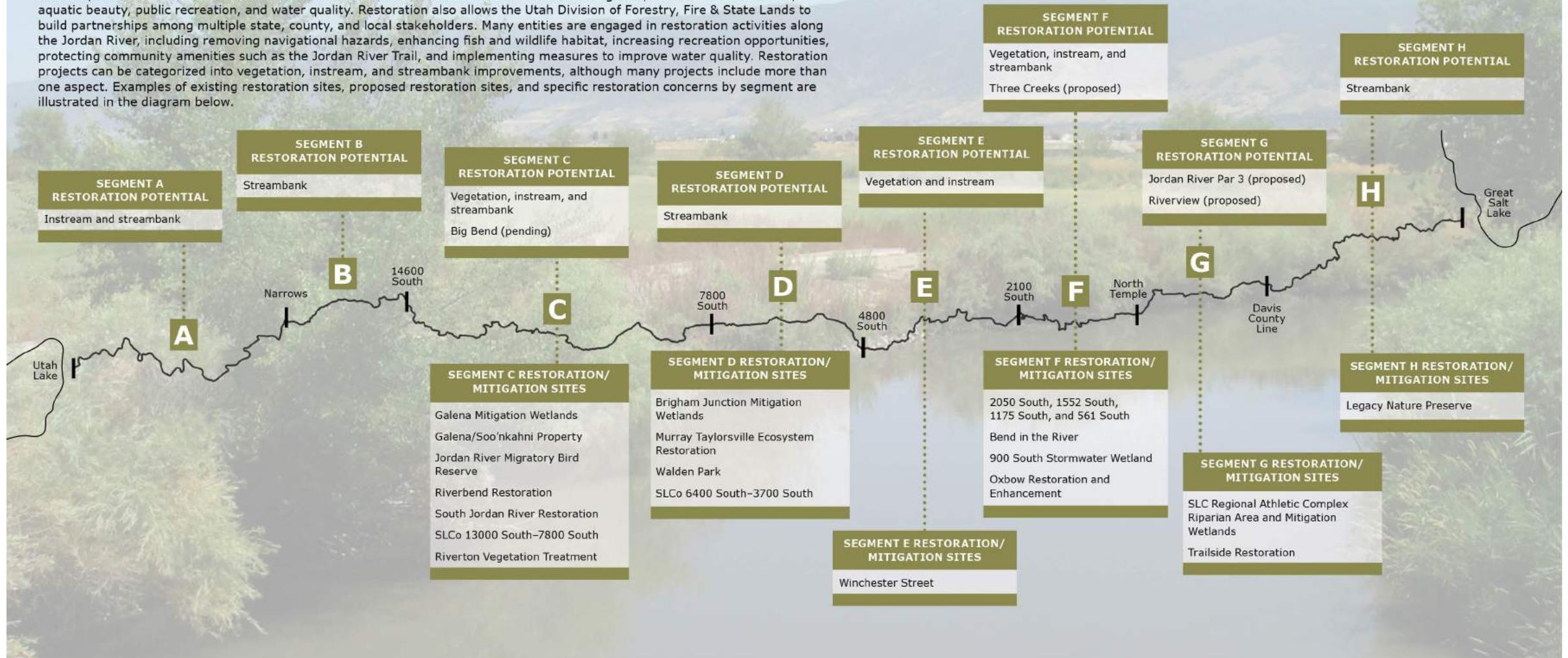
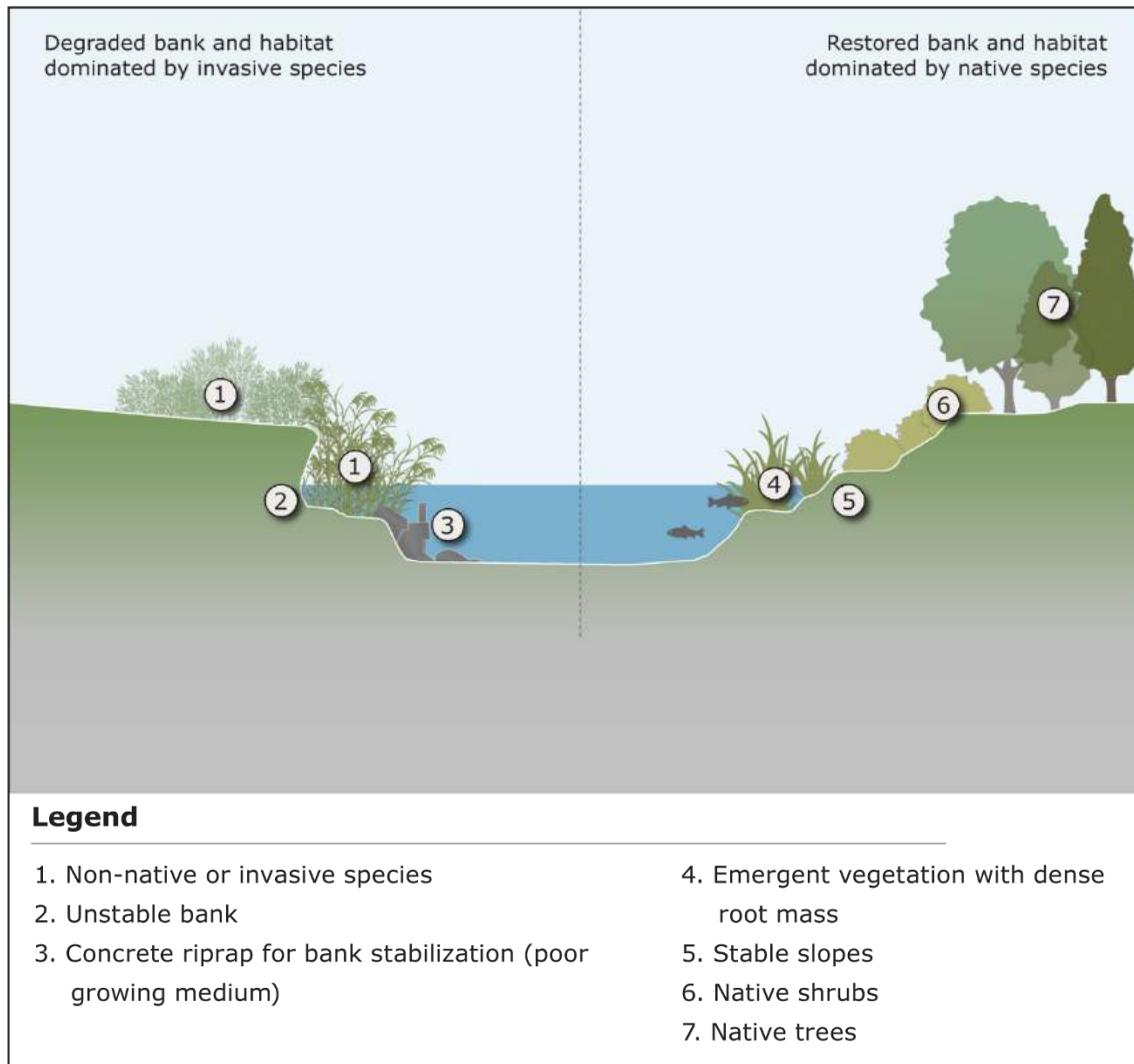


Figure 2.21. Primary restoration concerns and an overview of restoration locations by river segment.



**Figure 2.22.** River restoration cross section showing degraded banks versus restored riverbank with diverse habitats.



**Figure 2.23.** Jordan River restoration example: Salt Lake City's Open Space Lands Program 900 South Oxbow Restoration and Enhancement Project.

## **Wildlife Species**

### **INTRODUCTION**

This section provides information on populations of wildlife species known to occur in or adjacent to the Jordan River. It is intended to complement the Wildlife Habitat section by identifying priority wildlife species on which to base development of habitat restoration, enhancement, and/or preservation goals and provide information regarding certain species of regulatory and management concern. The Jordan River corridor provides habitat for many native wildlife species and provides important stop-over areas and foraging opportunities for migratory birds. Given high levels of disturbance in some areas, populations of non-native wildlife species are also found. Habitat associations for particular wildlife can be found in the Wildlife Habitat section.

Stakeholders working in the planning area should understand that certain wildlife are classified as special-status species, are legally protected, and may require special management under federal or state law. Stakeholders should also understand that certain wildlife species add to, or detract from, the overall health of the Jordan River ecosystem, such as beavers and common carp (*Cyprinus carpio*). Planning area stakeholders may also be interested in wildlife species that have recreational value, such as birds. During the *Blueprint Jordan River* public participation process, 34% of survey participants identified wildlife viewing areas as an important recreational activity along the river (Envision Utah 2008). Not only does the presence of a variety of wildlife provide recreational opportunities, it is also an indicator of a healthy ecosystem.

Figure 2.24 illustrates the segments of the river that are likely to contain a variety of wildlife species. Riparian areas, agriculture fields, and parks and golf courses generally support a range of wildlife species.

The following sections describe special-status species, fish, aquatic macroinvertebrates, bird species, and species of management concern found within the planning area.

### **SPECIAL-STATUS WILDLIFE SPECIES**

Special-status species include federally listed species that are protected under the Endangered Species Act (threatened and endangered species), species considered as candidates for such listing (candidate species), Utah wildlife species of concern, and species receiving special management under a conservation agreement to preclude the need for federal listing. Two species listed as threatened or endangered under the Endangered Species Act with potential to occur in the planning area are the June sucker (*Chasmistes liorus*; endangered) and the western yellow-billed cuckoo (*Coccyzus americanus*; threatened). June sucker is occasionally found in the southern end of the Jordan River between Utah Lake and the Salt Lake-Utah County line. However, the Jordan River most likely does not support a substantial population of this species. The yellow-billed cuckoo is most likely to occur at the southern end of the Jordan River where the largest, contiguous riparian habitat occurs. However, nesting yellow-billed cuckoos have not been documented along the Jordan River.

Twelve additional Utah wildlife species of concern may occur in or directly adjacent to the Jordan River: seven bird species, two mammal species, one amphibian species, one reptile species, and one invertebrate species. There are also two species receiving special management under a conservation agreement (one amphibian and one fish) with the potential to occur in the Jordan River. Table 2.6 provides a summary of these species, including their status, general habitat association, and potential for occurrence in the Jordan River or adjacent habitat.

# JORDAN RIVER – WILDLIFE

Many areas of the Jordan River are actively managed as wildlife habitat and support a variety of wildlife species. There has been a recent, concerted effort to protect and restore wildlife habitat associated with the river. Some examples include the Legacy Nature Preserve in Davis County and the Galena/Soo'nkahni Property in Salt Lake County. Both of these are examples of habitat restored and/or enhanced as part of Clean Water Act mitigation, and both are now set aside in perpetuity. Other examples of smaller mitigation sites and parcels with conservation easement also occur throughout the planning area. The Utah Division of Wildlife Resources recently conducted a fisheries study and sampled at multiple location on the river. Dominant fish species documented in the planning area are included in this figure by segment and in Table 2.7. Other groups, including the Tracy Aviary and the National Audubon Society, conduct bird monitoring along the river. Three of these monitoring locations are included on this figure with corresponding results in Table 2.9.

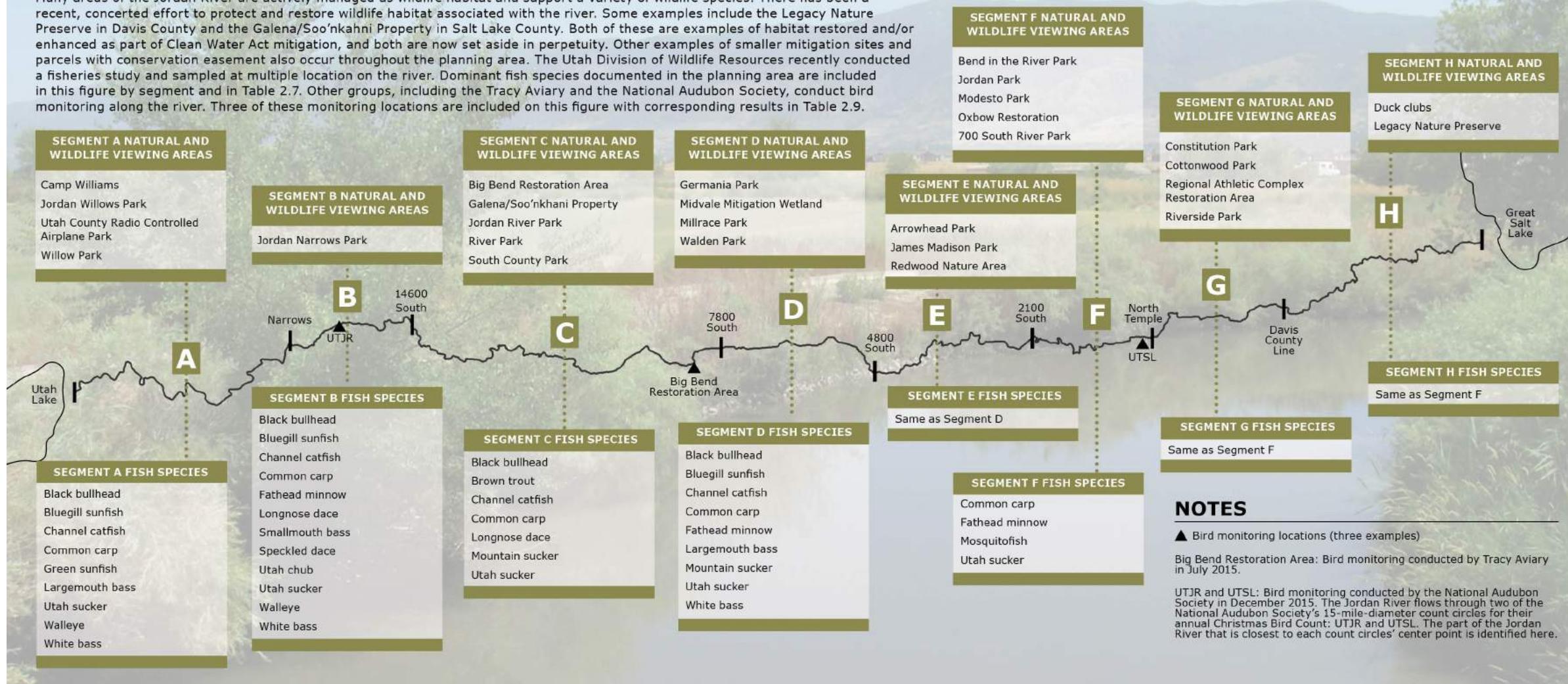


Figure 2.24. Wildlife viewing areas along Jordan River per segment and Utah Division of Wildlife Resources fish occurrence data per segment.

## Ecosystem Resources

**Table 2.6.** Special-Status Wildlife Species and their Potential to Occur in the Planning Area

Common Name and Scientific Name	Status*	General Habitat Association	Potential to Occur in the Planning Area
<b>BIRDS</b>			
Short-eared owl <i>Asio flammeus</i>	SPC	This species nests and forages in open grasslands, shrublands, and other open habitats.	This species does not nest along the Jordan River but can be observed foraging or migrating along the river in the spring, summer, and fall.
Ferruginous hawk <i>Buteo regalis</i>	SPC	This species generally nests and forages in open country, primarily prairies, plains, and desert. It tends to nest on cliffs, trees, or in power poles.	This species does not nest along the Jordan River but can be observed in the spring and fall migrating along the river.
Western yellow-billed cuckoo <i>Coccyzus americanus</i>	T-ESA	This species nests in large riparian areas generally made up of cottonwood trees, willows, and several other species.	This species is rare along the Jordan River and only occurs in the summer (Olson 2015). Additionally, there have been eight records of cuckoos being taken by the nesting peregrine falcons ( <i>Falco peregrinus</i> ) in downtown Salt Lake City. Seven of these were documented between 1986 and 1993, but the most recent was documented on July 4, 2014 (Pope 2015). It is not known if these taken cuckoos were from the Jordan River or if they were nesting or migrating at the time they were taken.
Bobolink <i>Dolichonyx oryzivorus</i>	SPC	This species nests in marshes, grasslands, and in hayfields.	This species has been documented as a rare migrant through the Jordan River (Olson 2015).

Common Name and Scientific Name	Status*	General Habitat Association	Potential to Occur in the Planning Area
Bald eagle <i>Haliaeetus leucocephalus</i>	SPC	This species tends to nest within 200 meters of water. They eat mainly fish and carrion.	There is one bald eagle nest on the Jordan River. In 2015, the nest was active and produced one chick that successfully fledged (Walters 2015).  Several hundred bald eagles winter along the Jordan River every year. They sometimes roost in large trees near the river and feed on carp and carcasses.
Lewis's woodpecker <i>Melanerpes lewis</i>	SPC	This species generally occurs in open woodland. It is a cavity nester.	This species has been documented as a rare permanent resident of the Jordan River (Olson 2015).
Long-billed curlew <i>Numenius americanus</i>	SPC	This species primarily nests in short grass and prairies. Migratory habitat includes shortgrass prairies, wetlands, and some agricultural areas such as alfalfa and barley fields.	This species can be observed along the Jordan River in the spring, summer, and fall. They prefer short grass habitats, including shortgrass and mixed-grass prairies as well as agricultural fields.
American white pelican <i>Pelecanus erythrorhynchos</i>	SPC	Foraging sites for this species are often waterbodies less than 8 feet deep where they feed on small fish, generally less than half of their bill length. The only known breeding area in Utah is on Gunnison Island in Great Salt Lake.	This species can be observed year-round along the Jordan River foraging or flying over.

Common Name and Scientific Name	Status*	General Habitat Association	Potential to Occur in the Planning Area
<b>MAMMALS</b>			
Western red bat <i>Lasiurus blossevillii</i>	SPC	This species is migratory. It roosts and forages in a variety of habitats including forests, grasslands, and croplands.	Though little is known about this species, it is likely to occur at least sporadically along the Jordan River.
Fringed myotis <i>Myotis thysanodes</i>	SPC	This species is migratory. It occurs in desert and woodland areas. It roosts in caves, mines, and buildings.	This species most likely migrates by the Jordan River.
<b>AMPHIBIANS AND REPTILES</b>			
Western (boreal) toad <i>Anaxyrus</i> (syn. <i>Bufo</i> ) <i>boreas</i>	SPC	This species is generally a high elevation species that occurs in wetlands surrounded by a variety of habitats.	This species is thought to still be common on the Jordan River (Potts 2011a). However according to the <i>Boreal Toad Conservation Plan</i> (DWR 2005b), no known populations occur near the Jordan River.
Smooth greensnake <i>Opheodrys vernalis</i>	SPC	This species prefers moist, grassy areas.	This species is thought to still be rare on the Jordan River (Potts 2011a).
Columbia spotted frog <i>Rana luteiventris</i>	CS	In Utah, this species is usually found in semi-permanent ponds (Welch and MacMahon 2005) with cool, clear spring-fed water and organic substrates (Dumas 1966; Morris and Tanner 1969).	This species is historically believed to have occurred on the Jordan River. However, surveys conducted in the 1990s failed to detect any spotted frogs, and they are generally thought to have been extirpated from the Jordan River (USFWS 2002).

Common Name and Scientific Name	Status*	General Habitat Association	Potential to Occur in the Planning Area
<b>FISH</b>			
June sucker <i>Chasmistes liorus</i>	E-ESA	Endemic to Utah Lake and Provo River, this species is actually not a bottom feeder but can collect zooplankton from the mid-water.	This is a lake species but is still found in surrounding rivers. It may occur in the southern end of the Jordan River.
Bonneville cutthroat trout <i>Oncorhynchus clarkia utah</i>	CS	Like other salmonids, this species generally requires clean, well-oxygenated water and a complexity of inland habitat and overhanging banks for cover.	This species is generally found in and near tributary creeks to the Jordan River.
<b>INVERTEBRATES</b>			
California floater <i>Anodonta californiensis</i>	SPC	This species is found in lakes and lake-like stream environments.	Known from the Jordan River watershed, although the Jordan River water quality conditions would likely not support this species.

\* E-ESA = endangered under the ESA; T-ESA = threatened under the ESA; SPC = Utah Wildlife Species of Concern; CS = species receiving special management under a Conservation Agreement to preclude the need for federal listing.

## FISH SPECIES

Sixteen dominant fish species have been detected in the Jordan River (Table 2.7). Of these dominant species, five are native, and 11 are introduced. Anecdotal evidence suggests that common carp, a pervasive non-native species, is the most common fish species found in the Jordan River.

**Table 2.7.** Jordan River Fish Species

Common Name	Scientific Name	Notes and Location in Planning Area
<b>NATIVE FISH</b>		
Utah sucker	<i>Catostomus ardens</i>	Found in Segments A, B, C, D, and E.
Mountain sucker	<i>Catostomus platythychnus</i>	Smaller than and not as common as the Utah sucker. Found in Segments C, D, and E.
Utah chub	<i>Glia atraria</i>	Found in Segment B.
Longnose dace	<i>Rhinichthys cataractae</i>	Found in Segments B and C.
Speckled dace	<i>Rhinichthys osculus</i>	Found in Segment B.
<b>NON-NATIVE FISH</b>		
Black bullhead	<i>Ameiurus melas</i>	Found in Segments A–E.
Common carp	<i>Cyprinus carpio</i>	Pervasive. This species can cause significant negative impacts to native species. Found in all segments.
Mosquitofish	<i>Gambusia affinis</i>	Stocked for mosquito abatement. Often found in shallow backwater areas. Found in Segments F, G, and H.
Channel catfish	<i>Ictalurus punctatus</i>	Occasionally stocked. Found in Segments A–E.
Green sunfish	<i>Lepomis cyanellus</i>	Found in shallow areas with cover. Found in Segment A.
Bluegill sunfish	<i>Lepomis macrochirus</i>	Primarily found in calm backwater areas. Found in Segments A and B.
Largemouth bass	<i>Micropterus salmoides</i>	Primarily found in backwater areas. Found in Segments A, D, and E.

Common Name	Scientific Name	Notes and Location in Planning Area
White bass	<i>Morone chrysops</i>	Found in Segments A, B, D, and E. This species causes significant negative impacts to native species.
Fathead minnow	<i>Pimephales promelas</i>	Introduced to Utah lake as prey species. Found in Segments B, D, E, F, G, and H.
Brown trout	<i>Salmo trutta</i>	Generally found in and near tributary creeks to the Jordan River. Found in Segment C.
Walleye	<i>Stizostedion vitreum</i>	Found in Segments A and B, especially during the spring spawning run, but found throughout the river.

Sources: DWR (2016); Hatton (1932); Potts (2011b); and Sigler and Sigler (1996).

## AQUATIC MACROINVERTEBRATES

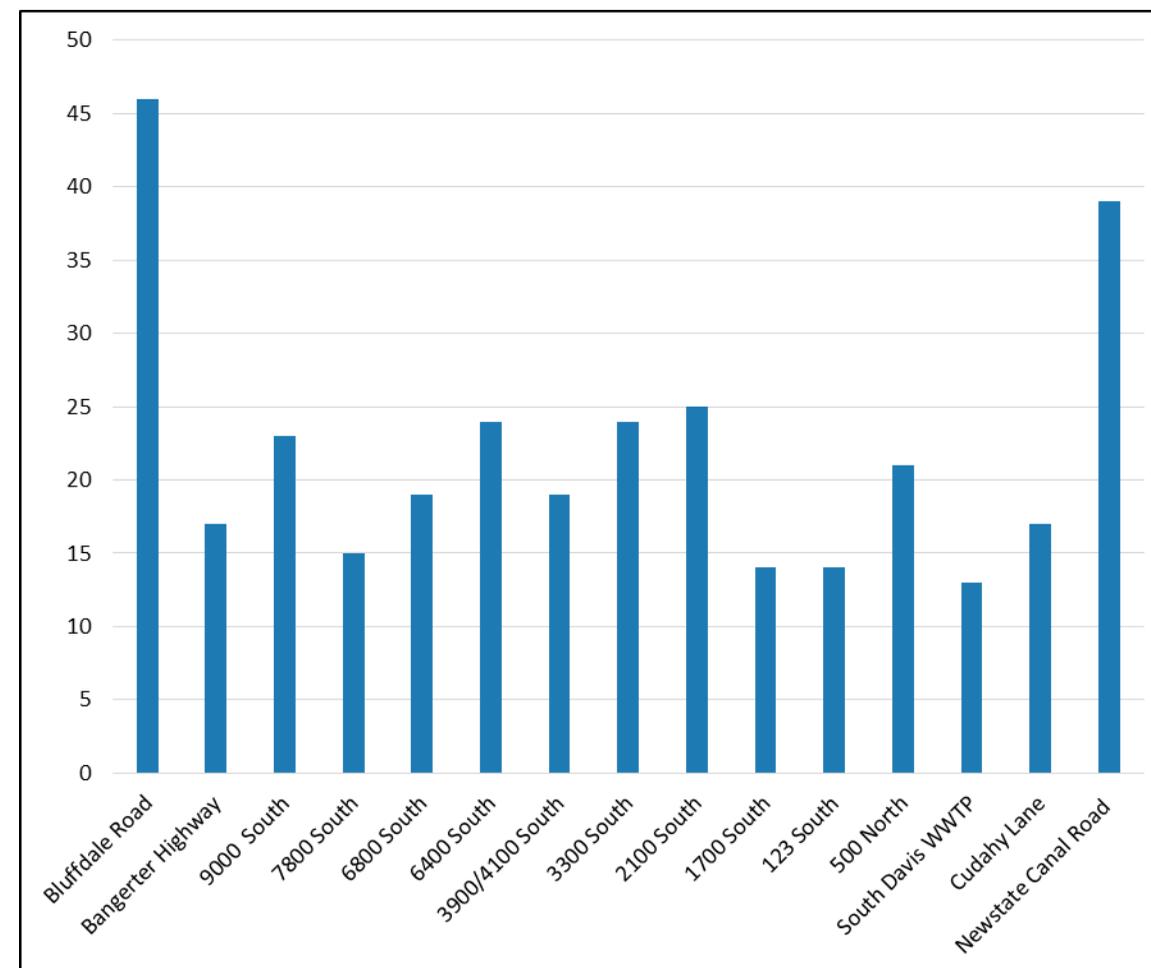
Aquatic macroinvertebrates are organisms that live in water for part or all of their life cycle, are big enough to see with the naked eye, and do not have a backbone. They can include beetles, dragonfly larva, mosquito larva, snails, and worms. Aquatic macroinvertebrates are important components of the Jordan River foodweb because they consume organic matter and are in turn consumed by other wildlife such as fish and birds. Macroinvertebrate communities are also indicators of ecological condition (e.g., water quality) because different macroinvertebrate taxa have varying levels of tolerance to pollutants. DWQ has conducted periodic macroinvertebrate sampling of the Jordan River at 15 locations between 1999 and 2009 (DWQ 2013). A summary of these data by location and the number of taxa found in each sample (i.e., richness) are found in Table 2.8 and Figure 2.25. Examples of common taxa collected include leeches (Arhynchobdellida [Erpobdellidae]), beetles (Coleoptera [Elimidae]), flies (Diptera [Chironomidae and Simuliidae]), mayflies (Ephemeroptera [Baetidae]), woodlice (Isopoda [Asellidae]), snails (Neotaenioglossa [Hydrobiidae]), damselflies (Odonata [Coenagrionidae]), worms (Oligochaeta [Physidae]), caddisflies (Trichoptera [Hydropsychidae and Hydroptilidae]), mites (Trombidiformes), flatworms (Turbellaria), and mollusks (Veneroida [Cyrenidae]) (DWQ 2013). Analysis of these data suggests ecological condition ranges from poor to good at a given location or sample date based on the macroinvertebrate taxa observed compared to what is expected based on other

reference sites. Macroinvertebrates are only one potential biological indicator commonly used to assess ecological condition. Other organisms used to assess the condition of waterbodies include fish, algae, amphibians, aquatic plants, and birds.

**Table 2.8.** Number of Invertebrate Taxa Identified in Jordan River Samples Collected Between 1999 and 2009

Jordan River Sampling Location	Year (number of taxa)
Bluffdale Road	1999 (11), 2000 (22), 2001 (26), 2002 (12), 2003 (15), 2004 (15), 2005 (9), 2006 (18)
Bangerter Highway	2007 (18)
9000 South	2007 (23)
7800 South	1999 (13), 2000 (8)
6800 South	2005 (19)
6400 South	2008 (24)
3900/4100 South	2007 (19)
3300 South	2009 (24)
2100 South	2009 (24)
1700 South	2005 (14)
123 South	2003 (14)
500 North	2007 (21)
South Davis WWTP	2009 (13)
Cudahy Lane	2009 (17)
Newstate Canal Road	2000 (26), 2001 (15), 2002 (13), 2003 (21), 2004 (13), 2005 (9)

Source: DWQ (2013).



**Figure 2.25.** Number of invertebrate taxa identified at Jordan River sample locations collected between 1999 and 2009.

## BIRD SPECIES

Data regarding bird species are available for specific locations in the planning area. Many groups conduct bird monitoring along and near the river. Tracy Aviary developed a citizen science project and is currently monitoring bird use along the river at the Big Bend Restoration Area (Olson 2015). The Jordan River flows through two of the National Audubon Society’s 15-mile-diameter count circles for their annual Christmas Bird Count (CBC): UTJR and UTSL. These 2015 monitoring efforts along and near the river resulted in more than 120 bird species recorded (Table 2.9).

**Table 2.9.** Bird Species Recorded along or near the Jordan River in 2015

Common Name	Scientific Name	Location*
<b>DUCKS AND GEESE</b>		
Wood duck	<i>Aix sponsa</i>	BB
American wigeon	<i>Anas americana</i>	UTJR
Northern shoveler	<i>Anas clypeata</i>	BB, UTSL
Green-winged teal	<i>Anas crecca</i>	BB, UTSL, UTJR
Cinnamon teal	<i>Anas cyanoptera</i>	BB, UTJR
Mallard	<i>Anas platyrhynchos</i>	BB, UTSL, UTJR
Gadwall	<i>Anas strepera</i>	BB, UTSL, UTJR
Lesser scaup	<i>Aythya affinis</i>	UTSL
Ring-necked duck	<i>Aythya collaris</i>	BB, UTSL, UTJR
Canvasback	<i>Aythya valisineria</i>	UTJR
Canada goose	<i>Branta canadensis</i>	BB, UTSL, UTJR
Cackling goose	<i>Branta hutchinsii</i>	BB
Common goldeneye	<i>Bucephala clangula</i>	BB, UTSL, UTJR
Hooded merganser	<i>Lophodytes cucullatus</i>	UTJR
Common merganser	<i>Mergus merganser</i>	UTSL

Common Name	Scientific Name	Location*
Red-breasted merganser	<i>Mergus serrator</i>	UTJR
Ruddy duck	<i>Oxyura jamaicensis</i>	UTSL
<b>PHEASANTS, GROUSE, AND QUAIL</b>		
California quail	<i>Callipepla californica</i>	BB, UTJR
Ring-necked pheasant	<i>Phasianus colchicus</i>	BB, UTJR
<b>LOONS AND GREBES</b>		
Western grebe	<i>Aechmophorus occidentalis</i>	BB
Eared grebe	<i>Podiceps nigricollis</i>	UTJR
Pied-billed grebe	<i>Podilymbus podiceps</i>	BB, UTSL, UTJR
<b>PELICANS AND CORMORANTS</b>		
American white pelican	<i>Pelecanus erythrorhynchos</i>	BB
Double-crested cormorant	<i>Phalacrocorax auritus</i>	BB
Neotropic cormorant	<i>Phalacrocorax brasilianus</i>	BB
<b>EGRETS AND IBIS</b>		
Great egret	<i>Ardea alba</i>	BB
Great blue heron	<i>Ardea Herodias</i>	BB, UTJR
Black-crowned night-heron	<i>Nycticorax</i>	BB
White-faced ibis	<i>Plegadis chihi</i>	BB
<b>VULTURES, HAWKS, AND EAGLES</b>		
Cooper’s hawk	<i>Accipiter cooperi</i>	BB, UTSL, UTJR
Sharp-shinned hawk	<i>Accipiter striatus</i>	BB, UTSL
Golden eagle	<i>Aquila chrysaetos</i>	UTJR
Red-tailed hawk	<i>Buteo jamaicensis</i>	BB, UTSL, UTJR
Rough-legged hawk	<i>Buteo lagopus</i>	UTJR
Swainson’s hawk	<i>Buteo swainsoni</i>	BB
Turkey vulture	<i>Cathartes aura</i>	BB

Common Name	Scientific Name	Location*
Northern harrier	<i>Circus cyaneus</i>	BB, UTSL, UTJR
Bald eagle	<i>Haliaeetus leucocephalus</i>	UTJR
Osprey	<i>Pandion haliaetus</i>	BB
<b>RAILS AND CRANES</b>		
American coot	<i>Fulica americana</i>	BB, UTSL, UTJR
Sandhill crane	<i>Grus canadensis</i>	BB
<b>PLOVERS, SANDPIPERS, AND GULLS</b>		
Spotted sandpiper	<i>Actitis macularius</i>	BB
Killdeer	<i>Charadrius vociferus</i>	BB, UTSL, UTJR
Wilson's snipe	<i>Gallinago delicata</i>	UTJR, UTSL
Caspian tern	<i>Hydroprogne caspia</i>	BB
California gull	<i>Larus californicus</i>	BB, UTSL, UTJR
Ring-billed gull	<i>Larus delawarensis</i>	BB, UTSL, UTJR
Franklin's gull	<i>Leucophaeus pipixcan</i>	BB
Long-billed curlew	<i>Numenius americanus</i>	BB
American avocet	<i>Recurvirostra americana</i>	BB
Forster's tern	<i>Sterna forsteri</i>	BB
<b>PIGEONS AND DOVES</b>		
Rock pigeon	<i>Columba livia</i>	BB, UTSL, UTJR
Eurasian collared-dove	<i>Streptopelia decaocto</i>	BB, UTSL, UTJR
Mourning dove	<i>Zenaida macroura</i>	BB, UTSL, UTJR
<b>OWLS</b>		
Great horned owl	<i>Bubo virginianus</i>	UTJR
Barn owl	<i>Tyto alba</i>	UTJR

Common Name	Scientific Name	Location*
<b>HUMMINGBIRDS</b>		
Black-chinned hummingbird	<i>Archilochus alexandri</i>	BB
Broad-tailed hummingbird	<i>Selasphorus platycercus</i>	BB
<b>KINGFISHERS</b>		
Belted kingfisher	<i>Megaceryle alcyon</i>	BB, UTSL, UTJR
<b>WOODPECKERS</b>		
Northern flicker	<i>Colaptes auratus</i>	BB, UTSL, UTJR
Downy woodpecker	<i>Picoides pubescens</i>	BB, UTSL, UTJR
<b>FALCONS</b>		
Merlin	<i>Falco columbarius</i>	BB, UTJR
Prairie falcon	<i>Falco mexicanus</i>	UTJR
Peregrine falcon	<i>Falco peregrinus</i>	BB, UTJR
American kestrel	<i>Falco sparverius</i>	BB, UTSL, UTJR
<b>FLYCATCHERS</b>		
Dusky flycatcher	<i>Empidonax oberholseri</i>	BB
Say's phoebe	<i>Sayornis saya</i>	BB
Western kingbird	<i>Tyrannus verticalis</i>	BB
<b>VIREOS</b>		
Warbling vireo	<i>Vireo gilvus</i>	BB
<b>JAYS AND CROWS</b>		
Woodhouse's scrub-jay	<i>Aphelocoma woodhouseii</i>	BB
American crow	<i>Corvus brachyrhynchos</i>	BB, UTSL
Common raven	<i>Corvus corax</i>	BB, UTSL, UTJR
Pinyon jay	<i>Gymnorhinus cyanocephalus</i>	BB
Black-billed magpie	<i>Pica hudsonia</i>	BB, UTSL, UTJR

## Ecosystem Resources

Common Name	Scientific Name	Location*
<b>LARKS</b>		
Horned lark	<i>Eremophila alpestris</i>	BB
<b>SWALLOWS</b>		
Barn swallow	<i>Hirundo rustica</i>	BB
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	BB
Bank swallow	<i>Riparia riparia</i>	BB
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>	BB
Tree swallow	<i>Tachycineta bicolor</i>	BB
Violet-green swallow	<i>Tachycineta thalassina</i>	BB
<b>CHICKADEES</b>		
Black-capped chickadee	<i>Poecile atricapillus</i>	BB, UTSL, UTJR
Mountain chickadee	<i>Poecile gambeli</i>	UTSL
<b>NUTHATCHES AND CREEPERS</b>		
Brown creeper	<i>Certhia americana</i>	BB, UTSL
<b>WRENS</b>		
Marsh wren	<i>Cistothorus palustris</i>	BB
Pacific wren	<i>Troglodytes pacificus</i>	UTJR
<b>GNATCATCHERS AND KINGLETS</b>		
Blue-gray gnatcatcher	<i>Poliophtila caerulea</i>	BB
Ruby-crowned kinglet	<i>Regulus calendula</i>	BB, UTSL, UTJR
<b>THRUSHES</b>		
Mountain bluebird	<i>Sialia currucoides</i>	UTJR
American robin	<i>Turdus migratorius</i>	BB, UTSL, UTJR
<b>THRASHERS</b>		
Gray catbird	<i>Dumetella carolinensis</i>	BB

Common Name	Scientific Name	Location*
<b>STARLINGS</b>		
European starling	<i>Sturnus vulgaris</i>	BB, UTSL, UTJR
<b>PIPITS</b>		
American pipit	<i>Anthus rubescens</i>	BB, UTSL
<b>WAXWINGS</b>		
Cedar waxwing	<i>Bombycilla cedrorum</i>	BB
Bohemian waxwing	<i>Bombycilla garrulus</i>	UTJR
<b>WARBLERS</b>		
Wilson's warbler	<i>Cardellina pusilla</i>	BB
MacGillivray's warbler	<i>Geothlypis tolmiei</i>	BB
Common yellowthroat	<i>Geothlypis trichas</i>	BB
Yellow-breasted chat	<i>Icteria virens</i>	BB
Orange-crowned warbler	<i>Oreothlypis celata</i>	BB
Virginia's warbler	<i>Oreothlypis virginiae</i>	BB
Yellow-rumped warbler	<i>Setophaga coronata</i>	BB, UTSL, UTJR
Yellow warbler	<i>Setophaga petechia</i>	BB
Townsend's warbler	<i>Setophaga townsendi</i>	BB
<b>SPARROWS</b>		
Dark-eyed junco	<i>Junco hyemalis</i>	BB, UTSL, UTJR
Lincoln's sparrow	<i>Melospiza lincolnii</i>	BB
Song sparrow	<i>Melospiza melodia</i>	BB, UTSL, UTJR
Spotted towhee	<i>Pipilo maculatus</i>	BB, UTSL, UTJR
Vesper sparrow	<i>Poocetes gramineus</i>	BB
Brewer's sparrow	<i>Spizella breweri</i>	BB
Chipping sparrow	<i>Spizella passerina</i>	BB
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	BB, UTSL, UTJR
Harris's sparrow	<i>Zonotrichia querula</i>	BB

Common Name	Scientific Name	Location*
<b>TANAGERS, GROSBEAKS, AND BUNTINGS</b>		
Lazuli bunting	<i>Passerina amoena</i>	BB
Black-headed grosbeak	<i>Pheucticus melanocephalus</i>	BB
Western tanager	<i>Piranga ludoviciana</i>	BB
<b>BLACKBIRDS AND ORIOLES</b>		
Red-winged blackbird	<i>Agelaius phoeniceus</i>	BB, UTSL, UTJR
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	BB, UTJR
Bullock's oriole	<i>Icterus bullockii</i>	BB
Brown-headed cowbird	<i>Molothrus ater</i>	BB
Common grackle	<i>Quiscalus quiscula</i>	BB
Western meadowlark	<i>Sturnella neglecta</i>	BB, UTJR
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	BB
<b>FINCHES</b>		
Evening grosbeak	<i>Coccothraustes vespertinus</i>	BB
Cassin's finch	<i>Haemorhous cassinii</i>	UTJR
House finch	<i>Haemorhous mexicanus</i>	BB, UTSL, UTJR
Pine siskin	<i>Spinus pinus</i>	BB
Lesser goldfinch	<i>Spinus psaltria</i>	BB, UTSL
American goldfinch	<i>Spinus tristis</i>	BB, UTJR
<b>OLD WORLD SPARROWS</b>		
House sparrow	<i>Passer domesticus</i>	BB, UTSL, UTJR

Source: Olson (2015) and National Audubon Society (2016).

\* BB = Big Bend Restoration Area; UTSL = National Audubon Society Salt Lake CBC count circle; UTJR = National Audubon Society Jordan River CBC count circle.

## SPECIES OF MANAGEMENT CONCERN

### Beaver

Based on restoration practitioner experience, beavers are common along the Jordan River. Depending on habitat, beavers either build dams or become what are known as “bank beavers.” Bank beavers build their lodges into the banks of rivers if the river is too large or too fast moving to build a traditional dam. Most beavers on the Jordan River are bank beavers. Bank lodges tend to have entrances at or below the water level. Bank beavers will often still build a lodge on top of the streambank to expand the available habitat and to access food with greater safety.

Beavers are often considered a nuisance species because they may cause flooding and because they cut down trees for food and dam building. However, beavers are also recognized as a keystone species for the restoration and conservation of natural resources associated with aquatic and riparian systems (DeVries et al. 2012; Pollock et al. 2012; Polvi and Wohl 2013; Wohl 2013). Beaver dams and lodges themselves can provide habitat for other species of wildlife such as birds, amphibians, small mammals, big game, and fish. Beaver activity as it relates to dam and lodge building can also create habitat. For example, when beavers feed on willows, it encourages shrubbier growth the following year, which can in turn provide excellent habitat for riparian passerine species. Beaver dams also help reduce erosion and filter anthropogenic pollutants from water.

Adaptive beaver management plans have been created for Utah (DWR 2010; Wheaton 2013). The Jordan River does not have a beaver adaptive management plan. The purpose of a beaver adaptive management plan is to advise on how best to manage beaver populations by balancing the habitat needs of the beaver and associated wildlife, the aesthetic value of an area, and the need to protect public and private resources (Wheaton 2013). A beaver management plan for the Jordan River could help benefit both wildlife and recreational use of the river while avoiding damage to public and private infrastructure.

### Bird Species

As illustrated in Table 2.9, the list of bird guilds and bird species (> 120) observed along the Jordan River is extensive. Using DWR's list of priority or key habitats (DWR 2005a) and specifically those found in the planning area, i.e., lowland riparian, wetland, and open water (flowing/standing) (see Figure 2.17), the JRCMP recommends considering individual bird species when developing habitat-related management goals, e.g., enhancement, restoration, and preservation. The following sections provide information about these habitats and bird species that depend on them.

#### LOWLAND RIPARIAN AND WETLAND HABITAT

Wetland and riparian habitats, like those adjacent to the Jordan River, are generally more productive and biologically diverse than surrounding upland habitats. Bird communities especially have greater diversity in riparian and wetland habitats than in upland habitats (Skagen et al. 2005; Woinarski et al. 2000). Roughly 50% of the bird species in the American Southwest nest exclusively in riparian and wetland habitat, and another 21% nest in higher densities in these habitats than in surrounding habitats (Johnson et al. 1985; Skagen et al. 2005). Increasing evidence also highlights the importance of riparian habitats during bird migration. Structurally complex riparian areas appear to have a higher abundance of birds and a higher diversity of bird species than do less complex areas (Krueper et al. 2003; Scott et al. 2003).

#### Riparian Species

The yellow warbler, found throughout Utah (including the Jordan River) generally nests in small riparian trees. Given the yellow warbler's relative abundance in the area, its nesting habitat parameters can be used in the development of riparian habitat restoration projects. Similarly, the bald eagle (state species of concern) and broad-tailed hummingbird (Partners in Flight priority species) both nest in lowland riparian habitats and can be the focus of habitat restoration efforts.

#### Wetland Species

The American avocet, which is found in northern Utah and has been observed along the Jordan River, inhabits shallow wetlands and mudflats (often saline or alkaline) during the breeding season. The presence of this species may be used as an indication that a certain level of habitat quality or wetland restoration success has been achieved. Other important wetland species include black-necked stilt (Partners in Flight priority species) and common yellowthroat (state species of special concern)

#### OPEN WATER (FLOWING AND STANDING)

Open water combines both flowing and standing aquatic habitats. It comprises approximately 3.4% of the total area of Utah (DWR 2005a) and includes lakes, reservoirs, streams, and rivers. Aquatic habitats on the Jordan River in many ways reflect the larger diversity of open water systems because there are areas of moderate gradient (flowing water) and areas of extremely low gradient (standing water) along various segments. Common types of birds seen in these habitats include ducks, geese, and swans. This family (Anatidae) of birds has evolved to float on the water's surface. Some species also dive for food in shallow areas. Several different species in this guild can be observed on the Jordan River, including Canada goose, wood duck, mallard, gadwall, northern pintail, northern shoveler, cinnamon teal, green-winged teal, American wigeon, redhead, ruddy duck, common goldeneye, and common merganser.

Also represented on the Jordan River are western grebe (*Aechmophorus occidentalis*), eared grebe (*Podiceps nigricollis*), and pied-billed grebe. These species in the Podicipediformes family can be seen floating on the water but dive underwater to forage for fish. The American white pelican (Partners in Flight priority species, state species of special concern) and osprey (state species of special concern) also use certain open water segments of the Jordan River.

## Carp

Because carp make up such a large percentage of the fish biomass in the Jordan River (Potts 2011b), additional information on this species is included here. Carp are a non-native, pervasive fish species that has the following negative effects on aquatic systems:

- Reduction of water quality by disturbing sediments.
- Riverbank erosion (carp feeding habits can undermine banks and cause them to collapse).
- Impacts to invertebrates (as carp increase in size, they begin eating native invertebrates).
- Impacts to aquatic plants through direct grazing and the uprooting of plants when feeding.
- Introduction of disease (carp often carry a range of parasites, fungal bacteria, and viral diseases).
- Impacts to native fish through competition for food and the effects of recruitment (population replenishment).

Rotenone, a natural chemical extracted from several tropical plants, is the most widely used toxicant to control carp populations; however, it affects all fish species indiscriminately. It is nontoxic to humans or waterfowl and is environmentally non-persistent (Wydoski and Wiley 1999). It was used for years in Farmington Bay to control carp populations. Other methods to control carp populations, which may or may not be effective on the Jordan River, include erecting physical barriers, harvesting through seining or trapping, and improving water clarity so that sight-feeding gamefish can more easily capture carp minnows.

## Further Reading

2015 Christmas Bird Count data (National Audubon Society 2016).

Biological Assessments: Key Terms and Concepts (U.S. Environmental Protection Agency 2011)

*eBird Explore Hotspots* (eBird 2016)

“The river continuum concept” in the *Canadian Journal of Fisheries and Aquatic Sciences* (Vannote et al. 1980)

*Tracy Aviary Bird Monitoring at Big Bend Restoration Area Report* (Roe 2015; not available online)

*Utah Comprehensive Wildlife Conservation Strategy* (Utah Division of Wildlife Resources 2005a)

*Utah Field Office Guidelines For Raptor Protection From Human And Land Use Disturbances* (Romin and Muck 2012)

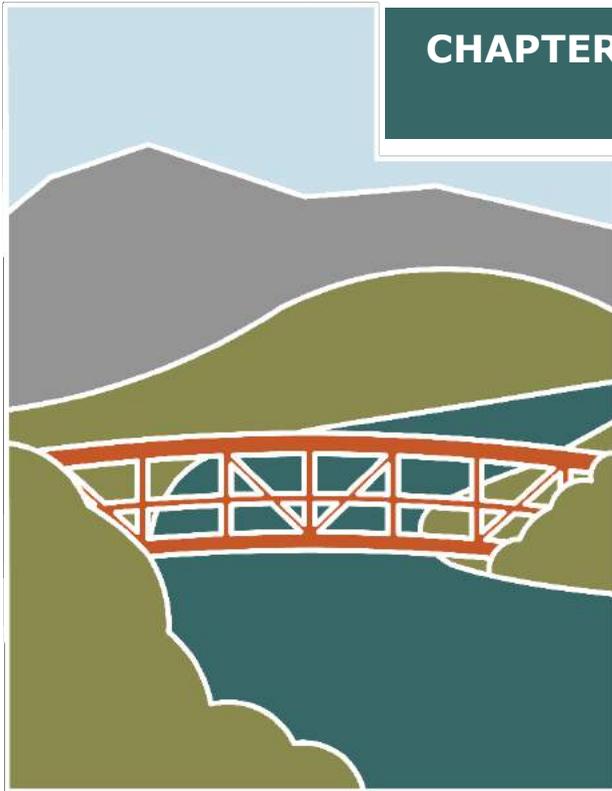
*Utah Partners in Flight Avian Conservation Strategy, Version 2.0.* (Parish et al. 2002)

*Utah Wildlife Action Plan* (Utah Wildlife Action Plan Joint Team 2015)

## Geographic Information System Data Layers

DWR Quail Habitat, DWR Pheasant Habitat, Monitoring Locations, Natural and Wildlife Viewing Areas

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### 2.3 Water Resources

Water resources in the Jordan River planning area are discussed in two sections: Hydrology and Water Quality.

#### **Hydrology**

The hydrology of the Jordan River is a study in the quantity, distribution, and timing of the flow of the river. The term *hydrology* represents a wide array of elements that when considered collectively describe the life of the river. The Jordan River is highly regulated and generally operates as a managed irrigation facility rather than a natural river, with the

exception of periods of high snowmelt runoff when the river functions more naturally. Many factors have coalesced to shape the river as it is today, including its natural position in the landscape and human-induced factors such as regulated releases from Utah Lake, irrigation diversions and returns, managed tributary flows, flood control practices, and development both within the banks of the river itself and the associated floodplain. Because of its hydrologic complexity, the river system is best described through an in-depth look at several of its primary elements: geomorphic setting, water budget, and surface water flow.

#### **GEOMORPHIC SETTING**

*Geomorphic setting* refers to the form of the landscape and other natural features that govern the physical layout of the river. The Jordan River begins at the outlet of Utah Lake and flows north through Salt Lake Valley for approximately 50 miles to terminate in Great Salt Lake. It is a slightly sinuous perennial stream with sinuosity increasing upstream (CH2M Hill 1992). The geomorphic form of the river is described in *Lower Jordan River: Phase 1 Report* using a

HEC-RAS model provided by Salt Lake County (SWCA and Hansen, Allen, & Luce 2013). This hydraulic model includes cross sections of the river beginning at Utah Lake and extending north to Burnham Dam. Each cross section contains data such as channel shape and the location of the left and right bank. Figure 2.26 illustrates three cross sections from this dataset that demonstrate how the geometry of the Jordan River channel has been modified along its course. Cross section A, 4 miles downstream of Utah Lake, is indicative of a wide river channel with a low bank and connectivity to an extensive floodplain. Cross section B, 1/3 mile downstream of 4500 South, retains a broad floodplain but note how the road prism on the left bank effectively serves as a levee. Immediately upstream of this cross section is an apartment complex with homes within 50 to 100 feet of the river, occupying what could have been the historic floodplain. Cross section C depicts the Jordan River immediately downstream of State Road 201 in its role as the Surplus Canal. Note the trapezoidal channel, steep banks, and high levees on each side of the river.

The longitudinal profile, also developed as part of the HEC-RAS model, illustrates a parabolic shape with slope decreasing downstream beginning at Turner Dam (Figure 2.27). The channel is steepest just below Turner Dam, becomes progressively less steep downstream, and has very low gradients as the river approaches Great Salt Lake.

Consideration of the geomorphology of the river requires understanding the concept of river stability. For the purposes of this document, stability is defined in the context of a riverine system, one that contains key physical features such as a historic floodplain, active floodplain, and river channel. These features are illustrated in a cross section and in a plan view in Figures 2.28 and 2.29, respectively. A stable river is one in which meanders throughout the active floodplain and bank locations change over time. For the Jordan River, migration of meander bends and erosion of banks are part of the river's dynamic equilibrium (CH2M Hill 1992). A more detailed description of these concepts as they apply to specific reaches of the river can be found in the *Jordan River Stability Study* (CH2M Hill 1992) and the *Jordan River Corridor Preservation Study* (JE Fuller/Hydrology & Geomorphology and CH2M Hill 2007). Additionally, FFSL maintains a map recording the historic locations of the Jordan River channel in 1856, 1937, 1963, 1992, and 1997 (FFSL 2016). These data illustrate changes in the channel over time as a result of both natural channel migration and channel manipulation.

JORDAN RIVER CROSS SECTIONS

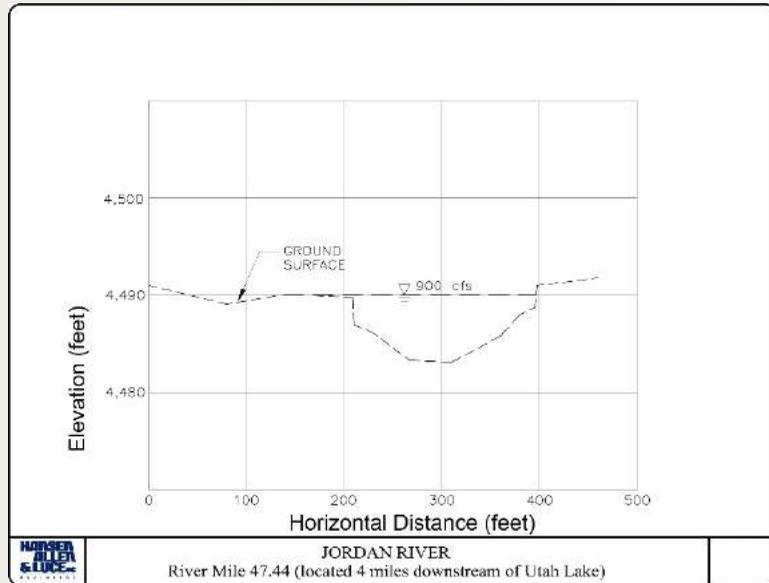


Figure 2.26a. Jordan River cross section A.

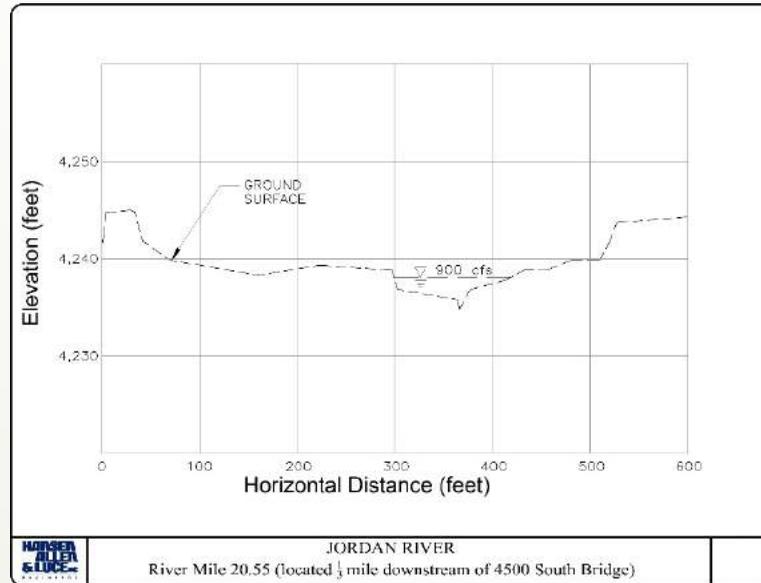


Figure 2.26b. Jordan River cross section B.

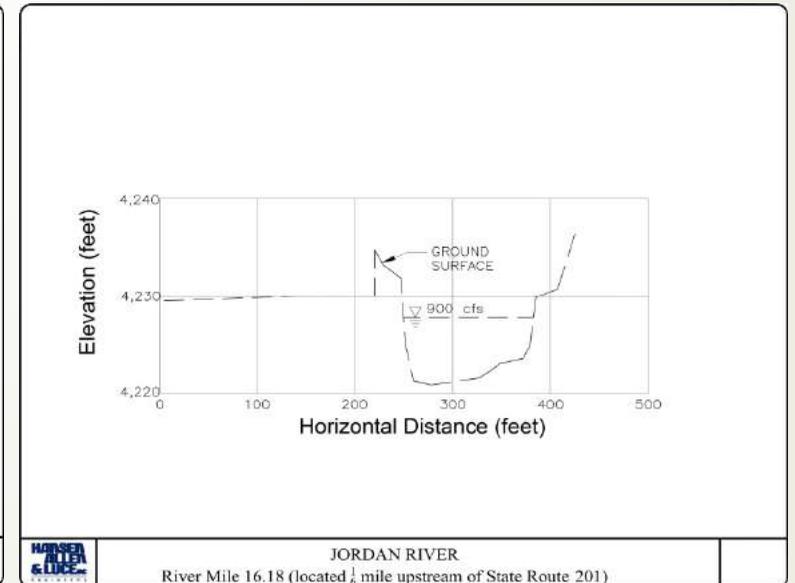


Figure 2.26c. Jordan River cross section C.

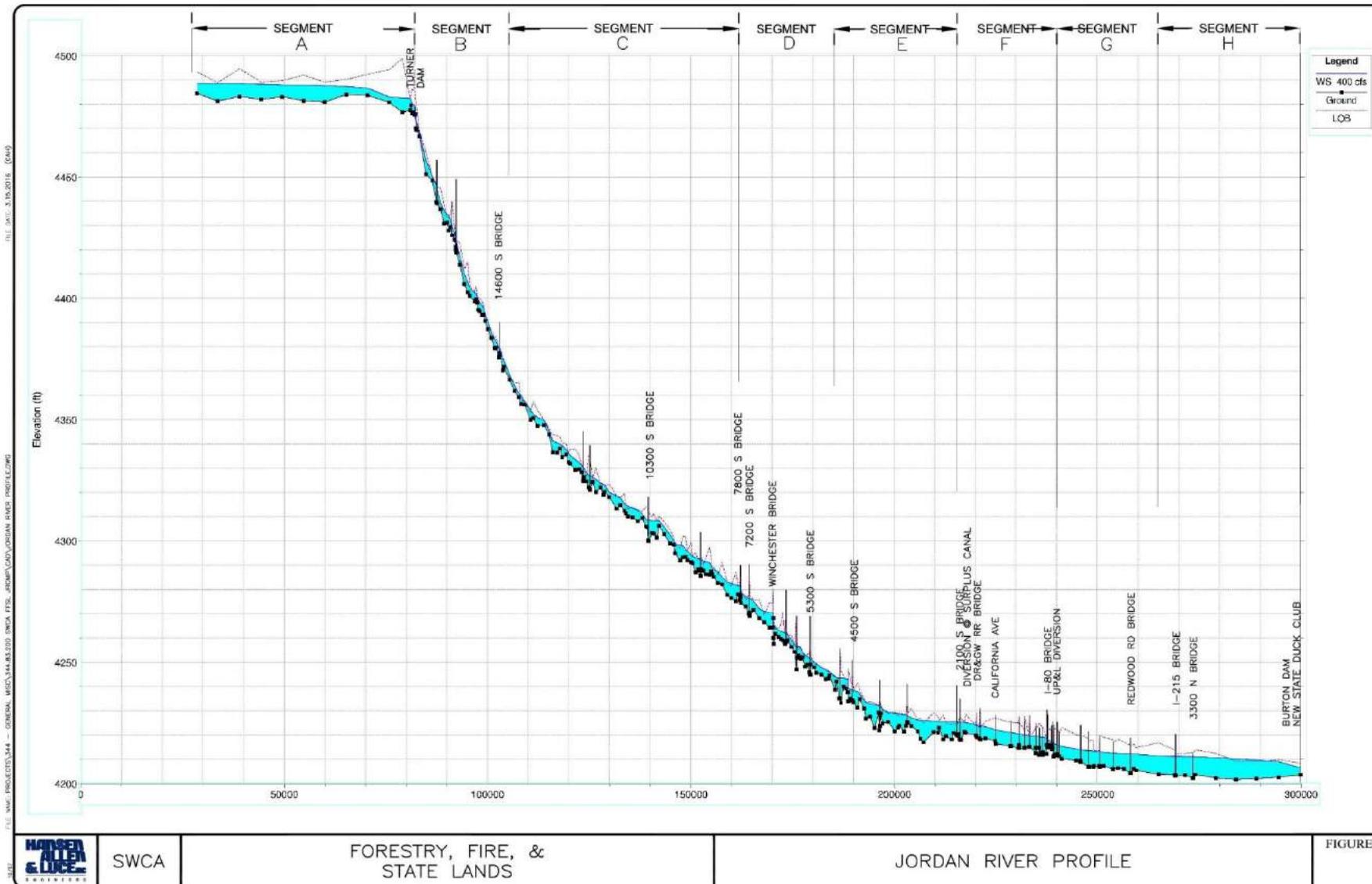
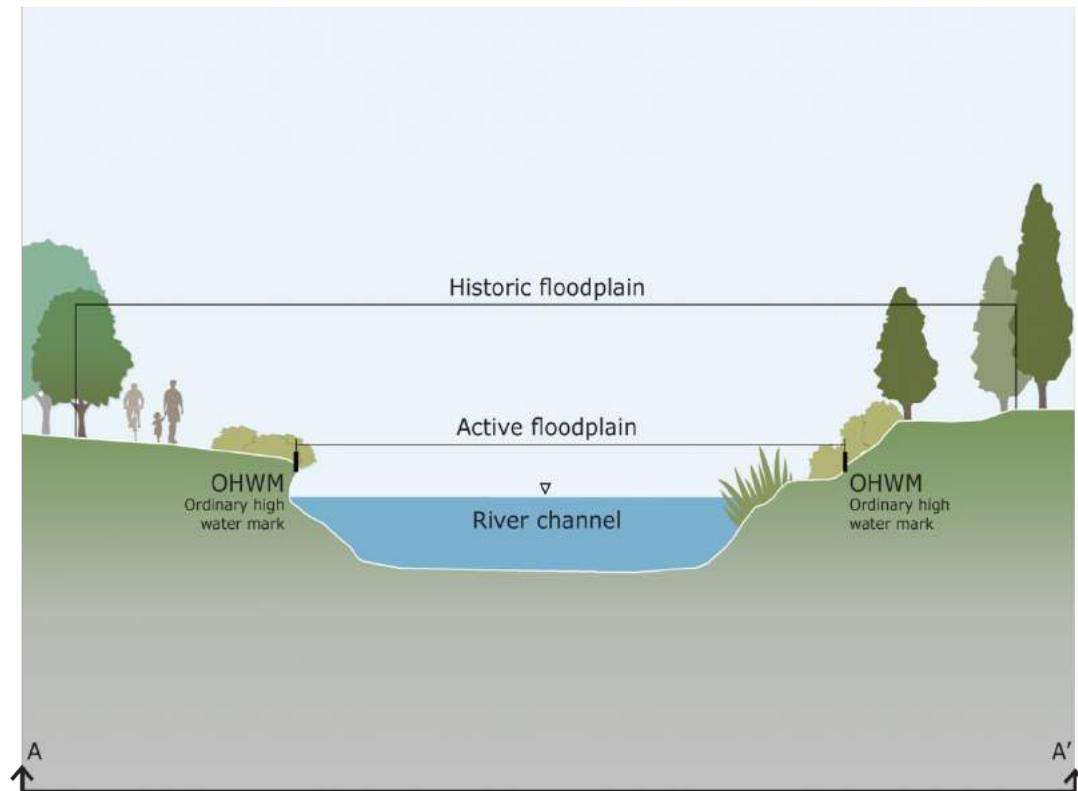
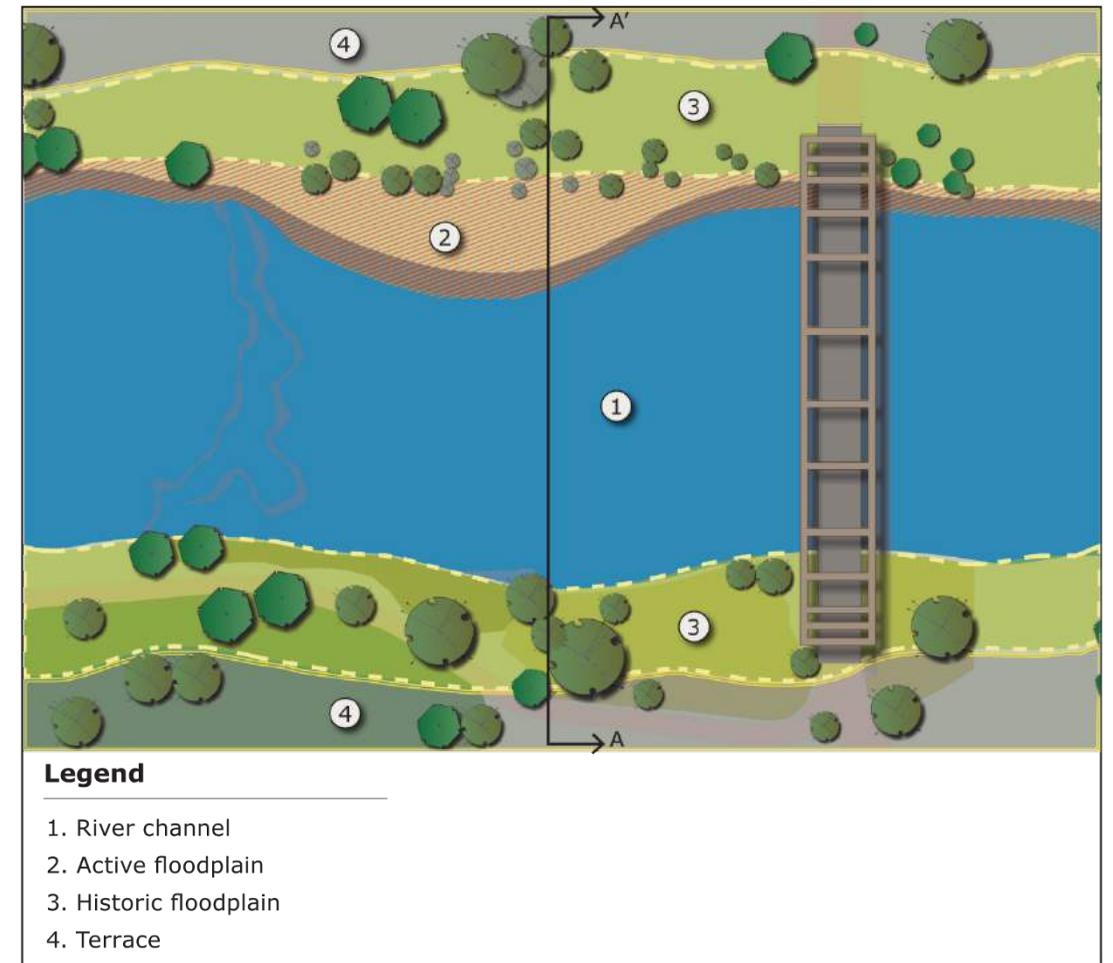


Figure 2.27. Longitudinal profile of the Jordan River.



**Figure 2.28.** Jordan River cross section showing an ordinary high water mark and physical features such as a historic floodplain, active floodplain, and river channel. *Note:* Transect A to A' represents the cross section of the river; this transect is also shown on the corresponding plan view in Figure 2.29.



**Figure 2.29.** Jordan River plan view showing physical features such as a historic floodplain, active floodplain, and river channel. *Note:* Transect A to A' represents the span of the river; this transect is also shown on the corresponding cross section in Figure 2.28.

When channel manipulation occurs, the natural dynamic equilibrium of the river is disrupted. Several changes have occurred over the past century that affect the equilibrium along the Jordan River, including river straightening, dredging, channel relocation, and stabilization. For example, Figure 2.30 illustrates the river extent and location in Murray both before (1937) and after (1990) the construction of I-215. The replacement of the floodplain with high density development, in addition to other channel manipulation activities, forces the river to adjust to these changes. The pace at which the adjustment occurs is much more rapid than what would naturally occur. This can lead to significant bank erosion (Figure 2.31), among other problems.



**Figure 2.30.** Comparison of the Jordan River before and after Interstate 215 construction. Photographs courtesy of Salt Lake County, 2016.



**Figure 2.31.** Bank erosion along the Jordan River.

## WATER BUDGET

A water budget reflects the relationship between the inputs, outputs, and changes in the amount of water in a specific region by breaking the water cycle into components. A general description of the sources and associated volume of water moving through the Jordan River watershed is important for understanding water use by both natural and human systems. It also lays the groundwork to illustrate a more detailed flow network. A water budget for the Jordan River Basin was developed by DWRe (2010) and is recreated here in Table 2.10. DWRe defines the *Jordan River Basin* as comprising all of Salt Lake County, with the exception of the northwest portion of the county that lies in Great Salt Lake. It includes all streams tributary to the Jordan River from the Salt Lake County line north to Great Salt Lake (DWRe 2010). For a more detailed description of the budget estimate methodology, see Section 2 of *Jordan River Basin – Planning for the Future* (DWRe 2010).

**Table 2.10.** Water Budget for the Jordan River Basin

Category	Water Supply (acre-feet/year)
Total precipitation	900,000
Inflow to the Jordan River Basin	295,000
Imports to the Jordan River Basin	171,000
Groundwater withdrawals	165,000
<b>Total Available Supply</b>	<b>1,531,000</b>
Used by vegetation and natural systems	503,000
Groundwater recharge	219,000
Agricultural depletions	32,000
Municipal and industrial depletions	181,000
Other depletions	95,000
<b>Total Losses</b>	<b>1,030,000</b>
Flow to Great Salt Lake ( <i>total available supply - total losses</i> )	501,000

Source: DWRe (2010).

The Jordan River Basin receives approximately 900,000 acre-feet of precipitation annually, over half of which is used by vegetation and natural systems. The remaining portion, plus inflow to the basin from the Jordan River at the Utah County line and imports to the basin, equates to a total available supply of 863,000 acre-feet annually. This is largely used through groundwater withdrawals and municipal and industrial depletions.

## SURFACE WATER FLOW

The Jordan River originates at Utah Lake, an approximately 150-square-mile natural lake that is the single largest contributor to flow in the river (Cirrus and Stantec 2013). In 1902, a gated structure and pumping plant were constructed at the Utah Lake outlet so that releases from the

lake could be regulated. Releases are regulated based on two guiding principles that were developed as part of a legal settlement known as the “Compromise Agreement” and that are currently part of the *Utah Lake and Jordan River Operating Procedures and Flood Management Plan* (DWRi 1992). These guiding principles are as follows:

- A maximum lake elevation of 4,489 feet above sea level. The gate outlet is opened when lake stage exceeds this elevation, and release rate is determined by the outlet capacity of Utah Lake or the current flows of the river.
- Minimum flows are released into the river when the lake level falls below 4,489 feet; flows are determined by the water rights of downstream users. However, Jordan River flows at the 2100 South diversion are limited to less than 3,400 cubic feet per second (cfs).

Gates are typically opened during the irrigation season, but they remain closed during the non-irrigation season until sufficient storage is accumulated in the lake to meet downstream water rights for the following year (Cirrus and Stantec 2013). During years of potentially high spring snowmelt runoff, flows are released to decrease lake elevation in anticipation of high tributary contribution.

In addition to flows from Utah Lake, the Jordan River receives flow from seven perennial tributaries (all on the east side of the basin), nine intermittent tributaries, and spring systems. Flow from the seven perennial tributaries and the combined average annual flow from all Wasatch Mountains streams are shown in Table 2.11. Average annual flow from the Wasatch Mountains streams is 173,500 acre-feet compared to 4,500 acre-feet from the Oquirrh Mountains streams. For most of the year, flow from City Creek, Parley’s Creek, Little Cottonwood Creek, and Big Cottonwood Creek are diverted for culinary purposes. All other perennial tributaries are diverted for irrigation during the irrigation season before reaching the Jordan River, with the exception being during spring snowmelt or storm events when water quality is poor and diversion works are exceeded. In this case, tributary flow reaches the river, along with a large quantity of sediment. Urbanization of tributary watersheds has resulted in the routing of four of the seven perennial

tributaries through conduits to reach the river. These include City Creek, which enters the river through the North Temple outfall and Red Butte, Emigration, and Parley’s Creeks, which primarily enter the river through an outfall at 1300 South or conduits at 800 and 900 South.

Other sources of flow to the river consist of permitted discharges from wastewater treatment plants (WWTPs), stormwater, diffuse runoff, irrigation diversions and return flows, and groundwater. A detailed description of each source of flow is provided in Appendix C of the *Jordan River Total Maximum Daily Load Water Quality Study – Phase 1* (Cirrus and Stantec 2013).

**Table 2.11.** Annual Flow for Major Tributaries to the Jordan River

Tributary	Flow	
	Average (acre-feet)	90% Reliability
City Creek	11,750	7,730
Red Butte Creek	2,450	1,330
Emigration Creek	4,440	1,290
Parley’s Creek	18,130	9,090
Mill Creek	10,760	7,020
Big Cottonwood Creek	51,240	36,300
Little Cottonwood Creek	46,190	32,950
Other tributaries	28,540	–
Wasatch Mountains streams	173,500	115,550
<b>Total</b>	<b>347,000</b>	<b>211,260</b>

Note: 90% reliability indicates that the stated flow will be exceeded in 9 out of 10 years.  
Source: DWRe (2010).

An extensive canal system is present in the Salt Lake Valley to transport water for crops, flood control, and public water supply purposes. An inventory of irrigation diversions conducted during the TMDL process (Cirrus and Stantec 2013) indicates that there are eight major diversions supporting 11 canals on both the east and west side of the river. For irrigation purposes, water is diverted as early as March 1, but it typically starts April 1 and runs to the middle or end of October (Silva 2016). Timing of diversions is associated with individual water rights. Water may, however, be moved year-round for flood control, stock watering, and water supply use, as is the case with the North Jordan Canal. The diversion network is illustrated in Figure 2.33 in the Existing Hydrologic Condition by Segment section. One of the larger diversions is the Surplus Canal, which extends from the Jordan River at 2100 South to Great Salt Lake and is managed as a flood control feature. Approximately 70% of water in the Jordan River can be diverted through the Surplus Canal at any given time (Salt Lake County et al. 2009).

The flow of the Jordan River can be illustrated with a hydrograph, which shows the rate of flow versus time past a specific point in the river. Gages along the river regularly measure flow. The past 20 years of approved flow data (1995–2014) were used for each of two gages to create monthly mean hydrographs. Select gages illustrate flow both above (Gage #150) and below the Surplus Canal diversion (Gage #10171000). Information and general location of flow gages are presented in Table 2.12.

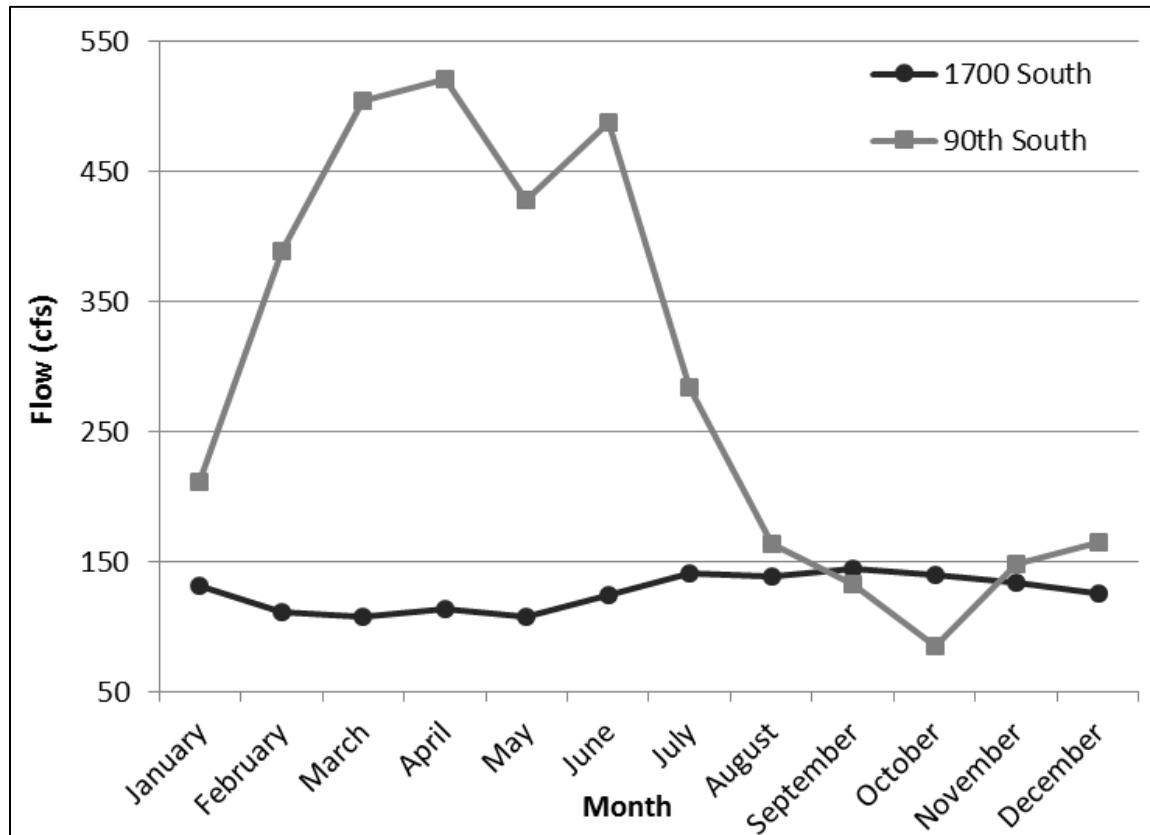
**Table 2.12.** Select U.S. Geological Survey and Salt Lake County Flow Gages on the Jordan River

Flow Gage Number	Operator	Description	Time Period Used in the Analysis	Average Annual Flow (cfs)
150*	Salt Lake County	Jordan River at 9000 South	1995–2011	307
10171000 <sup>†</sup>	USGS	Jordan River at 1700 South	1995–2014	126

\* Data from Salt Lake County (2016a).

<sup>†</sup> Data from USGS (2016).

The hydrograph presented in Figure 2.32 clearly illustrates the effect the Surplus Canal diversion has on flow in the Jordan River. The shape and variability in flow above the Surplus Canal diversion (9000 South gage) are more similar to snowmelt-driven rivers in Utah where a higher spring runoff period is followed by a decline throughout the summer. In contrast, flows in the river below the diversion (1700 South gage) are much more homogeneous and reflect the extent to which flow is regulated by the Surplus Canal.



**Figure 2.32.** Monthly mean hydrograph for flow gages above and below the Surplus Canal (1700 South gage [1995–2014]; 9000 South gage [1995–2011]).

### FLOODING

Flooding and flood control efforts have had significant effects on the shape, alignment, and condition of the Jordan River. Information on flood control is provided here and in the Infrastructure section of this chapter. Salt Lake County’s flood control access points along the river are shown on the GIS spatial data viewer for the JRCMP on the FFSL website. Flood control information for Utah and Davis Counties along the river is not included in the plan, in part because of the ability to manage high water using the Utah Lake Outlet Dam and the Surplus Canal, respectively. Flooding on the Jordan River in Davis County is also influenced by water levels in Great Salt Lake.

The FEMA flood insurance study report for Salt Lake County provides the following summary of flood protection efforts in the county:

Efforts to control flooding in Salt Lake County extend back to 1885 when local interests constructed the Surplus Canal from 2100 South Street to the Great Salt Lake. The purpose of this flood control structure was to divert upstream the Jordan River runoff around Salt Lake City. Enlargement of the canal was completed by the USACE in 1960. In order to supply downstream water rights, a gated structure was constructed at the head of the Surplus Canal and on the adjacent diversion to the Jordan River north of 2100 South. During periods of high runoff, the gates to the Jordan River north of 2100 South are closed, diverting all water in the Jordan River upstream of 2100 South into the Surplus Canal. This action reduces flood damage along the Jordan River in Salt Lake City by reserving channel capacity for inflow from the Salt Lake City streams ... As part of this same project, levees were also constructed on the Jordan River from the head of the Surplus Canal to the Mill Creek confluence. (FEMA 2012)

FEMA flood zones are shown on the GIS spatial data viewer on the FFSL website. Additional information about levees and dams on the Jordan River is found in the Infrastructure section of Chapter 2.

**EXISTING HYDROLOGIC CONDITION BY SEGMENT**

The existing hydrologic condition of the Jordan River by segment, including major inflows and outflows, WWTP discharges, and current and historical flow gages is presented in Table 2.13 and Figure 2.33.

**Table 2.13.** Existing Hydrologic Condition by Segment on the Jordan River

Segment	Major Inflows	Wastewater Treatment Plant Discharge	Major Outflows	Current and Historical Flow Gages (period of record)
A	Utah Lake	-	-	USGS 10166605 (1985-1987)
B	-	-	East Jordan Canal, Utah Canal, Salt Lake Canal, South Jordan Canal	USGS 10167000 (1935-1991)
C	-	-	North Jordan Canal	Salt Lake County (SLCo) 150 (1979-present)
D	-	South Valley Water Reclamation Facility	-	-
E	Little Cottonwood Creek, Big Cottonwood Creek, Mill Creek	Central Valley WWTP (discharges to Mill Creek)	Brighton Canal	USGS 10167300 (1980-1985)
F	Parley’s Creek, Emigration Creek, Red Butte at 1300 South (also includes irrigation returns), City Creek	-	Surplus Canal	USGS 10171000 (1942-present) USGS 10170490 (1942-2014)
G	-	-	-	SLCo 960 (1975-present)
H	-	South Davis WWTP	State Canal	-

**Further Reading**

*Flood Insurance Study, Salt Lake County, Utah* (Federal Emergency Management Agency 2012)

*Jordan River Basin – Planning for the Future* (Utah Division of Water Resources 2010)

*Jordan River Stability Study* (CH2MHill 1992)

*Jordan River Total Maximum Daily Load Water Quality Study – Phase 1* (Cirrus and Stantec 2013).

“The river continuum concept” in the *Canadian Journal of Fisheries and Aquatic Sciences* (Vannote et al. 1980)

*Two-Dimensional Streamflow Simulations of the Jordan River, Midvale and West Jordan, Utah* (Kenney and Freeman 2011)

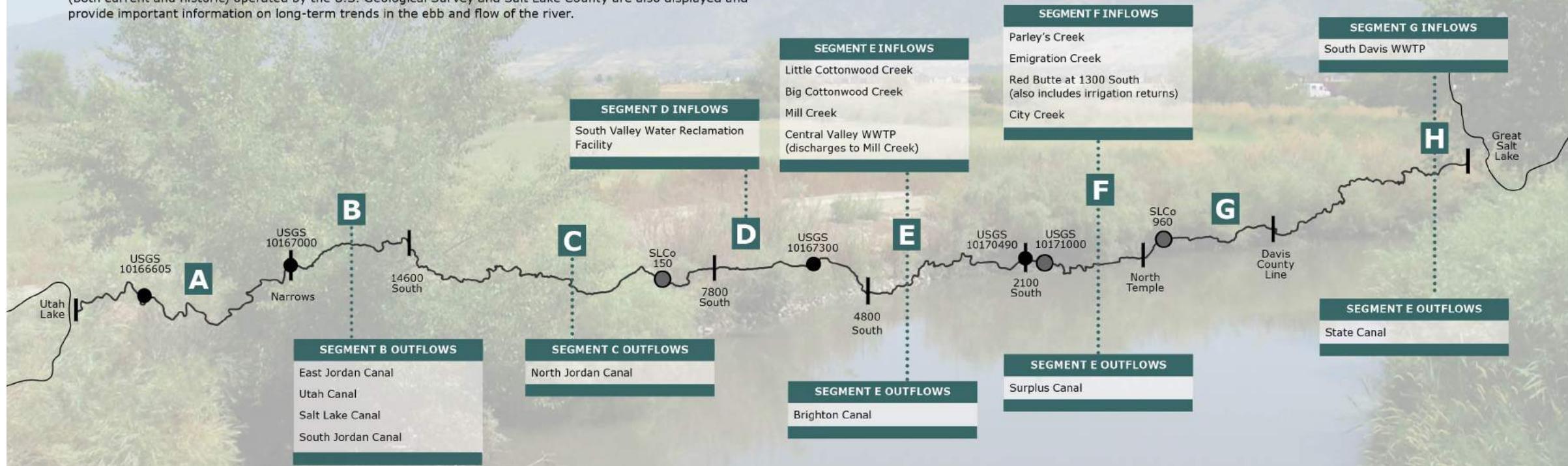
*Utah Lake and Jordan River Operating Procedures and Flood Management Plan* (Utah Division of Water Rights 1992)

**Geographic Information System Data Layers**

Flow Gages, FEMA Flood Zones, Major Tributary Inflows, Wastewater Treatment Plants, Historic Channel, Jordan River Meander Corridor, Jordan River Watershed HUC8, National Hydrography Dataset, Salt Lake County Flood Control, River Cross Sections, Depth to Groundwater

# JORDAN RIVER – HYDROLOGY

The Jordan River is a complex hydrologic network exhibiting multiple inflows and outflows throughout its 50-mile course from Utah Lake to Great Salt Lake. This figure illustrates the primary components of this network that include major inflows and outflows and their relative locations along the course of the river. Major inflows consist of seven perennial tributaries that enter the river on the east side, and major outflows consist of eight diversions that support eleven canals on both the east and west sides of the river. Streamflow monitoring gages (both current and historic) operated by the U.S. Geological Survey and Salt Lake County are also displayed and provide important information on long-term trends in the ebb and flow of the river.



## NOTES

● = current flow gage ● = historic flow gage  
 SLCo = Salt Lake County, USGS = U.S. Geological Survey, WWTP = wastewater treatment plant

Figure 2.33. Existing hydrologic condition of the Jordan River by river segment.

## Water Quality

Water quality refers to the chemical, physical, biological, and radiological characteristics of water. It is a measure of the suitability of water for a particular use. The State of Utah has developed and adopted over 190 water quality numeric criteria (chemical concentrations that should not be exceeded) to protect water quality and designated uses of surface waters. The water quality criteria for a pollutant can vary depending on the beneficial use assigned to a waterbody. To identify the use and value of a waterbody, DWQ has developed four major beneficial use classifications to characterize the uses of surface waters within the state. Table 2.14 lists Utah’s four major beneficial use classifications and sub-classifications.

**Table 2.14.** Utah’s Beneficial Use Classifications

Major Beneficial Use Classification	Beneficial Use Sub-Classification
1 Domestic Water Systems	1C Drinking Source Water
2 Recreational Use and Aesthetics	2A Frequent Contact Recreation
	2B Infrequent Contact Recreation
3 Aquatic Wildlife	3A Cold Water Aquatic Life
	3B Warm Water Aquatic Life
	3C Nongame Aquatic Life
	3D Waterfowl/Shorebirds
4 Agricultural	4 Agriculture

Source: Utah Administrative Code R317-2-6.

For the purposes of evaluating water quality and beneficial use support of the Jordan River, DWQ has subdivided the river into eight units, which coincide with the segments used in the plan (Table 2.15, Figure 2.34). Beneficial uses for the various segments of the Jordan River include domestic uses (Class 1C); secondary contact recreation such as boating, wading, and fishing

(Class 2B); cold water fisheries (Class 3A); warm water fisheries (Class 3B); nongame fish (Class 3C); wildlife (Class 3D); and agricultural irrigation (Class 4).

Beneficial uses are protected by a variety of water quality numeric criteria. Some segments of the Jordan River have been found to be non-supporting of one or more beneficial uses (i.e., impaired) because of the exceedance of one or more water quality criteria. Descriptions of water quality impairments that occur in the Jordan River are provided in Table 2.16.

**Table 2.15.** River Segments and Corresponding Utah Division of Water Quality Assessment Units

FFSL River Segment	Utah Division of Water Quality Assessment Unit*
Segment A	Unit 8
Segment B	Unit 7
Segment C	Unit 6
Segment D	Unit 5
Segment E	Unit 4
Segment F	Unit 3
Segment G	Unit 2
Segment H	Unit 1

\* Data from Utah Administrative Code R317-2-6.

**Table 2.16.** Descriptions of Water Quality Impairments that Occur in the Jordan River

Impairment	Description
<b><i>Escherichia coliform (E. Coli)</i></b>	Elevated concentrations of <i>E. coli</i> have been measured in Segments D, E, F, G, and H. DWQ is currently investigations processes and pollutant sources that contribute to impairment from high levels of <i>E. coli</i> . <i>E. coli</i> in water is an indicator of pathogen presence and is therefore a public health concern.
<b>Total dissolved solids (TDS)</b>	Elevated levels of TDS have been identified in Segments A, C, D, and E. Some of the larger known sources of TDS pollution that enter the Jordan River include discharge from Utah Lake, groundwater, wastewater discharge, irrigation return flow, and tributary inflow. High levels of TDS can negatively influence both livestock health and crop production.
<b>Temperature</b>	Temperature levels that exceed the Class 3A cold water aquatic life standard (20°C) have been measured in Segments B, C, and D. Warm waters discharged from Utah Lake and a lack of vegetative canopy in the riparian corridor in these segments influence water temperatures in the Jordan River. Temperature exceedances are a concern for aquatic species that have a limited temperature range within which they can survive and reproduce.
<b>Dissolved oxygen (DO)</b>	Low levels of DO are currently a concern in Segments C, F, G, and H, although a TMDL has been completed and approved for DO in Segments F, G, and H. DO levels in the Jordan River are part of a complex and dynamic system with many factors and processes influencing concentrations such as 1) physical factors, 2) aerobic decomposition and 3) nighttime algal consumption of DO associated with the transition from plant photosynthesis to respiration.
<b>Copper</b>	High levels of copper are currently a concern in Segment H. Although an essential nutrient at low concentrations, copper can be toxic to aquatic organisms at higher concentrations.

Impairment	Description
<b>OE bioassessment</b>	OE bioassessment is the biological health of a waterway that includes the protection of fish and the organisms on which they depend. Biological health is currently a concern in Segments B, C, E, F, G, and H.
<b>Total phosphorus</b>	Total phosphorus is a concern in Segment F. Phosphorus occurs naturally and is important for supporting aquatic food webs; however, high levels promote excess algae growth that can degrade lakes and streams.
<b>Selenium</b>	Selenium is a concern in Segment C. It is a naturally occurring element but can be toxic to aquatic life and other organisms (e.g., birds) that consume aquatic organisms.
<b>Arsenic</b>	High levels of arsenic are a concern in Segment A, primarily as it relates to drinking water. Arsenic is toxic to humans when consumed at certain concentrations.

# JORDAN RIVER – WATER QUALITY

The State of Utah has designated classes of beneficial uses for each segment of the Jordan River and has established numeric and narrative water quality criteria to ensure support for those beneficial uses. This figure illustrates the beneficial uses designated to various segments of the Jordan River and the water quality criteria found to be not supporting their beneficial use (i.e., "impaired"). These data reflect *Utah's 2016 Draft Integrated Report* (Utah Division of Water Quality 2016).

## NOTES

DO = dissolved oxygen, OE = observed expected, TDS = total dissolved solids, TP = total phosphorus

▲ Current and historic monitoring sites

**RIVER SEGMENT**  
Beneficial Use – Impairment

**SEGMENT A, UNIT 8**  
1C – Arsenic  
2B  
3B  
4 – TDS

**SEGMENT B, UNIT 7**  
2B  
3A – Temperature, OE bioassessment  
4

**SEGMENT C, UNIT 6**  
2B  
3A – DO, selenium, temperature, OE bioassessment  
4 – TDS

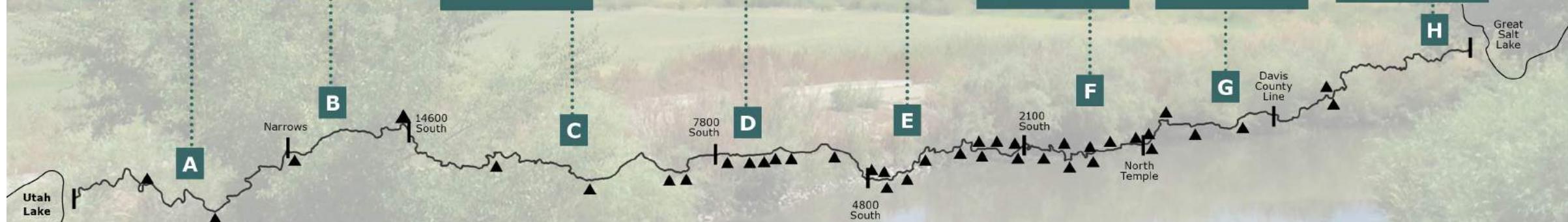
**SEGMENT D, UNIT 5**  
2B – *E. coli*  
3A – Temperature  
4 – TDS

**SEGMENT E, UNIT 4**  
2B – *E. coli*  
3B – OE bioassessment  
4 – TDS

**SEGMENT F, UNIT 3**  
2B – *E. coli*  
3B – DO, OE bioassessment  
4  
Not assigned – TP

**SEGMENT G, UNIT 2**  
2B – *E. coli*  
3B – DO, OE bioassessment  
3D – OE bioassessment  
4 – TDS

**SEGMENT H, UNIT 1**  
2B – *E. coli*  
3B – DO, copper, OE bioassessment  
3D – DO, copper, OE bioassessment  
4 – TDS



## DESIGNATED BENEFICIAL USES

- 1C** Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water.
- 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 wading, hunting, and fishing.
- 3A** Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.
- 3B** Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.
- 3D** Protected for waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.
- 4** Protected for agricultural uses including irrigation of crops and stock watering.

Figure 2.34. Beneficial uses and impaired segments of the Jordan River.

DWQ initiated water quality investigations of the Jordan River in 1996, and these have been ongoing since that time. The results of these investigations have shown that levels of dissolved oxygen (DO), total dissolved solids (TDS), temperature, and *Escherichia coliform* (*E. coli*) exceed Utah's water quality criteria for some segments of the Jordan River (see Figure 2.34). When levels of a pollutant such as *E. coli* exceed state water quality criteria, the waterbody is considered to be impaired, and the state is required by the CWA to develop a TMDL. A TMDL is the amount of a given pollutant that a waterbody can receive and still meet water quality standards. The methodology used by DWQ for assessing water quality conditions and determining beneficial use support is included in *Utah's 303(d) Assessment Methodology, Integrated Report* (Flemer et al. 2016).

In 2013, DWQ completed a TMDL for the Jordan River (Cirrus and Stantec 2013). The 2013 TMDL addresses the maximum concentration of total organic matter that will maintain the state's instantaneous DO water quality numeric criteria for the lower Jordan River. Impairments from other pollutants (TDS, *E. coli*, and temperature) are also addressed in the 2013 TMDL; however, the report does not include a TMDL for TDS, temperature, or *E. coli*. Exceedances of the numeric criteria for temperature and TDS are largely due to natural causes, including shallow water, hot summer air temperatures, and groundwater high in natural thermal discharges and TDS (Cirrus and Stantec 2013). A separate analysis of these factors is being undertaken that may include proposals for site-specific criteria. In addition, *E. coli* measurements are currently being collected throughout the Jordan River watershed to support a future TMDL study for this pollutant.

Segments D through H are high priority for TMDL development by 2022 for both *E. coli* and DO because 1) a TMDL is already in progress, 2) the Jordan River supports high levels of recreational use, and 3) the Jordan River is considered an important fishery. Also, Segment A is listed as high priority for arsenic because it is a drinking water source.

A synopsis of all documents produced as part of the Jordan River TMDL study from 2005 through 2010 is included in Appendix B of the 2013 TMDL (Cirrus and Stantec 2013).

## Further Reading

*2015 Salt Lake County Integrated Watershed Plan* (Salt Lake County 2016)

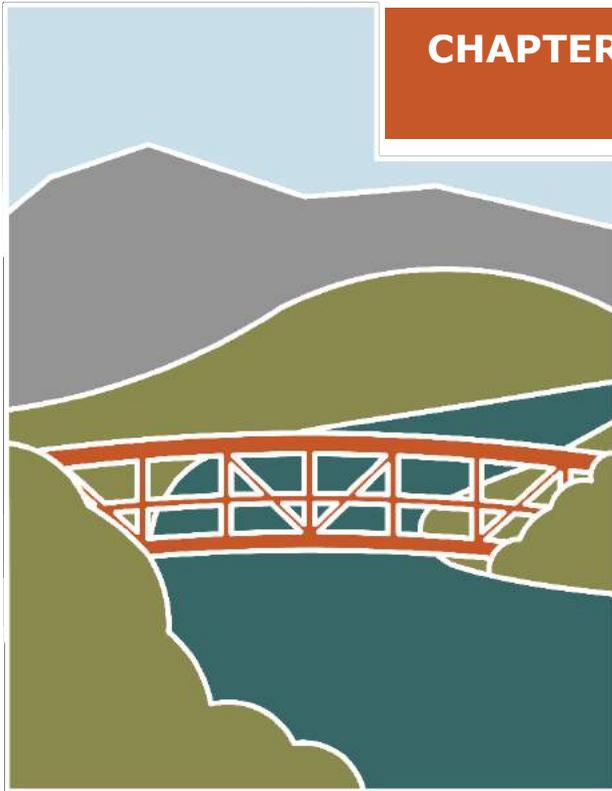
*Jordan River Total Maximum Daily Load Water Quality Study – Phase 1* (Cirrus and Stantec 2013).

*Salt Lake Countywide Watershed – Water Quality Stewardship Plan* (Salt Lake County et al. 2009).

## Geographic Information System Data Layers

DWQ Monitoring Sites, DWQ Assessment Units, Point Sources

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### 2.4 Community Resources

Community resources are those resources associated with the Jordan River that are valued, enjoyed, used, or needed by the public at large. The public includes, but is not limited to, stakeholder groups who participated in the planning process (see Appendix B). Community resources in the Jordan River planning area are discussed in six sections: Infrastructure, Cultural Resources, Recreation, Access, Public Safety, and Education.

#### ***Infrastructure***

Infrastructure in the Jordan River includes bridges, utilities, outfall structures, diversion dams, and levees. Infrastructure elements either treat the river as an obstacle to be crossed (bridges and utility crossings) or as a resource (outfall structures and diversion dams). Each of these infrastructure elements is described in more detail below.

When considering infrastructure development and construction, project proponents must operate in accordance with the FFSL authorization process and other applicable federal, state, and county requirements. Most of the existing infrastructure on the Jordan River sovereign land is sanctioned with an associated FFSL authorization; however, some infrastructure, especially older infrastructure, is not. Some bridges, outfall structures, diversion dams, and other infrastructure improvements are deemed eligible for the NRHP because of their age and local significance. Chapter 1 describes the permitting process and provides information on what to do when

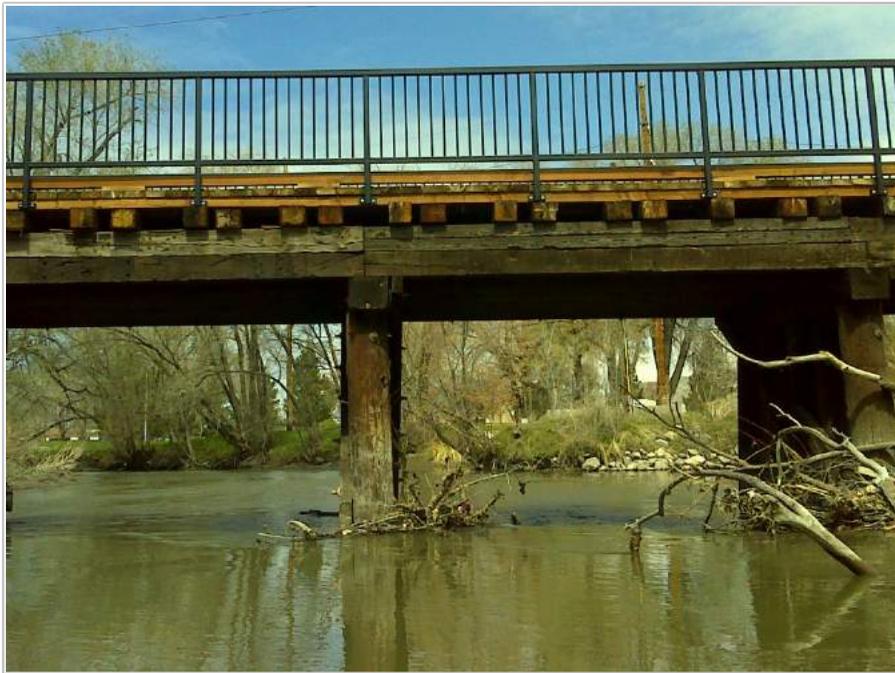
considering construction of new infrastructure or permitting facilities that do not have current authorizations. The infrastructure section of Chapter 3 describes design specifications for certain types of infrastructure.

Infrastructure for recreation users in the planning area, such as boater access points, is discussed in the Recreation section of Chapter 2.

Infrastructure can negatively affect navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality. For example, diversion dams can change river hydrology, present navigational and safety hazards, alter aesthetic beauty, change sediment transport below the dam, and alter fish and wildlife habitats. Proper infrastructure design and installation are important in preventing the creation of navigational or safety hazards. Careful placement of infrastructure, such as bridges along the Jordan River, is important, because poorly spaced infrastructure can damage the resource, inhibit navigation, and detract from aquatic beauty and the public recreation experience.

#### **BRIDGES**

Bridges serve as transportation links across the river for vehicles, trains, and pedestrians. Bridges spanning the Jordan River are of various ages, design, and construction materials. Newer bridges generally cross the main channel without obstructions, whereas many older bridges have piers and constrict the main channel. Low clearances and bridge piers can present obstructions to navigation, can change river hydrology, and can cause large woody debris to accumulate behind them, as shown in Figure 2.35.



**Figure 2.35.** Large woody debris causing an obstruction in the Jordan River.



**Figure 2.36.** Stand-alone above-grade crossing on the Jordan River.

## UTILITY CROSSINGS

Utility crossings include water pipelines, sewer pipelines, gas pipelines, fiber optic lines, and powerlines.

Crossing types include below grade and above grade. Below-grade crossings cross the river below the bed of the river and are generally not visible. Above-grade crossings either stand alone (such as powerlines) or are attached to an existing bridge (Figures 2.36 and 2.37). Some older utility crossings that rest on the bed of the channel are considered above grade.



**Figure 2.37.** Above-grade crossing attached to a bridge on the Jordan River.

## OUTFALL STRUCTURES

The Jordan River serves as the major outlet for almost all drainage systems in the Salt Lake Valley. Outfall structures include storm drain outlets, treatment plant outlets, irrigation return flows, and cooling water outlets. Figure 2.38 shows a typical outfall structure on the Jordan River.



**Figure 2.38.** Typical outfall structure on the Jordan River.

## DIVERSION DAMS

Several diversion structures (dams) have been constructed in the Jordan River to divert its water resources for other uses. Existing diversion dams are listed in Table 2.17.

**Table 2.17.** Jordan River Diversion Dams

Diversion Dam	Location	Facilities Served
Utah Lake outlet dam	At the junction with Utah Lake	Jordan River and all of its associated users
Turner Dam	Jordan Narrows	East Jordan Canal, Utah and Salt Lake Canal, Utah Lake Distributing Canal, Provo Reservoir Canal, Jordan Aqueduct
Joint diversion dam	1.5 miles downstream of the Turner Dam; approximately 2 miles upstream of 14600 South	Jordan and Salt Lake City Canal, South Jordan Canal
North Jordan Canal diversion dam	Near 9400 South	North Jordan Canal
Brighton Canal diversion dam	Near 4600 South	Brighton Canal
Surplus Canal – North Jordan River diversion dam	North of 2100 South	Surplus Canal, North Jordan River
PacifiCorp (Utah Power & Light Company) diversion dam (also known as Gadsby dam)	South Temple	PacifiCorp power plant
Burnham Dam (also known as State dam)	Approximately 1900 South Woods Cross	New State duck club

## LEVEES

Levees have been constructed for flood control along portions of the Jordan River and permitted through FEMA. Levees for the Jordan River that are recognized by FEMA in Flood Insurance Rate Maps are summarized in Table 2.18. Other areas along the Jordan River may appear to have levees, but these are most likely dredge spoils from flood control activities. Levee accreditation is tied directly to the management of the levee system, and it determines those activities and structures permitted within the levee prism so that levee operation and maintenance are not compromised.

**Table 2.18.** Jordan River Levees

Levee Location	Bank	Flood Protection Benefit
Approximately 8500 to 7900 South	East	Protects a portion of the Old Sharon Steel reclamation site.
Approximately 4170 to 4070 South	East	Does not have sufficient height or freeboard. Property east of the levee is zoned AH* with a 1% chance flood elevation designated as the same elevation as the river.
From Mill Creek to the Surplus Canal	East and west	The west-side levee does not have sufficient freeboard and is discounted as flood protection. The east-side levee is accredited and provides flood protection to areas east of the river.
Between North Temple and approximately 1800 North	West	Provides protection from floods up to a 1% chance (100-year) flood event for a large area.

\* An AH zone is an area subject to inundation by a 1% annual chance of shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Mandatory flood insurance purchase requirements and floodplain management standards apply to this zone (FEMA 2015a).

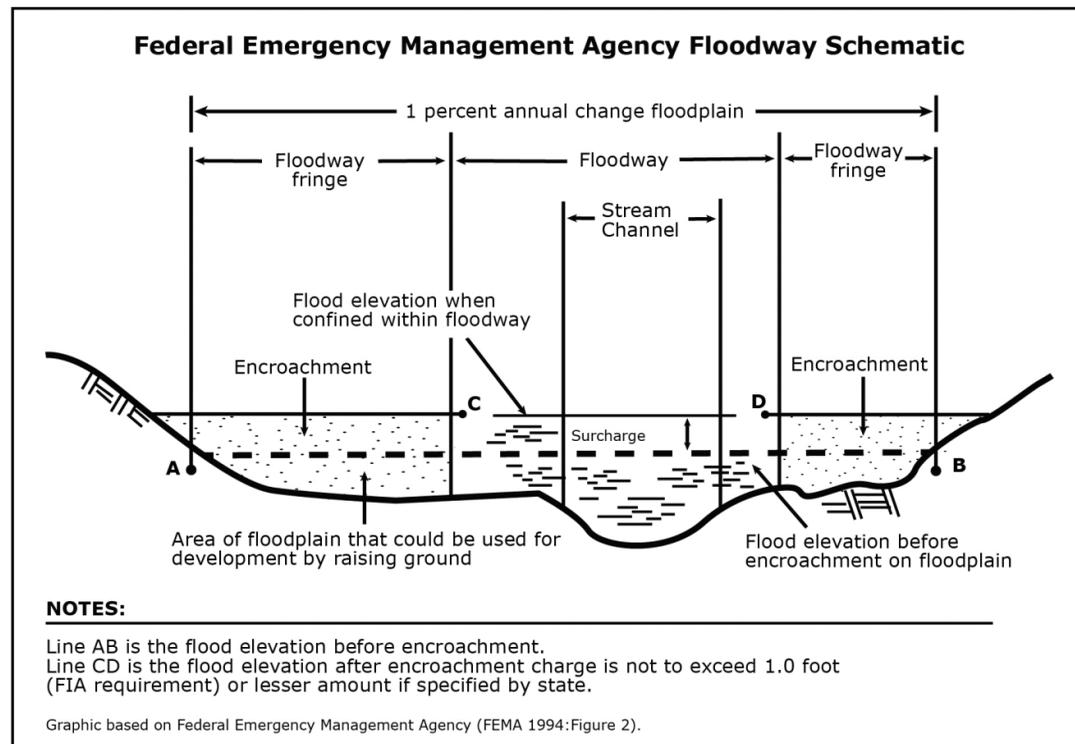
Source: FEMA (1994).

Levees accredited by FEMA for flood control must comply with FEMA inspection and maintenance requirements to maintain accreditation. FEMA requirements for vegetation control are described in *Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures* (USACE 2014). The guidelines require a “vegetation-free zone,” which is free of all vegetation except grass “to provide a reliable corridor of access to, and along, levees.”

## FLOOD CONTROL

FEMA Flood Insurance Rate Maps designate both a floodway and a floodplain for the Jordan River. A *regulatory floodway* is defined as the channel of a river and the adjacent land areas that must be reserved to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height (FEMA 2015b). The floodway concept allows encroachment into the floodplain but not into the floodway. Proposed development that would

encroach into the floodway must have a “no-rise” effect on flood elevations. Communities must regulate development in floodways to ensure that there are no increases in upstream flood elevations. The FEMA floodway schematic is shown in Figure 2.39.



**Figure 2.39.** Federal Emergency Management Agency floodway schematic.

Specific areas where Salt Lake County regularly accesses the river for flood control maintenance are shown on the GIS spatial data viewer for the JRCMP on the FFSL website. Salt Lake County Flood Control requires the right to access the entire length of the Jordan River to maintain the river and to respond to emergency flooding situations; approximately 68 points of access are used along the river between 14600 South in Bluffdale and 3300 North near the Salt Lake-Davis County line (Moncur 2015).

Major tributaries convey sediment loads into the Jordan River, especially during flood events. Areas downstream of major tributary confluences (such as Big Cottonwood Creek, Little Cottonwood Creek, and the 1300 South conduit) are accessed as needed by Salt Lake County to remove sediment accumulations.

### EXISTING CONDITIONS BY RIVER SEGMENT

Figure 2.40 presents an overview of key existing infrastructure on the Jordan River by segment.

#### Further Reading

*Best Practices for Riverfront Communities* (Jordan River Commission 2013b)

*Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures* (U.S. Army Corps of Engineers 2014)

*Utah Lake and Jordan River Water Rights and Management Plan* (Hooton n.d. [2005])

#### Geographic Information Systems Data Layers

Outfalls, Points of Diversion, DWRi Stream Alteration Permits, Bridges, Murray City Utilities, FFSL Authorizations, FEMA Flood Control Levees, Salt Lake County Flood Control, DWRi Dams

# JORDAN RIVER – INFRASTRUCTURE

Infrastructure in the Jordan River includes bridges, utilities, outfall structures, diversion dams, and levees. Infrastructure elements either treat the river as an obstacle to be crossed (bridges and utility crossings) or as a resource (outfall structures and diversion dams). Per river segment, this figure shows the existing permitted diversion dams and levees on the Jordan River. These diversion dams have been constructed in the Jordan River to divert its water resources for other uses, and levees have been constructed for flood control along portions

of the river. When considering infrastructure development and construction, project proponents must operate in accordance with the Utah Division of Forestry, Fire & State Lands authorization process and other applicable federal, state, and county requirements. Most of the existing infrastructure on the Jordan River sovereign land is authorized with an associated Utah Division of Forestry, Fire & State Lands authorization; however, some infrastructure, especially older infrastructure, is not.

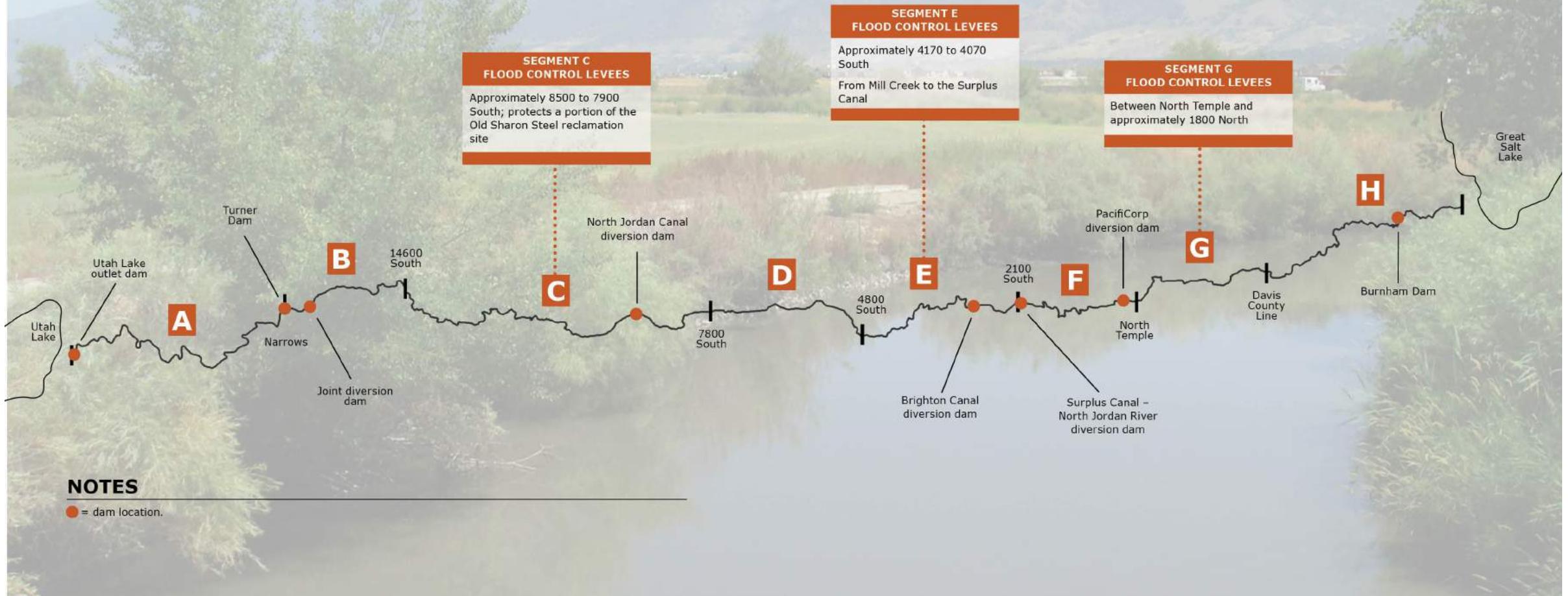


Figure 2.40. Key existing infrastructure on the Jordan River by segment.

## ***Cultural Resources***

A *cultural resource* is defined as “a building, structure, district, [archaeological] site, or object that is historically significant” (Hardesty and Little 2000:161). A cultural resource may also be referred to as a “historic property.” The National Historic Preservation Act (NHPA) defines *historic property* as “any prehistoric or historic district, site, building, structure, or object included on, or eligible for inclusion on, the National Register, including artifacts, records, and material remains relating to the district, site, building, structure, or object” (54 United States Code [USC] 300308). Section 9-8-404 of the Utah Code Annotated requires that FFSL take into account the effects of their actions on historic properties.

Prehistoric cultural resources refer to any site, feature, structure, or artifact that predates Euro-American contact in Utah (A.D. 1776). Based on existing data, previously documented prehistoric sites along the Jordan River consist of open campsites, lithic scatters, and artifact scatters. One such prehistoric site is 42SL186 (the Prison Site), which contains Archaic and Fremont period components. Data recovery activities conducted at the Prison Site identified a few Fremont components consisting of several artifacts as well as two Archaic housepits and a variety of artifacts. The Archaic component features and artifacts indicate the site was likely used during seasonal occupations for tool maintenance and repair and for food procurement and processing.

Housepits are a very rare find in the Salt Lake Valley and are even rarer along the Jordan River (Yenstch and Rood 2007).

*Historic resources*, as defined in the United States, refer to any site, feature, structure, or artifact that dates from A.D. 1500 through 50 years before present. In Utah, the Historic period dates from A.D. 1776, when Dominquez and Escalante reached Utah Lake, to 50 years before present, based on Euro-American contact. According to existing data, previously documented historic sites on the Jordan River consist of canals, a railroad, bridges, grade-control structures, transmission lines, buildings, structures, and artifact scatters.

Most of the cultural resources in the planning area are either prehistoric or historic resources, but some are multicomponent. Multicomponent sites consist of both prehistoric and historic resources at the same location. In addition, two historic properties adjacent to the Jordan River, the Fisher Mansion and the Utah State Fairgrounds, are listed on the NRHP. Other sites such as the Utah Lake Pump Station in Utah County and the Surplus Canal in Salt Lake County have been determined eligible for the NRHP but have not yet been listed. The types of cultural resources found along the Jordan River are described in Figure 2.41. Heritage and historic sites on the Jordan River are generally underutilized as a recreation option.

**TYPES OF CULTURAL RESOURCES ALONG THE JORDAN RIVER**



**Bridges**

Bridge types along the Jordan River may include pedestrian, vehicle, or railroad. The Jordan River has many historic crossings, e.g., 900 South Railroad Bridge in Salt Lake City. Many but not all historic bridges over the river have been removed and replaced with newer bridges.

**River Campsites**

Historic and prehistoric peoples often camped by waterbodies such as the Jordan River. Prehistoric and historic campsites, although dispersed, are likely to exist on the banks of the Jordan River and may be exposed during bank or bed disturbance. One known example along the Jordan River associated with a historic and prehistoric river crossing is the Indian Ford site in Utah County. The Indian Ford site may also be a Pony Express crossing, although no formal archaeological evidence supports this theory.



**Historic Buildings**

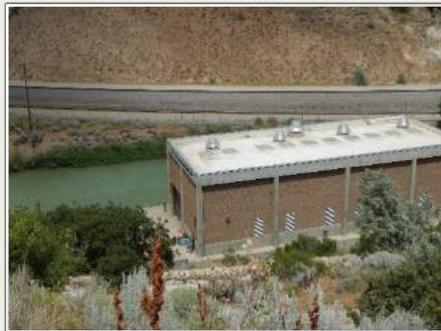
Buildings can provide good examples of a specific architectural style or can be connected with important state and national history. Historic buildings, e.g., Fisher Mansion, built adjacent to the Jordan River corridor range from private homes to public spaces.

**Artifact Scatters**

Artifact scatters can have both historic and prehistoric artifacts, historic homesteads, and trash scatters. Scatters can appear on the ground surface, but can also be several inches to several feet below the surface.

**Utilities**

Utilities include telephone, electric, sewer, water, and transmission lines, e.g., Jordan Narrows Pumping Plan Water System. Utility lines can be placed above grade or bored under the Jordan River.



**Canals and Diversions**

Canals are important to the history of Utah because they provided, and in many cases still provide, water for crops grown nearby or flood abatement, e.g., Surplus Canal.

Canals vary in size and shape.

Photographs from the top, left to right: Prison Site excavation, Prison Site artifacts, Fisher Mansion, Utah State Fairgrounds, Jordan Narrows Pumping Plant, and diversion canal.

Prison site photographs courtesy of Antiquities Section of the Utah Division of State History.

Fisher Mansion and Fairground photographs courtesy of Utah Division of State History.

**Figure 2.41.** Types of cultural resources on the Jordan River.

All cultural resources data examined were obtained from the UDSH's web-based data management system, UDSH's preservation files, and NRHP files. Recent cultural resources-related information on the Jordan River is limited because few archaeological and architectural surveys have taken place along the river within the last 10 years.

Figure 2.42 provides a river plan view of cultural resources that could be encountered during development authorized with an FFSL authorization.

### **EXISTING CULTURAL RESOURCES BY RIVER SEGMENT**

Figure 2.43 presents historic properties/cultural sites and NRHP-listed sites on the Jordan River by river segment.

### **Further Reading**

*A History of Davis County* (Leonard 1999)

*A History of Salt Lake County* (Sillitoe 1996)

*A History of Utah County* (Holzapfel 1999)

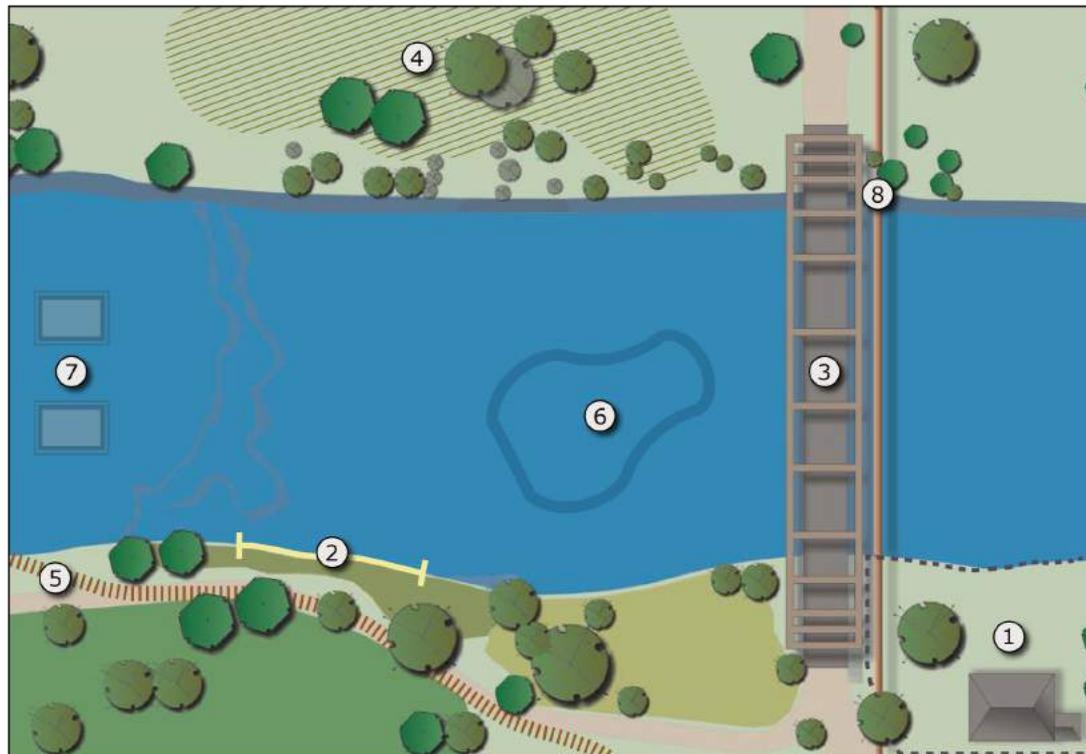
"Our Changing World" (Lockerbie 1949; not an online resource)

*The Pony Express Stations of Utah in Historical Perspective* (Fike and Headley 1979)

*The Prison Site: Evidence for Late Archaic Housepits in the Salt Lake Valley* (Yenstch and Rood 2007)

### **Geographic Information Systems Data Layers**

Archaeological Surveys, NRHP-Listed Historic Districts, Archaeological Sites, Architectural Surveys



**Legend**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. Historic house with property boundary to river</li> <li>2. Archaeological site eroding out of bank</li> <li>3. Historic bridge</li> <li>4. Archaeological site</li> <li>5. Historic trail</li> <li>6. Archaeological site on bottom of river</li> <li>7. Historic piers from old bridge or pipeline crossing</li> <li>8. Existing historic pipeline crossing the river</li> </ul> | <p>These represent potential archaeological and architectural sites that may occur along the river and should be considered during project planning.</p> <p>Archaeological sites may occur anywhere along the river: on the banks, in the channel, or adjacent to the river.</p> |
|---|--|

**Figure 2.42.** Jordan River plan view showing types of possible cultural resources in the planning area.

# JORDAN RIVER – CULTURAL RESOURCES

Historic properties are defined as “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register, including artifacts, records, and material remains related to such a property or resource” (16 United States Code 470(w)(5)).

Before a property is listed on the National Register of Historic Places (NRHP), a formal nomination is written and is later approved by the State Historic Preservation Office and the State National Register Review Board. Approved nominations are then sent to the keeper of the NRHP for final review and listing on the NRHP.

The Jordan River corridor has few documented historic properties and cultural sites because very few surveys have been conducted in the past 10 years along the corridor. Because the Jordan River is a water source, there are likely numerous undocumented historic resources (such as campsites, farmsteads, bridges, roadways, and infrastructure that are of historic age) along the corridor. Archaeological and architectural surveys are recommended before any project undertaking. The Utah State Historic Preservation Office should be contacted for consultation and assistance in determining archaeological and architectural survey requirements for each project.

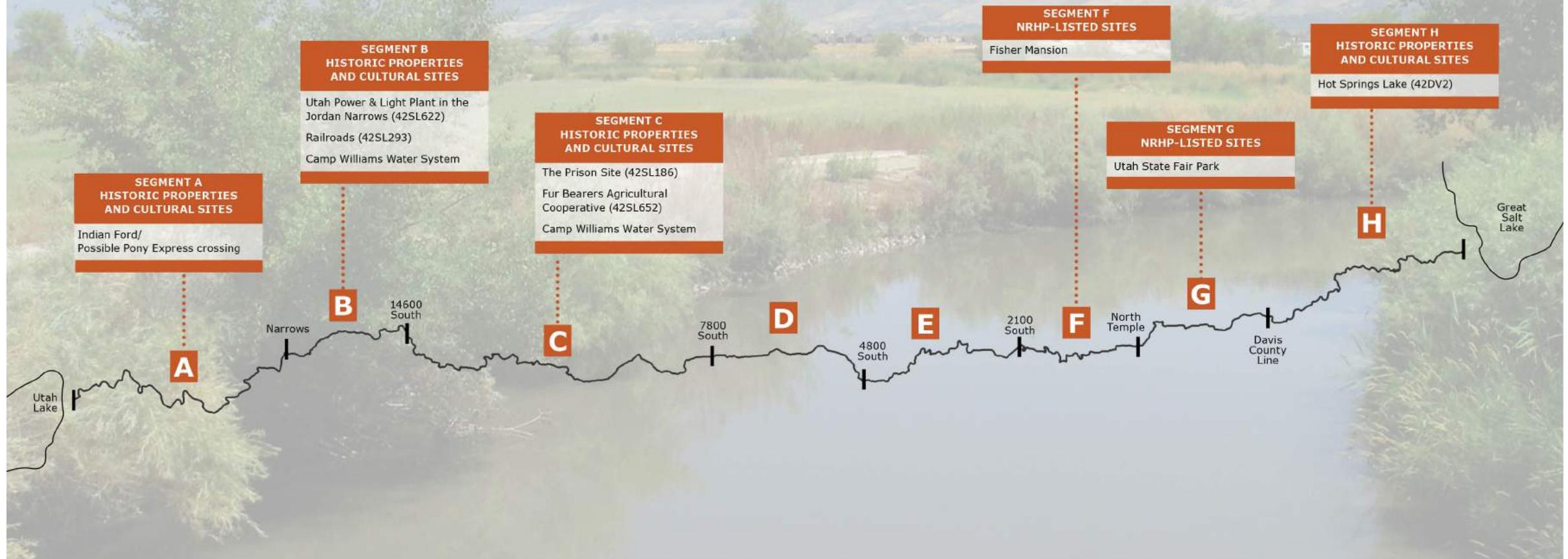


Figure 2.43. Historic properties, cultural sites, and National Register of Historic Places-listed sites on the Jordan River by river segment.

### Recreation

As described in the *Blueprint Jordan River* (Envision Utah 2008) and *Best Practices for Riverfront Communities* (JRC 2013b) documents, recreation is a key activity in the Jordan River corridor (Figure 2.44).



#### **Blueprint Jordan River**

“The Jordan River has had many different uses over the years, some good and some detrimental. The time has come to recognize the incredible asset that the Jordan River is to the surrounding communities. The river’s central location makes it an ideal recreation center for the Wasatch Front region.”

#### **Best Practices for Riverfront Communities**

“The Jordan River corridor is a regional recreation resource that provides all ages and abilities an opportunity to experience nature in the city and build support for river stewardship. Recreation facilities also have the potential to be developed in such a way that they contribute to a robust green infrastructure network that can mitigate negative impacts of development, contribute to natural habitat, and provide valuable transportation linkages.”

Recreation in the planning area consists primarily of boating (kayaking, canoeing, and rowing) on the water trail. Fishing and wildlife viewing may also occur in the planning area (often where spur trails lead to the banks of the river or at river access points). Boaters require infrastructure such as put-ins where they can launch their boat into the river and take-outs where they can remove their boat from the river. Put-ins, take-outs, boat ramps, and boat launches are described as “boater access points” in this document. The condition of boater access points on the river varies, and some boating infrastructure may be unpermitted. FFSL does not own or maintain boater access points; however, FFSL recognizes that protection of navigation is part of managing for the Public Trust and supports the development of appropriate boating infrastructure. Note that boater access points are different than the general access to the Jordan River discussed in the Access section.

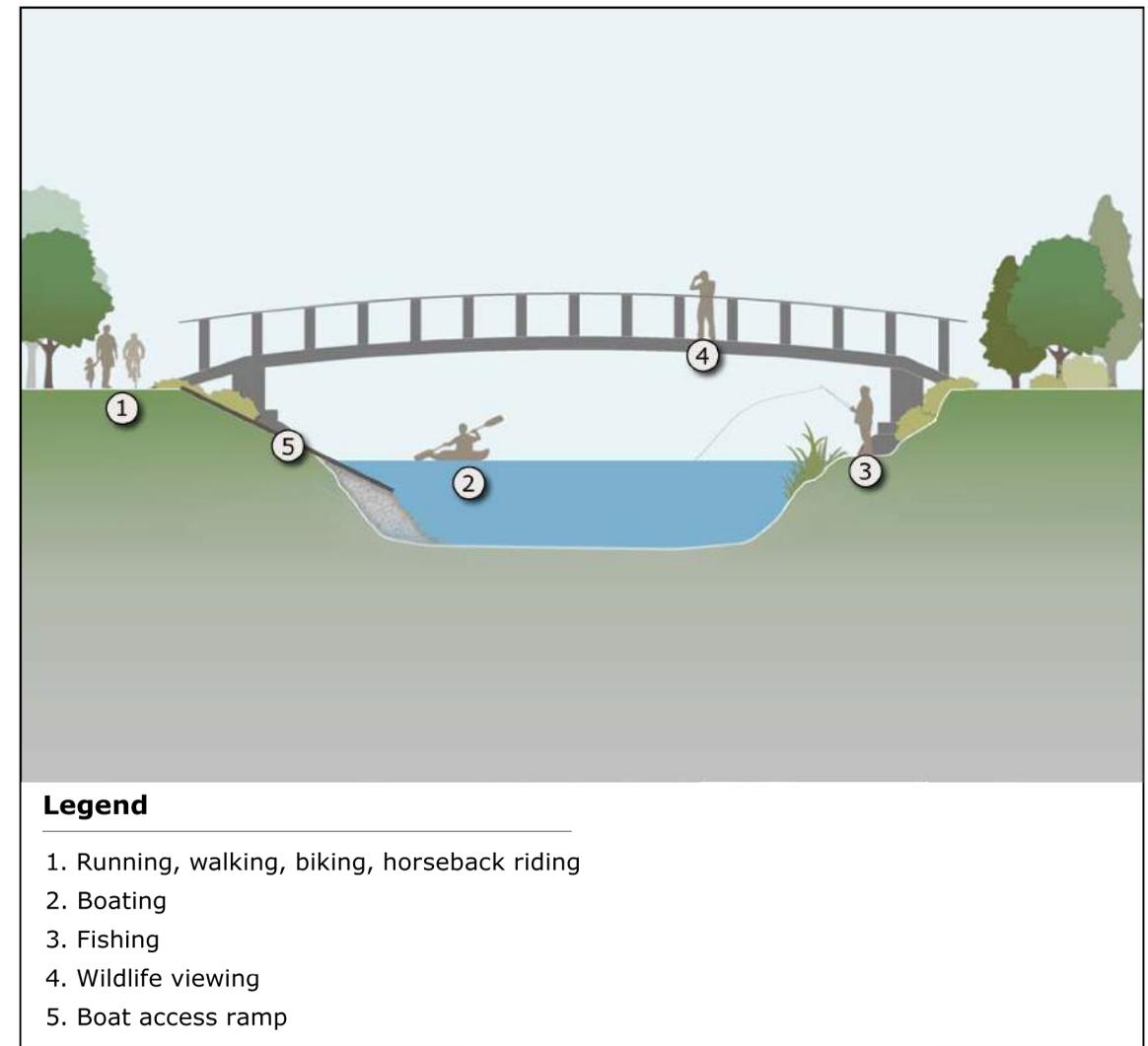
Recreation in the larger river corridor outside the planning area centers around a trail system called the Jordan River Parkway Trail, which is a multiple-use trail paralleling the Jordan River (Figure 2.45). The trail system includes a paved trail, an equestrian trail, several connecting neighborhood trails, and in the long term will include the water trail for boaters (JRC 2016a). Users of the surface trail include bicyclists, pedestrians and runners, and horseback riders. The FFSL planning area typically does not include the surface trail. Using a cross section of the Jordan River, Figure 2.46 illustrates some of the types of recreation users along the river.

Survey participants for the *Blueprint Jordan River* identified multiple-use trails as the most important recreational activity that the river corridor should support (Envision Utah 2008). In general, recreation users appreciate a more natural experience, the ability to enjoy the aquatic beauty of the Jordan River corridor, good access to the Jordan River, and opportunities for safe navigation.

**Figure 2.44.** Notable passages about recreation on the Jordan River.



**Figure 2.45.** Jordan River Parkway Trail paralleling the Jordan River.



**Figure 2.46.** Jordan River cross section showing recreation types along the river.

**FISHING**

Fishing is popular all over the river (Thompson 2016); examples of some hot spots are listed in Figure 2.47 and shown in Figure 2.48.

**BOATING**

Section R651-205-9 of the Utah Administrative Code states that the use of motors is prohibited on the Jordan River, with one exception. Motors whose manufacturer-listed horsepower is less than 10 are allowed on the Utah County portion of the river.

Unofficial Jordan River water trail maps for boating show 35.26 miles of water trail on the river consisting of 14 distinct navigable sections and divided by four gaps that are not boatable (Mott 2015). These maps illustrate boater access points for each section and note some of the river hazards. The northern section of the Jordan River has many navigable reaches with numerous boater access points and portages (none of the portages require the use of ropes) (Thompson 2016). However, this section is not currently Americans with Disabilities Act-accessible, and it does contain some hazards (Thompson 2016). Additional portages may be required because of dynamic river conditions, changing water levels, and differing boater abilities. Portages are areas where boaters must carry their watercraft around an obstacle in the river, such as a diversion dam. A portage consists of two boater access points: an exit point to leave the river and an entry point to return to the river. Figure 2.47 lists popular floats from south to north. In general, boater access along the Jordan River needs to be improved to direct boaters to safe sections and away from unsafe areas and to minimize navigational hazards.



**Boating\***

- Jordan Narrows
- 14600 to 10000 South
- 9000 South to Winchester
- Winchester to 4800 South
- 4500 South with mandatory portages at 9000 and 4700 South for low head dams
- 1700 South to Fisher Mansion

**Fishing†**

- 12300 South Rotary Park
- 7600 South overlook and bridge
- Winchester Park
- Little Cottonwood confluence
- 1700 South
- 1300 South
- 900 South
- 500 North
- State Route 73 in Lehi

\* Photograph courtesy of Elliott Mott, 2016.

† Photograph taken at Bountiful Pond.

**Figure 2.47.** Hot spots for boating and fishing along the Jordan River (Thompson 2016).

In 2008, Salt Lake County published a preliminary water trail master plan within the *Jordan River Trail Master Plan* (Landmark Design, Inc. 2008). The county intends to update and refine this plan in 2016 and is seeking funding to implement the plan upon its completion. The overall vision for the water trail includes consistent signage, formalized boater access points, and safety interventions and signage at boater hazards. In Utah County, the City of Saratoga Springs plans to install three boater access points in 2016, with plans for two more to be installed in the future. Salt Lake City has identified six locations for new or improved boater access points. In addition, the City of North Salt Lake is constructing a boater access point and parking area at Center Street.

Several rowing or boating groups recreate on the Jordan River. The Wasatch Rowing Foundation currently uses the river from approximately 2850 South to 2100 South (a section approximately 6,560 feet [2,000 meters] long) and the Surplus Canal from the junction of Indiana Avenue and DeLong Street to California Avenue, next to Redwood Road (a section approximately 4,260 feet [1,300 meters] long). The Surplus Canal section typically does not have enough water for spring rowing until around April 15. Among other projects such as removing river obstacles, Wasatch Rowing is currently raising funds to build a boathouse on the Jordan River at approximately 1200 South next to the Surplus Canal (Wasatch Rowing Foundation 2016). Other boating groups that use the Jordan River are Splore, which offers adaptive paddling trips (canoeing and paddleboarding) on various river sections; Utah Outdoors, which leads regular trips down the Jordan River on Friday and Saturday mornings; and Great Salt Lakekeeper, which provides group tours of the Jordan River.

## RECREATION AREAS AND CONCERNS BY RIVER SEGMENT

Figure 2.48 illustrates existing boater access points, proposed boater access points, and other recreation uses by river segment.

### Further Reading

*Best Practices for Riverfront Communities* (Jordan River Commission 2013b)

*Blueprint Jordan River* (Envision Utah 2008)

Jordan River Commission website

*Jordan River Trail Master Plan* (Chapter 4, Urban Water Trail)  
(Landmark Design, Inc. 2008)

### Geographic Information Systems Data Layers

Trails, JRC Recreation Planning, Wildlife Appreciation,  
Fishing Hotspots

# JORDAN RIVER – RECREATION

Recreation is a key activity in the Jordan River corridor. In the planning area, recreation consists primarily of boating (kayaking, canoeing, and rowing) on the water trail and fishing and wildlife viewing from riverbanks or bridges. Some hunting may also occur along the Jordan River. Boaters require infrastructure where boats can be launched into or removed from the river. The most commonly used existing boater access points are mapped here by river segment. Proposed boater access points and other recreational activities are also shown. The Utah Division of Forestry, Fire & State Lands does not own or maintain boater access points, and their condition and usability vary. The installation of new boater access points would require Utah Division of Forestry, Fire & State Lands permitting.



Figure 2.48. Existing and proposed boater access points and other recreational uses by river segment.

## Access

Access is the ability to approach and use the Jordan River for recreation, development, education, research, or other purposes such as flood control. From a legal standpoint, the bed and banks of the Jordan River are always open to public use because they are sovereign lands. Much of the Jordan River corridor is open access, and many municipalities have actively planned for use of the Jordan River Parkway Trail by developing connecting spurs. However, some areas along the river are inaccessible because they are privately owned or because they are blocked by non-native vegetation such as *Phragmites*. Privately owned areas can only be accessed with the consent of the landowner.

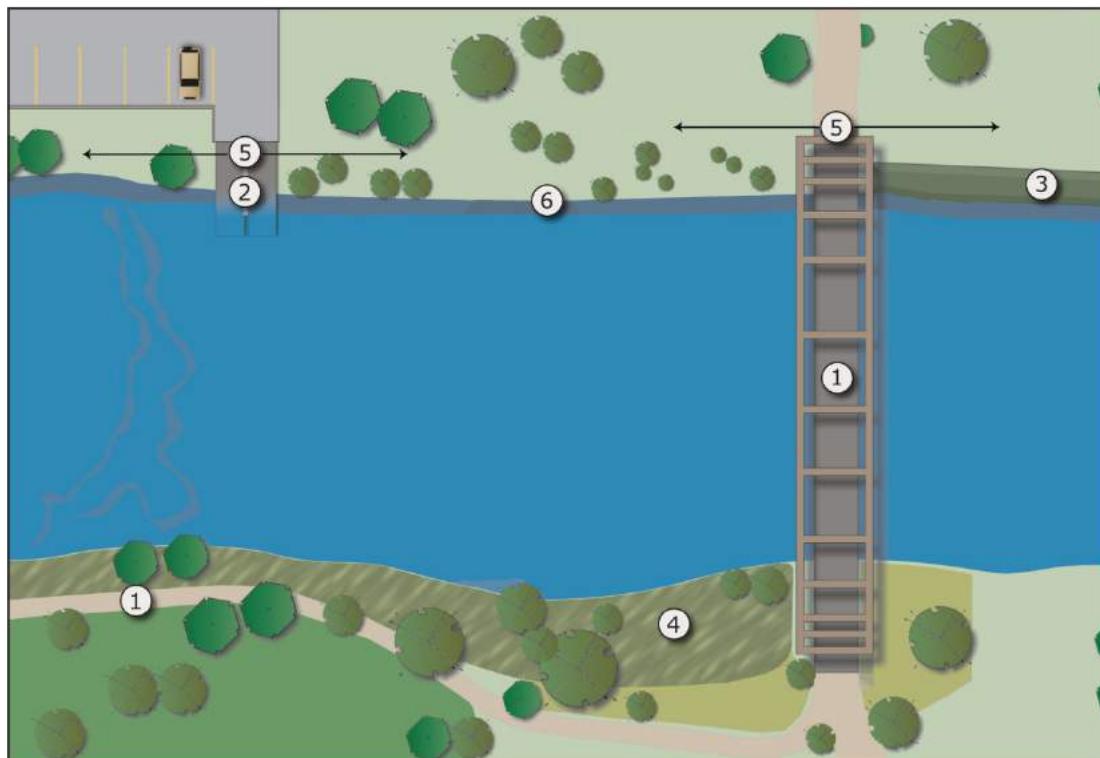
Access to the planning area for the development of infrastructure or other projects requires an authorization such as an easement, general permit, or right-of-entry from FFSL (see Section 1.7 in Chapter 1). Access to infrastructure such as utilities and outfall structures must be protected so that maintenance and repairs can be conducted. Access for flood control must also be protected (see Infrastructure section). Infrastructure for recreation users in the planning area may include wildlife viewing and fishing platforms, boating-related structures for the water trail, surface trail bridges and pedestrian crossings, and signage. As discussed in the Recreation section, boating-related infrastructure includes boater access points and portages. Infrastructure should be safe for the public, protect natural resources, take into account river fluctuations, and be Americans with Disabilities Act-accessible as required by law. Figure 2.49 shows a boater access point along the Jordan River. Figure 2.50 further illustrates several types of access available along the river as well as access concerns.

Good public access fosters stewardship and support for the protection and enhancement of the river corridor. Access should take into account and tie into regional transportation networks (i.e., other trails and public transit) where possible. By doing so, it can provide an alternative transportation network for the region. Access must be balanced to protect the resource. Too many access points can damage the resource and associated infrastructure; too few access points can limit opportunities to experience the river, create crowding at access areas, and reduce the public support for and use of the river. For these reasons, spacing of access points is important.

Although there are no recommended distances between access points, FFSL will take into account safety, the number and type of existing access points, the presence of roads, river use class, and other factors when deciding how close access points should be placed along the river.



**Figure 2.49.** 1700 South boat access on the Jordan River.



**Legend**

- 1. Bridge and surface trail
- 2. Boat ramp
- 3. Levee
- 4. Obstructed access from *Phragmites*
- 5. Appropriate distance between facilities
- 6. Possible flood-control access point

**ACCESS AND PUBLIC SAFETY CONCERNS BY RIVER SEGMENT**

Figure 2.51 illustrates by river segment existing access and public safety concerns as well as educational facilities along the river.

**Further Reading**

- Blueprint Jordan River* (Envision Utah 2008)
- Jordan River Commission website
- Jordan River Trail Master Plan* (Landmark Design, Inc. 2008)
- Jordan River Water Trail Section and Maps (Mott 2015; not available online)

**Geographic Information System Data Layers**

Trails, JRC Recreation Planning

# JORDAN RIVER – ACCESS, PUBLIC SAFETY, AND EDUCATION

Jordan River sovereign lands, by their nature, are always accessible and open to the public. However, it is important to be aware that adjacent private property may be accessed only with permission from the property owner.

During the public planning and scoping process, participants and stakeholders identified areas of the river that contain navigational hazards. Navigational hazards limit boater access and present safety issues for boaters. Examples of navigational hazards include a bridge that is too low to boat under during high water flows, a diversion dam that blocks the entire river, and downed tree limbs. Participants also identified other access and safety issues such as the presence of *Phragmites* and bank erosion. The Utah Division of Forestry, Fire & State Lands recognizes that protection of navigation is part of managing for the Public Trust. Decisions concerning river management will consider removal of existing navigational hazards and new project design parameters that allow for safe passage.

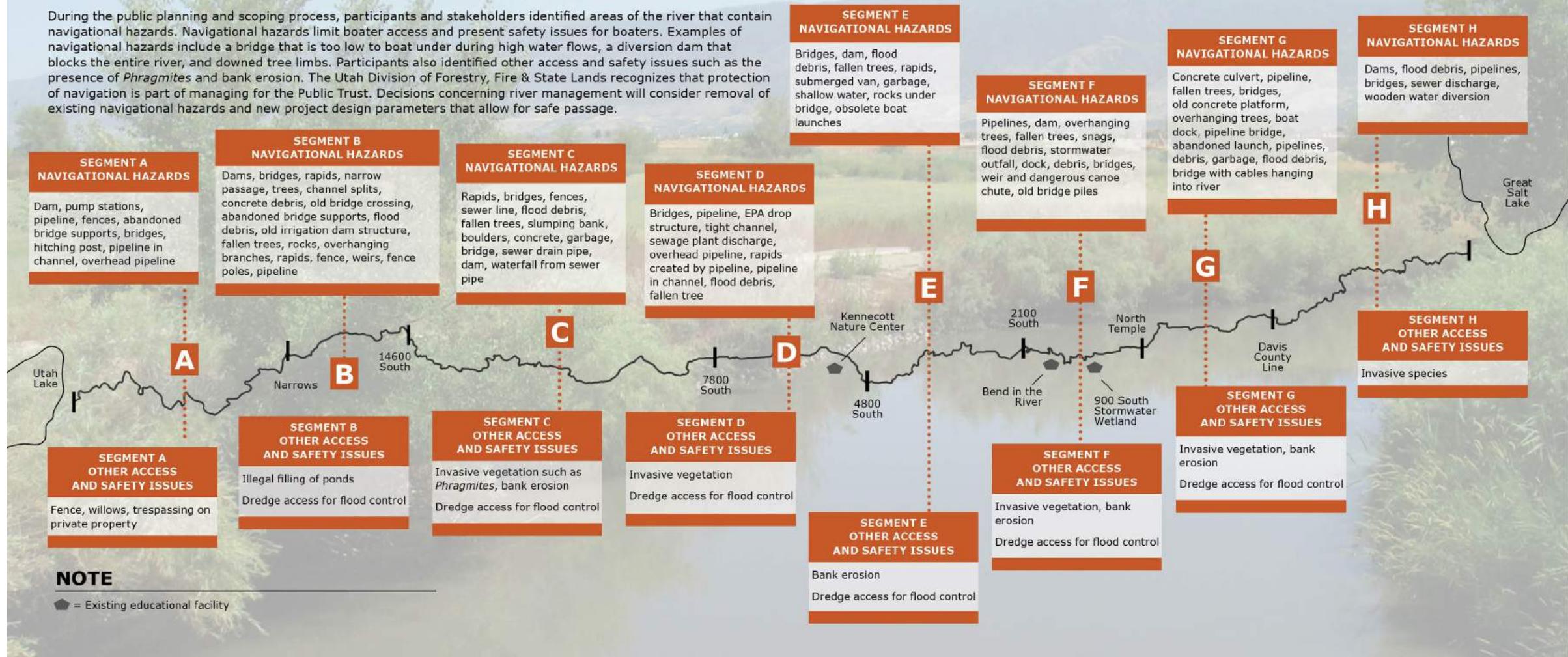


Figure 2.51. Existing access problems, safety concerns, and educational facilities by river segment.

### Public Safety

Public safety refers to the welfare and protection of the general public. With respect to the planning area, it primarily applies to recreational use of the water trail (use of the Jordan River by boaters) and the associated boater access points and navigational hazards. It could also apply to other recreational uses in the planning area, such as wildlife viewing and fishing on spurs of the surface trail that lead to the banks of the river and at river access points. Typically, the surface trail is located away from the banks of the river and does not fall under the jurisdiction of FFSL. However, there are a few instances where the surface trail extends onto the riverbanks and is used by pedestrians, cyclists, and equestrians. In addition, the surface trail crosses the river at multiple locations.

Public use of facilities such as parking lots, trailheads, and restrooms is outside of FFSL jurisdiction, and safety at these locations is the responsibility of other entities. The safety of workers during the construction, operation, and maintenance of utility lines, bridges, dams, and other facilities in the planning area is protected through regulations administered by the federal Occupational Safety and Health Administration.

Water quality is not considered a public safety issue because the beneficial uses for various segments of the river do not include frequent contact recreation (such as swimming). Designated uses include secondary contact recreation, which includes boating, wading, and fishing.

### PUBLIC SAFETY ISSUES

In 2008, most of the *Blueprint Jordan River* survey participants (51%) indicated that they felt safe using the Jordan River Parkway Trail (20% indicated they did not feel safe, 22% were unsure, and 7% were “other”) (Envision Utah 2008). Although most trail users feel safe, specific public safety issues have been identified in the planning area and are presented in Figure 2.52.

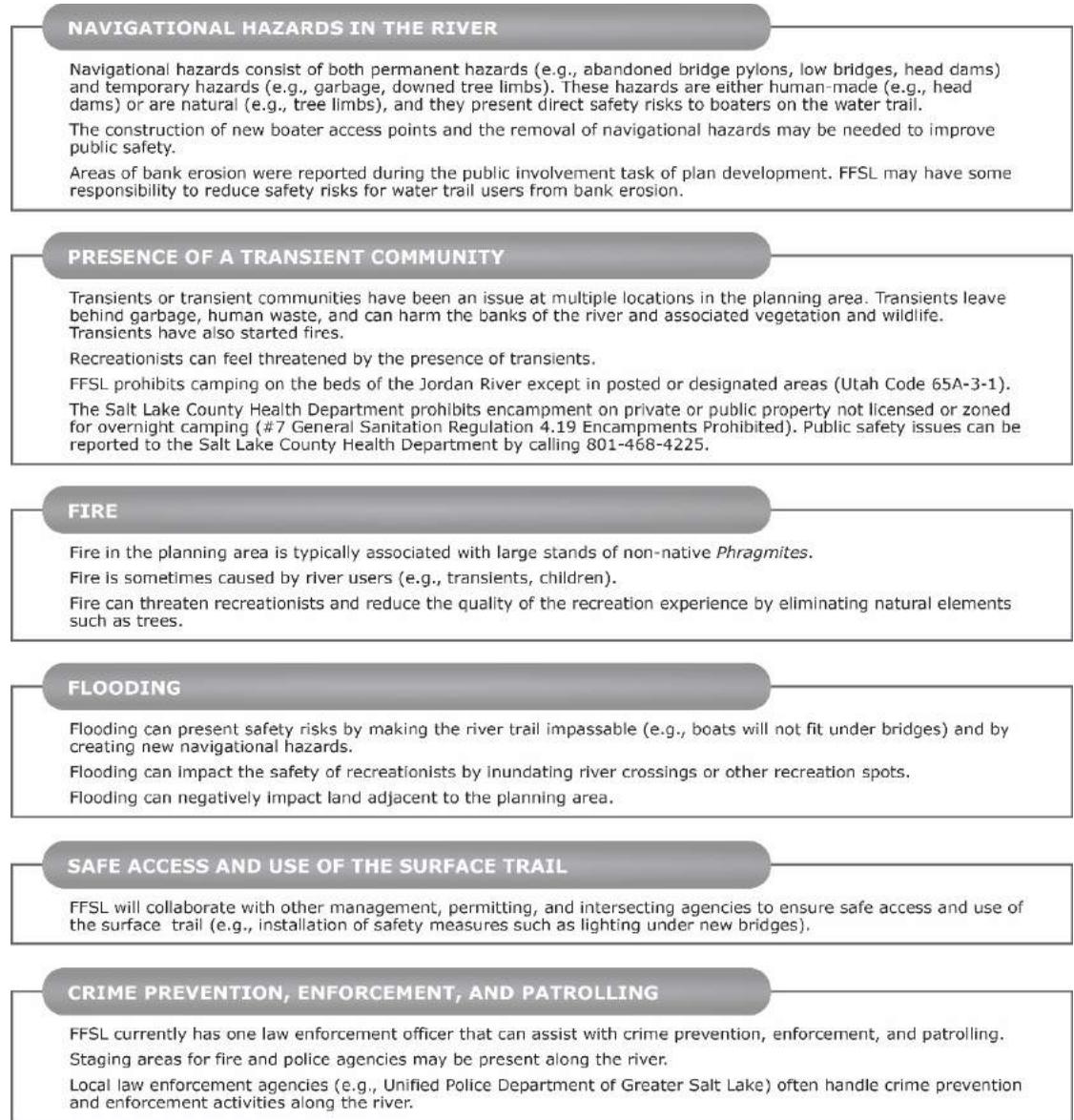
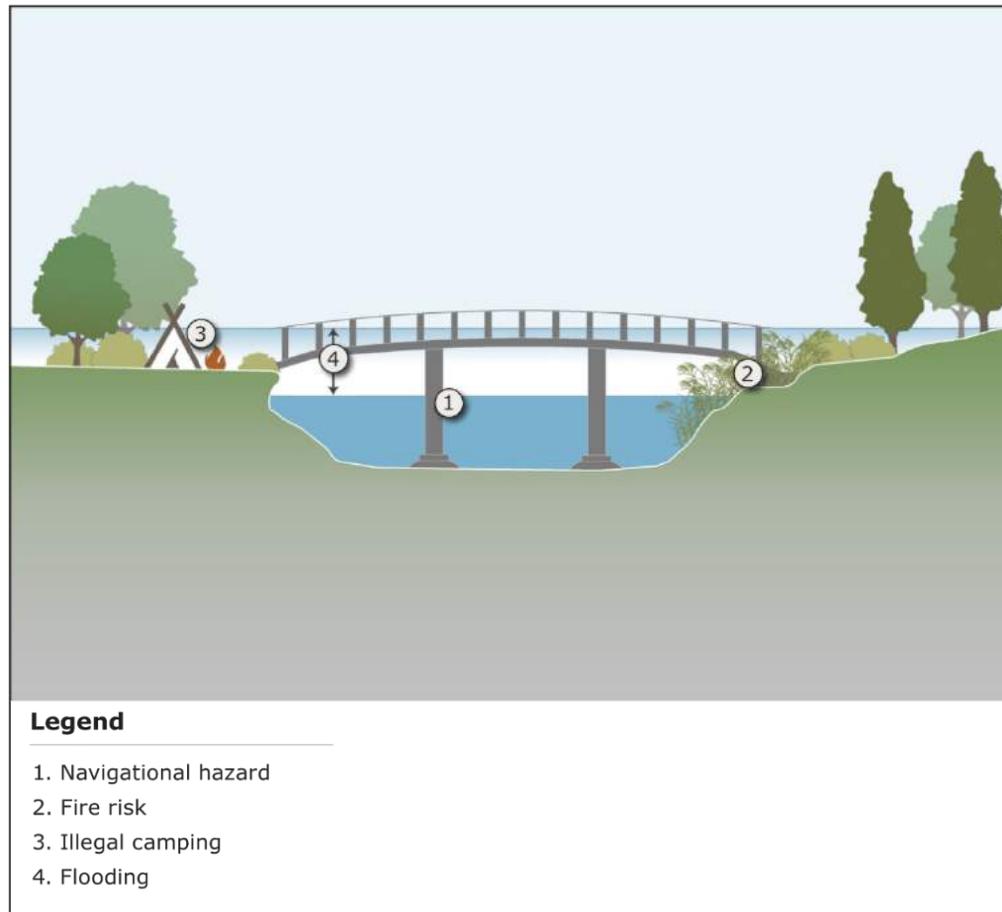


Figure 2.52. Public safety issues in the planning area.

As noted in Figure 2.52, FFSL prohibits camping on the beds of navigable rivers except in posted or designated areas (Utah Code 65A-3-1).

Public safety concerns on the Jordan River identified during the planning and scoping process are shown in Figure 2.53.



**Figure 2.53.** Cross section showing potential public safety hazards on the Jordan River.

### Further Reading

*Jordan River Trail Master Plan* (Landmark Design, Inc. 2008)

*Salt Lake County Flood Preparedness Manual* (Salt Lake County 2016c)

Salt Lake County Health Department, #14 Watershed Regulation (Salt Lake County 2006)

Utah Code 65A-3-1 (Trespassing on state lands — Penalties)

### Geographic Information System Data Layers

Salt Lake County Navigational Hazards, FEMA Flood Zones

### Education

Education is an important component of successfully managing the planning area because it provides direction to user groups for the appropriate use of the Jordan River, clarifies FFSL’s jurisdiction and management authority, and fosters public appreciation of the river and understanding of its value and the need to protect it.

In addition, educating Jordan River planners and managers through the dissemination of research data and results can improve their understanding of the ecosystem and enhance the management and stewardship of the resource. Research on the Jordan River is often conducted in the planning area and may require permits for access and equipment installation. Researchers may be associated with universities, other educational facilities, private or public entities, non-profit organizations, or government agencies. FFSL encourages research on the Jordan River and would support partnerships with organizations doing research.

User groups that benefit from educational efforts are listed in Figure 2.54.

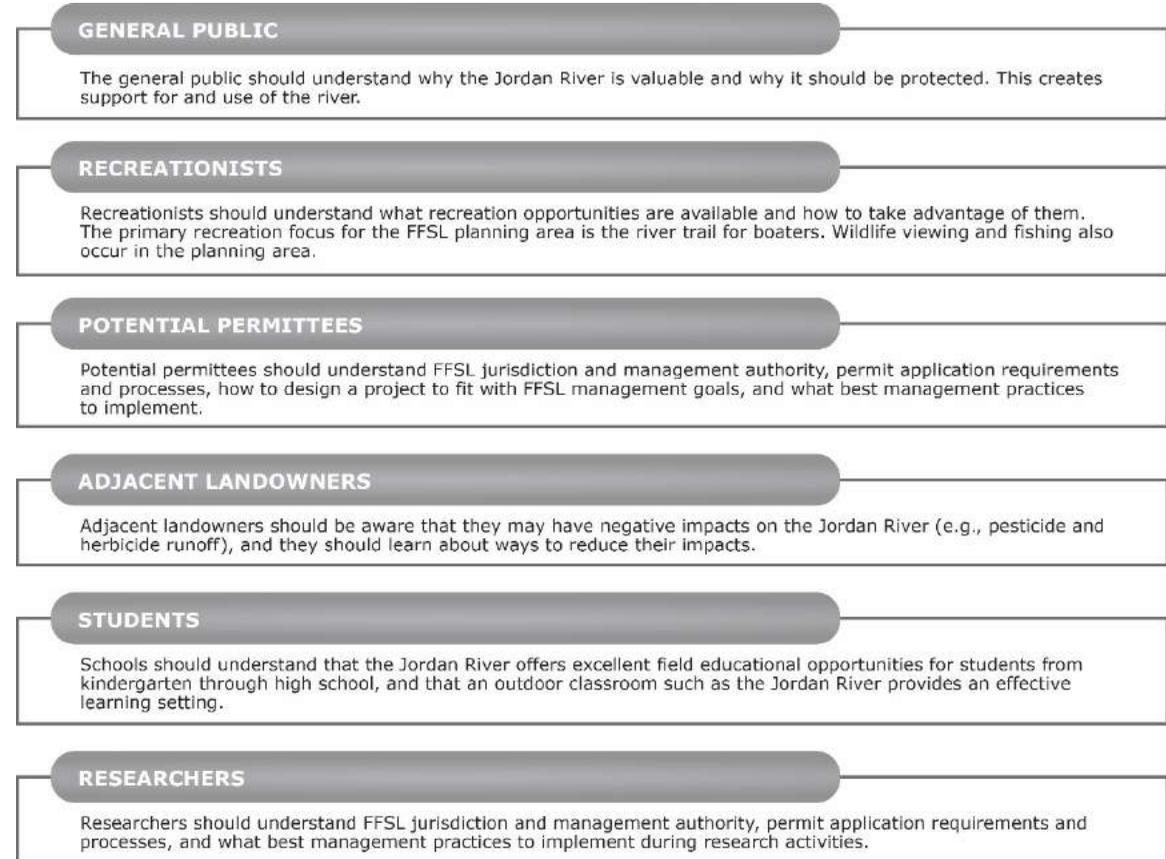


Figure 2.54. User groups in the planning area.

## EDUCATIONAL FACILITIES AND PROGRAMS

Three educational facilities are currently along the Jordan River (see Figure 2.51):

- The Kennecott Nature Center (5044 South Lucky Clover Lane, Murray) provides opportunities for children from Murray School District and selected Granite School District 4th-grade classes to observe and learn about nature through hands-on experiences.
- At Bend in the River (1030 West Fremont Avenue, Salt Lake City), city employees, community residents, elementary and university students, and other volunteers work on a continual basis to restore wildlife habitat, cultivate native plants, maintain and improve the grounds, and bring educational events to the site (Figure 2.55). Interpretive displays with information on local flora and fauna are present.
- 900 South Stormwater Wetland (900 South 900 West, Salt Lake City) includes riparian and water conservation demonstration gardens with pathways and overlooks in restored wetlands. Interpretive materials are also available for visitors.



**Figure 2.55.** Bend in the River educational facility on the Jordan River.

Two self-guided tours are along the Jordan River: 1) the Rose Park Self-Guided Tour and the 2) Meadowbrook Natural Area Self-Guided Tour (JRC 2016a). The JRC provides a paper trail map for river users, a digital trail guide that includes educational/interpretive stops (JRC et al. 2016), a digital working map of the water trail, tour guides for birds of the Jordan River corridor and the ecology of the Jordan River, and native and invasive species pocket field guides. Other Jordan River educational programs discussed on the JRC website include the following:

- The Center for Documentary Expression and Art operates an 8-week school residency program for students in 7<sup>th</sup> through 12<sup>th</sup> grades. Students explore the Jordan River and the environmental movement through photography, creative writing, science experiments, and hands-on restoration work.

## Community Resources

- The Salt Lake City Department of Public Utilities lends out water quality and invertebrate field kits and a Jordan River watershed-specific teacher and student guide.
- A Streamside Science Curriculum from Utah State University uses hands-on stream monitoring techniques to teach middle and high school students about water pollution and water functions (the curriculum can also be adapted to teach students in 5<sup>th</sup> through 12<sup>th</sup> grade). It engages students directly in their local watersheds.
- The Utah Lake Commission has curriculum focused on Utah Lake, the primary source of water for the Jordan River. Much of the curriculum can be adapted to a Jordan River lesson.
- The JRC has developed a series of lesson plans (in-class and a field activity) to introduce 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> grade students to the Jordan River ecosystem and watershed (JRC 2016b).
- The Jordan River Natural Areas Forum (JRNAF) is a voluntary coalition of county, state, and federal agencies; local municipalities; non-profit organizations; local businesses; and individual citizens dedicated to promoting awareness, acquisition, management, and restoration of natural areas along the Jordan River. The JRNAF adopted a strategic plan in 2003 with a number of educational goals, including increasing awareness of FFSL’s trust responsibilities, educating corridor neighbors such as golf courses, establishing three new locations as major public environmental education interpretive sites along the river, and developing a Jordan River education program for classrooms (JRNAF 2003).

### SIGNAGE

Currently, Salt Lake County Parks and Recreation has not installed any educational signage along the Jordan River, but it has plans to place two interpretive signs at the Little Confluence Trailhead (west of the river and south of 4800 South) and eight interpretive signs at the Redwood Nature Area (on the west side of the river at approximately 3100 South). These signs will be located outside the planning area (Larsen 2016). Salt Lake City is also planning to install interpretive signage (15 kiosk signs and two wayside signs) along the Jordan River Parkway Trail in late 2016 (Kogan 2016).

### CURRENT RESEARCH

Current research on the Jordan River focuses on water quality impairments, river flow, and stakeholder engagement. Organizations such as Splore, Utah Water Watch, Project Budburst, Tracy Aviary, and the Living Planet Aquarium conduct “citizen-science” research on the river.

#### Further Reading

*Best Practices for Riverfront Communities* (JRC 2013b)

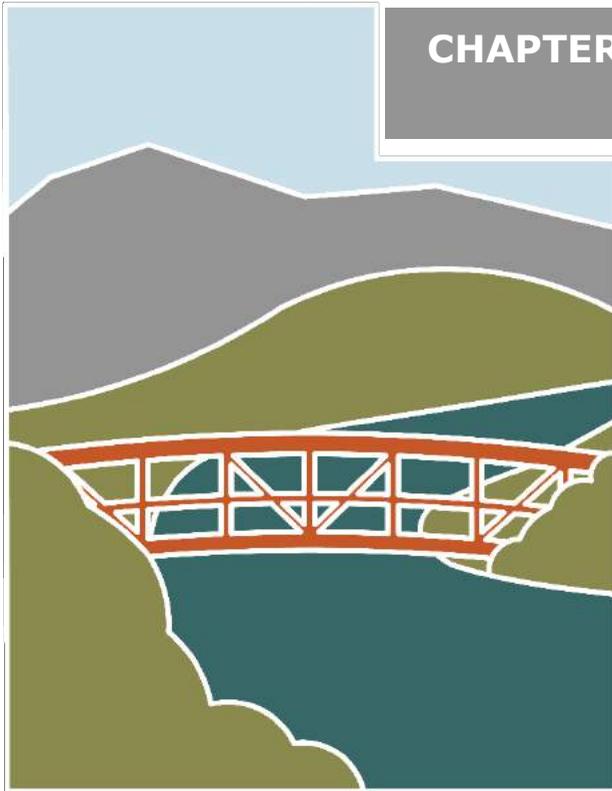
*Blueprint Jordan River* (Envision Utah 2008)

Jordan River Commission website

*Jordan River Parkway: An Alternative* (Urban Technology Associates 1971)

#### Geographic Information System Data Layers

Education Facilities



### 3.1 Introduction

This chapter focuses on management strategies that FFSL will implement to meet the needs of Jordan River resources described in Chapter 2 of the plan. The management strategies are organized around each resource area and consist of management goals and objectives. The goals and objectives focus on management actions and decisions that are within FFSL’s jurisdiction. In instances where FFSL does not have direct management authority over a particular resource, FFSL will endeavor to coordinate with and support agencies and

other stakeholders that do have management and/or permitting jurisdiction over the resource. The management strategies allow numerous opportunities for coordination with respect to Jordan River resources, a fundamental responsibility of FFSL according to Utah Code 65A-10-1. Collectively, the management strategies discussed in this chapter are designed to facilitate FFSL’s management of Jordan River and its resources in accordance with the Public Trust Doctrine and under multiple-use, sustained-yield principles, as stated in Utah Code 65A-2-1.

#### ***Managing for the Public Trust***

As described in Chapter 1, in managing for the Public Trust, FFSL recognizes that the protection of navigation, fish and wildlife habitat, aesthetic beauty, public recreation, and water quality should be considered and balanced against other uses. The following general management strategies reflect FFSL’s commitment to these Jordan River services when considering specific projects, decisions, and authorization applications:

- **Navigation:** Management of Jordan River sovereign lands will strive to maintain or improve navigation along the Jordan River. Decisions concerning river management will consider mitigation and removal of existing navigation hazards and will consider design parameters for new projects that allow for passage.
- **Fish and wildlife habitat:** Management of Jordan River sovereign lands will strive to maintain, enhance, or restore aquatic, wetland, riparian, and terrestrial habitat under its jurisdiction.
- **Aesthetic beauty:** Management of Jordan River sovereign lands will strive to maintain or improve visual conditions along the Jordan River, recognizing that aesthetic beauty increases the value of the Jordan River as a community resource.
- **Public recreation:** Management of Jordan River sovereign lands will consider and support diverse recreation activities and facilities at sustainable levels.
- **Water quality:** Management of Jordan River sovereign lands will consider and support the State of Utah’s anti-degradation policy for water quality.

When implementing the general management strategies, FFSL is obligated to follow applicable laws, including statutes, regulations, and legal doctrine.

#### ***Desired Future Condition***

Desired future condition is a planning construct used by the U.S. Forest Service to establish a benchmark for what a resource will look like through implementation of a management plan and associated goals and objectives. As with any planning construct, a desired future condition has limitations, but in the case of the JRCMP, it allows for multiple-use management, can be modified over time based on new data, and avoids the pitfalls of setting a “restored” ecological condition as a management target. For example, in highly managed systems like the Jordan River, setting restoration goals must account for new normal conditions—e.g., invasive species and hydrologic modifications—that make restoration to some earlier condition unrealistic or in some cases unattainable. The JRCMP has established desired future conditions for each of the three resources headings: Ecosystem, Water, and Community. The subsequent management goals and objectives for each subresource provide a means for working toward a desired future condition for the Jordan River.

### River Use Classes

As described in Chapter 1, FFSL has codified sovereign land use classes to guide management of areas with diverse current and desired future conditions. A mapbook of how these use classes are applied to Jordan River sovereign lands is found in Chapter 1, Figure 1.7. From a management perspective, FFSL recognizes that different activities have different impacts on sovereign lands. Table 3.1 provides a list of common actions requiring FFSL authorization and guidance for applicants seeking an easement, general permit, right-of-entry, or other authorization. Actions presented to FFSL not listed in Table 3.1 will be reviewed on a case-by-case basis to arrive at a use determination.

In many cases, these use determinations pertain to public and commercial actions. Construction activities by private, residential landowners are generally not permitted (e.g., private boat docks or ramps), although bank treatments (e.g., stabilization and herbicide application) may be permitted. Use determinations for proposed actions consist of allowable (A), potentially allowable (P), and not allowable (N) except with certain conditions. An “A” use determination will likely require no site-specific analysis of resources within a project area, but the project will still be reviewed for adherence to BMPs. For “P” use determinations, a site-specific analysis may be completed to determine project feasibility and mitigation opportunities. The site-specific analysis will consider the potential impacts (beneficial and adverse) of the proposed project to Jordan River resources. Certain BMPs must be incorporated into the project design and long-term maintenance to minimize adverse impacts to sovereign lands. For “N” use determinations, the proposed use will not be permitted unless the JRCMP is amended. Suitability of proposed easements, general permits, rights-of-entry, and other authorizations will also be considered in the context of existing authorizations to avoid use conflicts, e.g., boat ramps and utilities in the same location. Finally, under certain jurisdictions such as CWA permit conditions or FEMA-accredited levee operation and maintenance, some proposed actions may not be authorized regardless of FFSL river use class or use determination.

**Table 3.1.** Use Determinations for Proposed Actions by River Use Class

Proposed Action*	Class 1	Class 2	Class 3	Class 5	Class 6
Above-ground utilities <sup>†</sup>	P	P	N	N	N
Aquatic habitat structures	A	A	A	A	A
Bank stabilization (bio-engineering)	A	A	A	A	A
Bank stabilization (hardened)	A	A	P	P	P
Below-ground or buried utilities <sup>†</sup>	A	A	A	A	P
Boat docks (permanent) <sup>†</sup>	N	N	N	N	N
Boat docks (temporary) <sup>†</sup>	A	A	A	P	P
Boat ramps <sup>†</sup>	A	A	A	A	P
Bridges (pedestrian) <sup>†</sup>	A	A	A	P	N
Bridges (vehicle) <sup>†</sup>	A	A	A	P	N
Dams	P	P	P	N	N
Diversion structures	A	A	P	P	P
Dredging <sup>†</sup>	A	A	A	A	P
Education and interpretation	A	A	A	A	A
Emergency clean-up	A	A	A	A	A
Emergency rescue training	A	A	A	A	P
Fire prevention treatments	A	A	A	P	P
Fisheries management	A	A	A	A	P
Grade controls	A	A	P	P	P
Herbicide treatment	A	A	A	A	A
Irrigation pumps	A	A	A	A	A
Navigation hazard removal	A	A	A	A	A
Outfall structures	A	A	A	P	P
Recreation structures (permanent) <sup>†</sup>	A	A	P	P	P

Proposed Action*	Class 1	Class 2	Class 3	Class 5	Class 6
Recreation structures (temporary) <sup>†</sup>	A	A	A	P	P
Scientific research instruments	A	A	A	A	A
Signage	A	A	A	A	A
Survey and monitoring activities	A	A	A	A	A
Trash booms	A	A	A	P	P
Vegetation planting	A	A	A	A	A
Vegetation removal	A	A	A	P	P
Wildlife habitat (e.g., nesting structures)	A	A	A	A	A

Notes: A = allowable, P = potentially allowable with certain conditions, N = not allowable.

\* Actions general pertain to public and commercial activities, but some carry over to private landowners (e.g., bank stabilization, emergency clean-up, fire prevention, herbicide treatment, vegetation planting, vegetation removal, and habitat or nesting structures).

<sup>†</sup> In the interest of supporting the Public Trust, utilities, bridges, boat docks, boat ramps, dredging, and other similar actions proposed by private landowners will generally not be permitted.

## Resource Management Issues

Throughout the 2015–2016 JRCMP planning process, numerous management issues regarding each Jordan River resource were raised during the public comment period, municipal meetings, stakeholder workshops, and JRCMP planning team meetings. Within each resource, broader management issues were distilled down into a few substantive resource management issues over which FFSL has jurisdiction or would be a cooperating agency. Some of the resource issues raised overlap with other resource issues, such as navigational hazards, which can be discussed from recreation, infrastructure, and public safety perspectives. As a result, developing management goals and objectives for one resource issue may incorporate management of other resources. In this case, the management goal is included once and in the resource section most pertinent to the objectives for achieving the goal.

The management strategies in this chapter are organized by resource and follow in the same order as they appear in Chapter 2 (Current Conditions). Each resource section includes a list of desired future conditions for that resource. Additionally, each resource section includes a management strategy table that includes goals, subsequent objectives, and applicable agencies, as well as a list of BMPs applicable to that resource. Each of these is discussed in more detail below.

## Management Goals and Objectives

The goals and objectives reflect the intention of FFSL to protect and sustain the Public Trust resources while providing for their use. Each goal is supported by a number of objectives that can be used to achieve it. In some cases, objectives equate to specific management prescriptions with potential for implementation by FFSL (e.g., inventory and map noxious weeds that align the Jordan River), but also include coordination (e.g., coordination with restoration partners on projects that benefit habitat on sovereign land) and general support (e.g., support flow studies and releases that would benefit the riverine ecosystem and fluvial processes).

## Interagency Coordination

Effective coordination and communication with government agencies regarding Jordan River resources are vital to ensuring the health and long-term stability of the ecosystem. Coordination between FFSL and other agencies will vary in timing and intensity based on the resource issue at hand. For the purposes of developing the JRCMP management strategies, the government agencies involved fall into three different categories depending on their participation in each unique resource issue:

1. Management agency: A management agency is directly responsible for the management of a particular resource. As mandated through Utah Code, administrative rule, or agency objectives, the agency is responsible for on-the-ground management and/or monitoring.

2. **Permitting agency:** A permitting agency is responsible for authorizing Jordan River resource-related permits. They are limited in most cases to FFSL, USACE, DWRi, and Salt Lake County Flood Control, who can each issue permits for projects in or adjacent to the Jordan River. Each agency has the potential to impact the resource through permit authorizations, including mitigation. The agency is responsible for monitoring permit compliance.
3. **Intersecting agency:** An intersecting agency is an agency that does not have direct responsibility for managing a particular resource or permitting activities on the Jordan River but is tangentially related. The decisions of these agencies may directly or indirectly impact a particular resource. FFSL management decisions have the ability to impact resources managed, influenced, and/or researched by intersecting agencies. These agencies have the tools, data, and information that could be used by FFSL to make well-informed management decisions. Intersecting agencies may be responsible for research and/or monitoring at a broad scale.

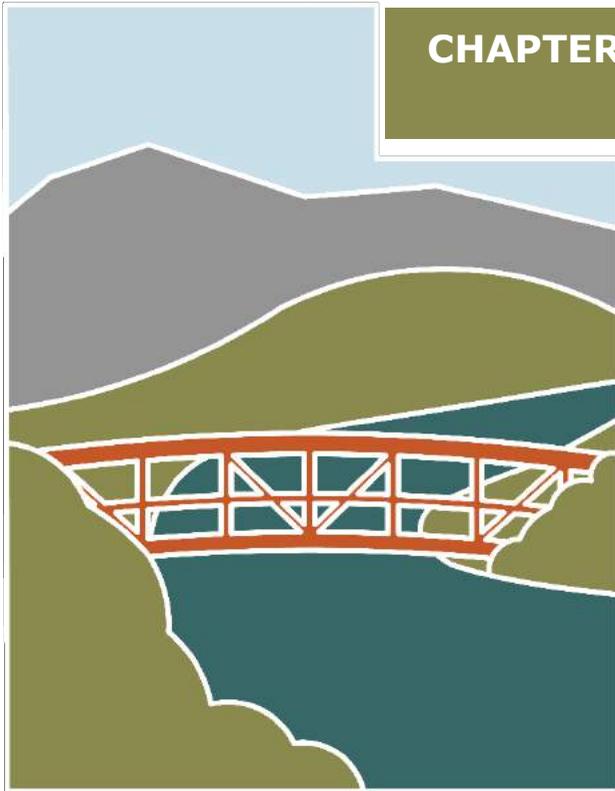
By identifying which agency (or agencies) has management, permitting, or intersecting responsibility for a particular resource, FFSL can ensure that we are coordinating with the appropriate agency to efficiently address resource concerns. It is important to note that although adjacent private landowners, businesses, special interest groups, land managers, local universities, and other stakeholders are not listed as responsible parties within each resource issue, FFSL is interested and available to discuss resource-specific matters with concerned entities.

Throughout the Management Strategies chapter, terms such as *participate*, *coordinate*, *support*, and *promote* occur often. These terms are used to highlight FFSL's responsibility to coordinate activities of various Utah Department of Natural Resources revisions under Utah Code 65A-10-8. They are used to promote FFSL's involvement with the diverse range of resources within

sovereign land boundaries. Further, FFSL is interested in supporting other agencies and being involved in projects and resource issues that impact (or have the potential to impact) the Jordan River ecosystem. The levels to which FFSL will coordinate, support, participate, and promote will depend on the project or resource issue. For example, a right-of-entry permit to conduct a riparian restoration training event would require less communication between agencies than would an easement to place a new bridge or stormwater outfall structure in the river. Ultimately, FFSL is optimistic that participation and communication between agencies and entities throughout the stages of project planning or while addressing resource concerns will lead to beneficial outcomes for the Jordan River.

### ***Best Management Practices***

Implementation of BMPs for each resource helps avoid or minimize impacts to Jordan River sovereign lands. These range from examples of desired plant lists and seed species mixes to be used for revegetation to design specifics for buried utility lines. Most BMPs pertain specifically to the bed and bank of the Jordan River. For a list of BMPs relevant to land uses that extend from the river and beyond, see *Best Practices for Riverfront Communities* (JRC 2013b). Users of the JRCMP should review the BMPs during their project planning process and demonstrate in authorization application documents how BMPs are incorporated and/or why they are not practicable.



### 3.2 Ecosystem Resources

**Desired Future Conditions:**

- A sustainable river system that supports diverse populations of native plant and animal species with limited constraints from invasive and non-native species.
- Recognition that natural disturbance can be beneficial and of the need to avoid anthropogenic disturbance to the extent practicable.

- Understanding that certain areas, although not pristine, exhibit natural and wild character and that preservation of these areas and the restoration of degraded ecosystems enhance overall ecological condition.

**Table 3.2.** River Use Classes and Ecosystem Management

River Use Class	What the Use Class Means for Ecosystem Management
<b>Class 1</b>	Greater potential for actual loss or degradation of habitat. Balance between existing authorizations and uses and potential for wildlife habitat. High potential for streambank and instream restoration. Limited opportunity/priority for wildlife habitat restoration.
<b>Class 2</b>	Potential future loss or degradation of habitat. Balance between existing authorizations and uses and potential for wildlife habitat. High potential for streambank and instream restoration. Limited opportunity/priority for wildlife habitat restoration.
<b>Class 3</b>	Allows for conservation of wildlife habitat through implementation of BMPs and other types of mitigation.
<b>Class 5</b>	High-priority ecosystem protection and conservation. Potential for conservation easement status. No current regulatory restrictions on use or protection.
<b>Class 6</b>	Preservation of ecosystem services and ongoing opportunities for adaptive management and habitat improvement projects. Current regulatory protection of adjacent land use.

Table 3.2 describes what the river use classes mean for ecosystem management.

### Wildlife Habitat

As discussed in Section 1.8 in Chapter 1, river use classes are applied to specific locations along the Jordan River based on a variety of parameters. Table 3.3 presents management goals and objectives for wildlife habitat.

**Table 3.3.** Wildlife Habitat Management Goals and Objectives Common to All Classes

<b>Wildlife Habitat Goal 1: Protect and sustain native habitats along the Jordan River.</b>
<b>Objective:</b> Cooperate with partners to identify and maintain areas with high wildlife habitat value.
<b>Objective:</b> Cooperate with partners to consider the cumulative impacts of past, present, and reasonably foreseeable future projects on instream and adjacent habitat through consultation with management, permitting, and intersecting agencies below.
<b>Management Agencies:</b> FFSL, DWR, local cities and counties
<b>Permitting Agencies:</b> FFSL, DWRI, USACE, DWQ
<b>Intersecting Agencies:</b> JRC
<b>Wildlife Habitat Goal 2: Restore and enhance native habitats along the Jordan River.</b>
<b>Objective:</b> Support restoration of the riparian zone, emphasizing connectivity along the river corridor.
<b>Objective:</b> Use native or desirable species in plant lists and seed mixes when conducting restoration or enhancement activities.
<b>Objective:</b> Coordinate with agencies and restoration partners to re-establish floodplains and other geomorphic features (e.g., point bars and low emergent benches).
<b>Objective:</b> Support removal of human-made structures that degrade native habitats.
<b>Management Agency:</b> FFSL, DWR, local cities and counties
<b>Permitting Agency:</b> FFSL, DWRI, USACE, DWQ
<b>Intersecting Agencies:</b> JRC

<b>Wildlife Habitat Goal 3: Support habitat restoration or enhancement on lands adjacent to the Jordan River.</b>
<b>Objective:</b> Coordinate with restoration partners on projects that benefit habitat on sovereign lands.
<b>Objective:</b> Cooperate with partners to inventory adjacent lands where restoration or enhancement would benefit navigation, water quality, wildlife habitat, recreation, or aesthetic beauty.
<b>Management Agency:</b> FFSL, DWR, local cities and counties
<b>Permitting Agency:</b> FFSL, DWRI, USACE
<b>Wildlife Habitat Goal 4: Manage invasive and noxious weed species along the Jordan River.</b>
<b>Objective:</b> Inventory and map noxious weed occurrences along the Jordan River.
<b>Objective:</b> Identify concentrations and dispersal vectors for <i>Phragmites</i> within the river corridor.
<b>Objective:</b> Target and treat invasive weed species (especially <i>Phragmites</i> ) and treat colonizing invasive species in the planning area.
<b>Management Agencies:</b> FFSL, local cities and counties
<b>Permitting Agencies:</b> FFSL, DWRI
<b>Intersecting Agencies:</b> DWR, JRC

BMPs for wildlife habitat in the planning area are shown in Figure 3.1.

### BEST MANAGEMENT PRACTICES FOR WILDLIFE HABITAT IN THE PLANNING AREA

- Manage invasive and noxious weed species.
- Improve and restore native plant diversity.
- Enhance the river vegetative buffer to minimize noise and light pollution.
- Protect undisturbed areas and open space.
- Improve natural river function, e.g., floodplain connectivity.
- Improve bank stability.
- Manage nuisance wildlife species.
- Enhance connectivity between habitat patches.



**Figure 3.1.** Best management practices for wildlife habitat management in the planning area.

### Wildlife Species

As discussed in Section 1.8 in Chapter 1, river use classes are applied to specific locations along the Jordan River based on a variety of parameters. Table 3.4 presents management goals and objectives for wildlife species. BMPs for wildlife in the planning area are shown in Figure 3.2.

**Table 3.4.** Wildlife Species Management Goals and Objectives Common to All Classes

<b>Wildlife Species Goal 1: Recognize the importance and support the sustainability of viable populations of native fisheries and migratory bird species and their habitats.</b>
<b>Objective:</b> Coordinate with partners to encourage the maintenance of a diversity of habitats and adequate food supply for fish and migratory birds.
<b>Objective:</b> Support inventory, monitoring, and research of fisheries and migrating bird populations with partners, including non-governmental organizations and citizen science groups.
<b>Objective:</b> Support wildlife-related beneficial uses and help ensure compliance with numeric criteria for pollutants.
<b>Management Agencies:</b> FFSL, DWR, local cities and counties
<b>Permitting Agencies:</b> FFSL, DWRi, USACE, DWQ
<b>Intersecting Agencies:</b> JRC
<b>Wildlife Species Goal 2: Recognize the importance of watchable wildlife opportunities along the Jordan River.</b>
<b>Objective:</b> Coordinate with partners to increase the biodiversity and numbers of birds and other wildlife species along the Jordan River through habitat restoration and enhancement.
<b>Objective:</b> Support establishment of viewing stations along the Jordan River at key locations.
<b>Management Agency:</b> FFSL, DWR, local cities and counties
<b>Permitting Agency:</b> FFSL, DWRI, USACE
<b>Wildlife Species Goal 3: Support the management of existing non-native species, prevent the spread of existing non-native species, and prevent the introduction of new non-native species to the Jordan River.</b>
<b>Objective:</b> Support control and eradication of non-native pests that are presently in the river system through coordination with DWR and other agencies.
<b>Objective:</b> Coordinate with DWR on public awareness programs and other strategies for keeping non-native pest species out of the Jordan River.
<b>Management Agency:</b> USFWS, DWR
<b>Permitting Agency:</b> Not applicable
<b>Intersecting Agencies:</b> USFWS, JRC

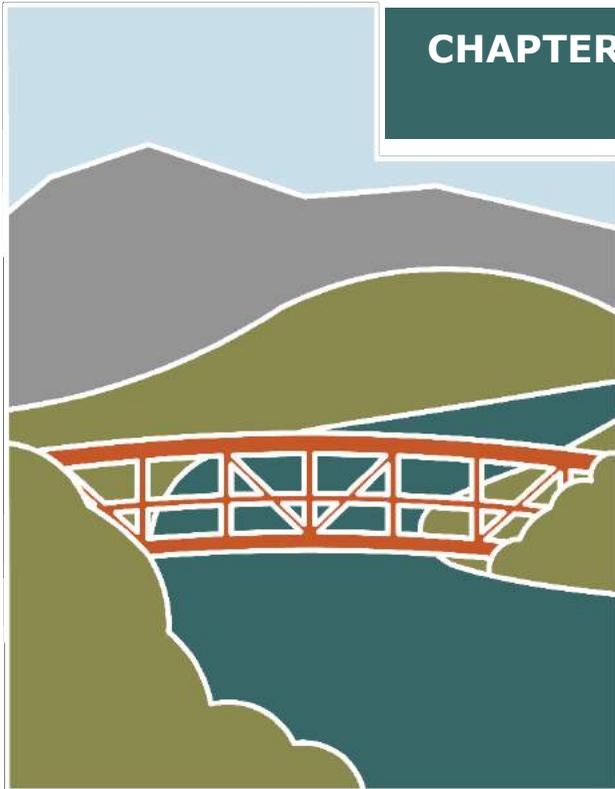
**BEST MANAGEMENT PRACTICES FOR  
WILDLIFE SPECIES IN THE PLANNING AREA**

- Adhere to all federal regulations (Endangered Species Act, Migratory Bird Treaty Act, and Bald and Golden Eagle Protection Act).
- Apply seasonal bird nesting guidelines described in *Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances* (Romin and Muck 2002) during project implementation.
- Follow herbicide application protocol especially during use near aquatic resources.
- Refer to DWR key habitats and priority species when planning restoration projects along the river (DWR 2005a; Utah Wildlife Action Plan Joint Team 2015).



**Figure 3.2.** Best management practices for wildlife species management in the planning area.

# CHAPTER 3 – MANAGEMENT STRATEGIES: WATER RESOURCES



## 3.3 Water Resources

### Desired Future Conditions:

- A sustainable river system with naturalized flows and floodplain connectivity.
- Maintenance of seasonal variation in discharge and minimum instream flows that support sediment transport and enhance riparian plant communities.
- Reduction in the effects of bank hardening and channelization on navigability, aquatic habitat, and water quality impairment of recognized beneficial uses.

## Hydrology

As discussed in Section 1.8 in Chapter 1, river use classes are applied to specific locations along the Jordan River based on a variety of parameters. Some variation may exist with regard to hydrology management from one class to the next. Table 3.6 presents management goals and objectives for hydrology.

**Table 3.6.** Hydrology Management Goals and Objectives Common to All Classes

<b>Hydrology Goal 1: Support instream structure removal and facilitate appropriate instream infrastructure design and management to maintain and improve hydrology.</b>
<b>Objective:</b> Support comprehensive mapping and inventory of instream structures.
<b>Objective:</b> Assess condition of instream structures to determine impact on hydrology.
<b>Objective:</b> Consider removal or repair of instream structures that are degrading hydrologic conditions.
<b>Objective:</b> Ensure that placement and design of new instream infrastructure will not degrade hydrology (see BMPs following this table).
<b>Management Agencies:</b> FFSL, land-use applicants
<b>Permitting Agencies:</b> FFSL, USACE, DWRi, Salt Lake County Flood Control
<b>Intersecting Agencies:</b> DWR, JRC
<b>Hydrology Goal 2: Support restoration efforts that integrate natural river processes.</b>
<b>Objective:</b> Consider geomorphologic characteristics when managing river restoration efforts. For example, in river segments where the slope is steep, consider the likelihood of scour versus in segments where slope is gentle. Also consider the likelihood of deposition.
<b>Management Agency:</b> FFSL, landowners along the river corridor
<b>Permitting Agency:</b> FFSL, USACE, DWRi
<b>Intersecting Agencies:</b> DWR, JRC

Table 3.5 describes what the river use classes mean for water resource management.

**Table 3.5.** River Use Classes and Water Resource Management

River Use Class	What the Use Class Means for Water Resource Management
<b>Class 1</b>	High potential for monitoring, modifying, and replacing existing instream structures that may have a negative effect on hydrology and water quality, which may currently be degrading local hydrology.
<b>Class 2</b>	Potential degradation of local hydrology and water quality is possible without implementation of BMPs and other mitigation measures.
<b>Class 3</b>	Potential degradation of local hydrology and water quality is possible without implementation of BMPs and other mitigation measures.
<b>Class 5</b>	Emphasis is placed on protection of hydrology and water quality, and certain activities may be under additional scrutiny beyond regulation BMPs.
<b>Class 6</b>	Emphasis is placed on protection of hydrology and water quality, and certain activities may be under additional scrutiny beyond regulation BMPs.

**Hydrology Goal 3: Recognize the importance of natural flows that support aquatic, adjacent habitat, and instream processes.**

**Objective:** Support flow studies and releases that would benefit the riverine ecosystem and fluvial processes.

**Objective:** Coordinate with DWR on establishment of instream flows to support fisheries and associated aquatic and wildlife habitat.

**Management Agency:** DWRi, DWRe, DWR

**Permitting Agency:** DWRi, Salt Lake County Flood Control

**Intersecting Agencies:** DWQ

BMPs for hydrology management in the planning area are shown in Figure 3.3 and are adapted from the *Jordan River Corridor Preservation Study* (JE Fuller/Hydrology & Geomorphology and CH2MHill 2007).

### BEST MANAGEMENT PRACTICES FOR HYDROLOGY MANAGEMENT IN THE PLANNING AREA

- Through engineering analyses, demonstrate no adverse impact on hydraulic, hydrologic, and scour/erosion conditions for new projects.
- Replace and/or enhance bank vegetation disturbed by construction.
- Ensure that steep channel bank slopes are 2.5:1.0 or flatter to support vegetative growth.
- Ensure that structural measures are adequately toed down below the design scour depth, or provide grade control to limit long-term scour.
- Design bank stabilization measures to overtop.
- Use bioengineering.



**Figure 3.3.** Best management practices for hydrology management in the planning area.

## Water Quality

Water quality is part of FFSL’s multiple-use framework; therefore, water quality concerns do not vary from one class to the next. In addition, FFSL will draw on beneficial use and not the river use class system for water quality management. Table 3.7 presents management goals and objectives for water quality.

**Table 3.7.** Water Quality Management Goals and Objectives Common to All Classes

**Water Quality Goal 1: Promote the policy of antidegradation of Jordan River water quality.**

**Objective:** Coordinate with DWQ to ensure compliance with Utah Water Quality Act regulations (Utah Administrative Code R317).

**Objective:** Require water quality certifications per Utah Administrative Code R317-15. The purpose of certification is to ensure that the federally permitted or licensed activities will be conducted in a manner that will comply with applicable discharge and water quality requirements to maintain the chemical, physical, and biological integrity of waters of the U.S. within the state.

**Objective:** Promote the maintenance and improvement of existing water quality to protect the existing beneficial uses designated for the Jordan River.

**Management Agencies:** DWQ, land-use applicants

**Permitting Agencies:** DWQ

**Intersecting Agencies:** Local cities and counties

**Water Quality Goal 2: Recognize the importance of minimizing pollutant loads to the river, specifically those that have been identified as contributing to low DO concentrations (i.e., organic matter).**

**Objective:** Coordinate with DWQ to ensure compliance with numeric criteria for parameters of concern, e.g., DO.

**Objective:** Coordinate with municipal stormwater management entities, WWTPs, and other entities that discharge on reducing pollutant loads to the river.

**Objective:** Communicate new project proposals to DWQ to help ensure impacts do not affect compliance with the existing narrative standard and the numeric DO standard.

**Objective:** Support maintenance of existing and/or restore degraded wetland, riparian, and vegetated infiltration buffers adjacent to sovereign lands.

**Management Agency:** FFSL, DWQ

**Permitting Agency:** DWRi, DWQ, USACE

**Intersecting Agencies:** Local cities and counties

BMPs for water quality management in the planning area are shown in Figure 3.4.

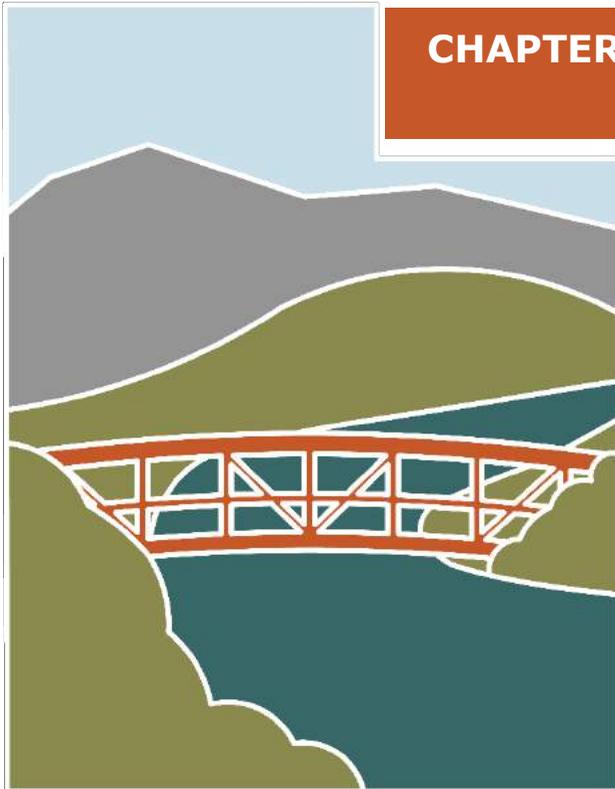
**BEST MANAGEMENT PRACTICES FOR WATER QUALITY MANAGEMENT IN THE PLANNING AREA**

- Use sediment and erosion control fencing during construction activities.
- Use bio-engineering practices for bank stabilization.
- Limit construction activities within the stream corridor, particularly during low-flow periods.
- Treat WWTP discharges.
- Treat stormwater through the use of constructed wetlands, bio-swales, and other natural features.
- Revegetate the riparian corridor to provide filtration and thermal protection.



**Figure 3.4.** Best management practices for water quality management in the planning area.

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### 3.4 Community Resources

**Desired Future Conditions:**

- A sustainable river system that supports multiple uses and provides navigability and safe access for diverse stakeholders.
- Acknowledgement of the inherent benefits and constraints of the urban and rural landscape through which the river flows.
- Preservation and enhancement of the aesthetic beauty of the river ecosystem and human environment without diminished use for the benefit of recreation, education, and art.

### Infrastructure

Because infrastructure can negatively affect navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality, management goals and objectives generally seek to minimize the impacts of new and existing infrastructure and to protect elements of the river system such as the river channel and its banks. The careful placement of infrastructure and proper infrastructure design and installation are a priority for FFSL. Table 3.9 presents management goals and objectives for infrastructure.

**Table 3.9.** Infrastructure Management Goals and Objectives Common to All Classes

<b>Infrastructure Goal 1: Minimize impact of new infrastructure.</b>
<b>Objective:</b> Avoid creating new navigational hazards as a result of infrastructure development.
<b>Objective:</b> Restore instream and adjacent habitat damaged during construction of new infrastructure.
<b>Objective:</b> Coordinate with DWQ to ensure compliance with Utah Water Quality Act regulations (Utah Administrative Code R317) and numeric criteria for pollutants of concern to protect beneficial uses.
<b>Management Agencies:</b> FFSL, land-use applicants
<b>Permitting Agencies:</b> FFSL, Salt Lake County Flood Control, DWRI, USACE, DWQ
<b>Intersecting Agencies:</b> Utility and infrastructure companies, JRC
<b>Infrastructure Goal 2: Minimize impact of infrastructure removal.</b>
<b>Objective:</b> Avoid damage to adjacent habitats during infrastructure removal.
<b>Objective:</b> Restore habitat, as per a revegetation or restoration plan, damaged during infrastructure removal.
<b>Objective:</b> Coordinate with DWQ to ensure compliance with Utah Water Quality Act regulations (Utah Administrative Code R317) and numeric criteria for pollutants of concern to protect beneficial uses.
<b>Management Agency:</b> FFSL, land-use applicants, DWQ
<b>Permitting Agency:</b> FFSL, Salt Lake County Flood Control
<b>Intersecting Agencies:</b> Utility and infrastructure companies, JRC

Table 3.8 describes what the river use classes mean for community resource management.

**Table 3.8.** River Use Classes and Community Resource Management

River Use Class	What the Use Class Means for Community Resource Management
<b>Class 1</b>	Clustering of community resources such as infrastructure and recreation facilities may occur in this class with concern for safety, practicality, and potential degradation of cultural resources.
<b>Class 2</b>	Clustering of community resources such as infrastructure and recreation facilities may occur in this class with concern for safety, practicality, and potential degradation of cultural resources.
<b>Class 3</b>	Emphasis on mitigation to avoid impacts to ecosystem, water, and cultural resources with consideration of multiple-use practices.
<b>Class 5</b>	Preference for activities and mitigation that maintain potential for future resource preservation and restoration.
<b>Class 6</b>	New authorizations may have to adhere to mitigation standards and regulations associated with conditions of conservation easements, deed restrictions, and other state or federal laws.

## Community Resources

### Infrastructure Goal 3: Support flood control measures that minimize impacts to the bed and bank of the Jordan River.

**Objective:** Coordinate with management agencies to maintain access to existing dredging and flood control locations.

**Objective:** Coordinate with Salt Lake County and other management agencies during emergency or high flow events that require flood control action.

**Objective:** Support restoration of habitat damaged during dredging and flood control activities with an emphasis on bank stabilization and re-vegetation with appropriate species.

**Management Agency:** FFSL, Salt Lake County Flood Control, other cities and counties, DSPR, DWRe, USACE

**Permitting Agency:** FFSL, Salt Lake County Flood Control, DWRe, USACE

**Intersecting Agencies:** JRC

### Infrastructure Goal 4: Support projects that apply bioengineering methods to address bank and channel stability as appropriate.

**Objective:** Replace impermeable and hardened surfaces where possible.

**Objective:** Use woody and herbaceous plant material to protect banks and decrease excessive erosion or scour.

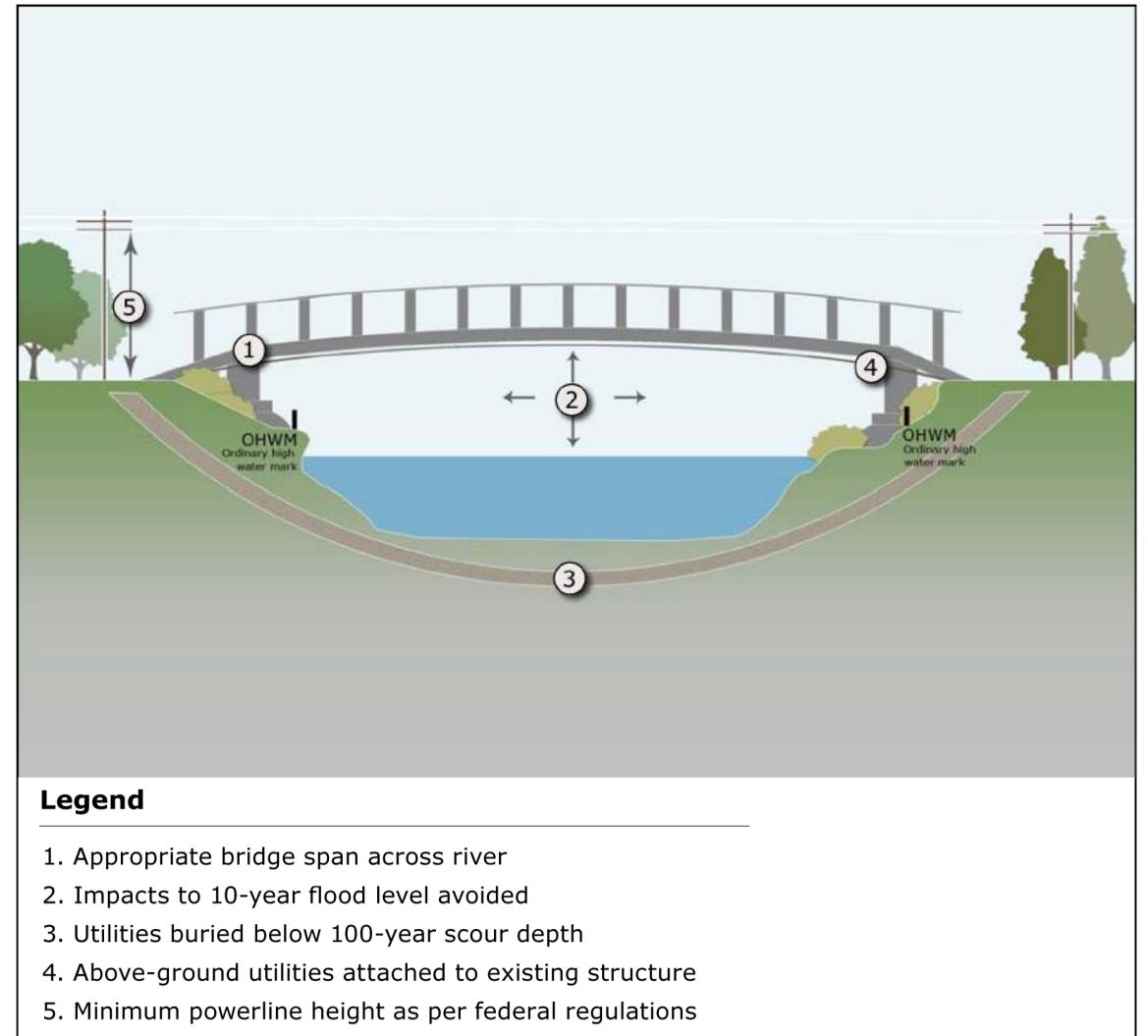
**Management Agency:** FFSL

**Permitting Agency:** USACE, FFSL, DWRe, Salt Lake County Flood Control

**Intersecting Agencies:** DWRe, JRC

Figure 3.5 illustrates the correct placement of infrastructure along the Jordan River.

BMPs for the permitting, construction, and removal of infrastructure in the planning area are shown in Figure 3.6.



**Figure 3.5.** Correct placement of infrastructure along the Jordan River.

## BEST MANAGEMENT PRACTICES FOR THE PERMITTING, CONSTRUCTION, AND REMOVAL OF INFRASTRUCTURE IN THE PLANNING AREA



### General

- Bridges on sovereign lands that are located in low-use areas, are too low, or have footings or pylons should be decommissioned.
- When removing existing bridges, above-grade utility crossings, outfall structures, and diversion dams, adhere to applicable CWA, stream alteration, and flood control permits. These permits will require that removal of the infrastructure be completed without significantly or adversely affecting water quality and bank stability. Below-grade utility crossings should generally be abandoned in place after assuring that pipes are plugged.
- Habitat damaged during infrastructure removal should be restored during the same growing season as project implementation and as seasonal conditions allow.
- As unpermitted infrastructure is discovered on FFSL sovereign lands in the Jordan River corridor, owners should come into compliance through the permitting process or to remove the infrastructure.
- Although no minimum spacing of infrastructure is stipulated, the proximity of one facility to another should be considered as part of the permitting process. In general, pedestrian bridges should not be authorized within 500 feet of one another unless there are safety concerns, e.g., a busy road. Proposals for new vehicle bridges should be accompanied by a transportation analysis that demonstrates its need. Utilities can be clustered to minimize disturbance. New utilities crossing the river, including powerlines, should be buried according to the below-grade utility BMPs discussed below. If above-ground utilities must be installed, they should be attached to existing infrastructure and not placed on the bed of the channel.

### Design and infrastructure for new **bridges:**

- The clear span of the bridge should cross the main channel without piers or other obstructions in the channel.
- The bridge should not impact the 10-year (10% annual chance) flood flow depth, velocity, water surface elevation, and channel section.
- The bridge should be located (if possible) on a straight channel segment and oriented perpendicular to the flow.
- The bridge should provide sufficient freeboard above the 10-year flood flow event to allow for clear navigation.

**Figure 3.6.** Best management practices for the permitting, construction, and removal of infrastructure in the planning area.

**BEST MANAGEMENT PRACTICES FOR THE PERMITTING, CONSTRUCTION, AND REMOVAL OF INFRASTRUCTURE IN THE PLANNING AREA (CONTINUED)**

Design and construction of new **below-grade utilities:**

- Below-grade utility crossings should be buried below the 100-year (1% annual chance) local scour depth plus the long-term scour (local and general scour), and below the dredge depth of Salt Lake County Flood Control.
- The depth should be maintained across the floodplain or beyond a public structure, which will protect the utility from exposure by bank erosion.

Design and construction of new **outfall structures** to the Jordan River:

- New outfall structures should provide for dissipation of excess energy prior to discharge to the river.
- New outfall structures to the Jordan River should have means for removal of settleable solids (e.g., sediment traps) prior to discharge.
- Outfall structures should be designed to not impede navigation.

New proposed **diversion dams:**

- New diversion dams should not impede navigation.
- Proposed new dams should obtain a FEMA Conditional Letter of Map Revision, including mitigation of all adverse flooding impacts.
- New diversion dams should provide for dissipation of excess energy prior to flows entering the downstream river channel.
- New diversion dams should have stable dam designs meeting all State Dam safety requirements.
- CWA, stream alteration, and Salt Lake County Flood Control permits should be obtained for new diversion dams.

Construction near **levees:**

- Proposed construction on or adjacent to an accredited levee should obtain FEMA authorization prior to construction.
- FEMA regulations likely restrict tree planting, structures, horizontal and vertical bores, right-of-way encroachments, and bridges within the levee prism, or any other action that restricts levee operation and maintenance.



**Figure 3.6.** Best management practices for the permitting, construction, and removal of infrastructure in the planning area (continued).

### Cultural Resources

There is a higher likelihood of encountering intact prehistoric cultural resources in river use classes with less development and fewer alterations. However, historic river meandering and ongoing erosional processes can expose resources in most any location or use class. In addition, sections of the river that have significant development of, and alteration to, the natural environment have the potential for the discovery of cultural resources, especially historic structures. Table 3.10 presents management goals and objectives for cultural resources.

**Table 3.10.** Cultural Resource Management Goals and Objectives Common to All Classes

<b>Cultural Resources Goal 1: Recognize the importance of cultural resource protection on sovereign lands.</b>
<b>Objective:</b> Collaborate with SHPO on the management of known cultural resource sites on Jordan River sovereign lands.
<b>Objective:</b> Consider how future projects using state funds would affect historic properties, according to Utah Code 9-8-404.
<b>Objective:</b> Adhere to Utah Code 9-9-402 and Utah Administrative Code R230-1 regarding the discovery of human remains on sovereign lands.
<b>Objective:</b> Establish a programmatic agreement with SHPO to facilitate authorization review and other management decisions along the Jordan River.
<b>Management Agencies:</b> SHPO
<b>Permitting Agencies:</b> Not applicable
<b>Intersecting Agencies:</b> FFSL, DWRe

BMPs for cultural resources in the planning area are listed in Figure 3.7.

**BEST MANAGEMENT PRACTICES FOR CULTURAL RESOURCES IN THE PLANNING AREA**

- For archaeological surveys, SHPO recommends resurveying areas if the previous survey is 10 or more years old, because the older survey may not use current inventory methods and requirements. For architectural surveys, "there is no formally established protocol or policy regarding when to redo or update site forms. The rule of thumb or general recommendation is that if a survey or site form is older than 10 years then a new one should be completed. If it is less than 10 years, then it should be updated with a new photograph and any changes should be noted (or if new information about the property has come to light, then that should be added)." (Hansen 2015)
- Under Utah Code 9-9-307, "any person who discovers any archaeological resources on lands owned or controlled by the state or its subdivisions shall promptly report the discovery to the division." In addition, "any person who discovers any archaeological resources on privately owned lands shall promptly report the discovery to the division [Utah Division of State History]."
- Before issuing any permits for projects adjacent to, over, or in the Jordan River, FFSL should notify SHPO before a project starts and before a permit is issued. Project notification will also allow FFSL to informally consult with SHPO on how to best complete FFSL's legal responsibilities regarding cultural resources. Treatment of unanticipated discoveries (i.e., cultural resources unexpectedly found during a project) along the Jordan River should be discussed during initial consultations to create a plan if these occur. For any Native American consultations, FFSL should follow the Utah Department of Natural Resources consultation plan created per the executive order issued by Governor Herbert on July 30, 2014.
- A cultural resource site may be considered a recreation destination or it may enhance the aesthetics of a place to a recreation user. Consider highlighting several well-known cultural resource sites for public education and recreation purposes.



**Figure 3.7.** Best management practices for cultural resources in the planning area.

## Recreation

Recreation includes many activities, and the management goals and objectives in this section seek to enhance and provide safe recreation experiences. The JRCMP does not intend to limit recreation but in some cases does support limited use in certain areas of high wildlife habitat value. For this reason, there is some difference in recreation management decisions between river use classes. Table 3.11 presents management goals and objectives for recreation.

**Table 3.11.** Recreation Management Goals and Objectives Common to All Classes

**Recreation Goal 1: Balance recreation needs, development, and protection of the natural environment.**

**Objective:** Support the identification and development of areas where recreation infrastructure is most needed and is also appropriate.

**Objective:** Minimize the impacts of recreation infrastructure on the river environment and on existing and potential development (e.g., utility corridors) through authorization conditions.

**Management Agencies:** FFSL, local cities and counties, DSPR

**Permitting Agencies:** FFSL, USACE, DWRI, Salt Lake County Flood Control

**Intersecting Agencies:** JRC, utility and infrastructure companies

**Recreation Goal 2: Encourage recreational opportunities along the Jordan River where appropriate, and allow for a variety of recreation interests.**

**Objective:** Coordinate with cities, counties, and other entities to improve or add existing recreation infrastructure, and create new recreation opportunities in the planning area (e.g., wildlife viewing platforms, boater access points, kayak “play” areas, and urban fisheries).

**Objective:** Support creation of a comprehensive water trail map to provide information on boating, wildlife viewing, fishing, and other recreation opportunities in the planning area.

**Objective:** Encourage the application of appropriate design standards (e.g., Americans with Disability Act, or *Salt Lake County Jordan River Trail Master Plan* standards) to support increased visibility and recreational use of the river.

**Objective:** Coordinate with management partners to update and disseminate recreation information (e.g., brochures, website, and signage) when changes occur or as needed.

**Management Agency:** FFSL, local cities and counties, DSPR

**Permitting Agency:** FFSL

**Intersecting Agencies:** JRC

**Recreation Goal 3: Support development and maintenance of recreation infrastructure.**

**Objective:** Supplement the in-house database of recreation infrastructure with information on maintenance responsibility.

**Objective:** Consider and support the removal of recreation infrastructure that is dysfunctional, obsolete, or incompatible with other uses or river classes as opportunities allow.

**Objective:** Support development of boater portages around navigational hazards such as diversion dams in the water trail.

**Management Agency:** FFSL, local cities and counties, DSPR

**Permitting Agency:** FFSL

**Intersecting Agencies:** JRC, DSPR

**Recreation Goal 4: Integrate recreation and restoration opportunities along the river as appropriate.**

**Objective:** Integrate restoration projects into the Jordan River Trail system.

**Objective:** Consider recreational navigation of the river when designing restoration projects.

**Management Agency:** FFSL, local cities and counties

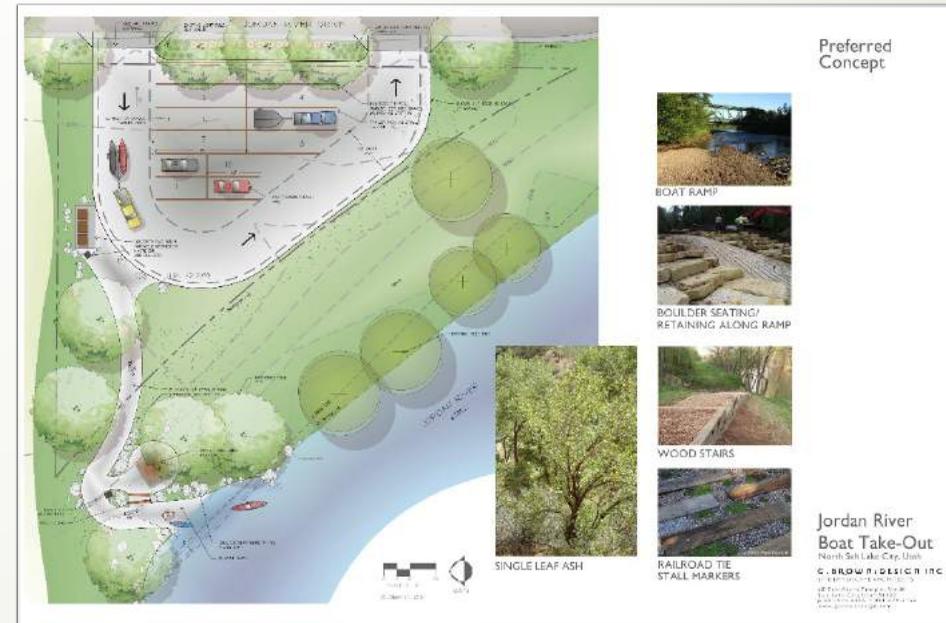
**Permitting Agency:** USACE, FFSL, DWRI, DWQ/UDEQ

**Intersecting Agencies:** JRC, DWR, DSPR, DWRe

BMPs for recreation in the planning area are shown in Figure 3.8.

**BEST MANAGEMENT PRACTICES FOR RECREATION IN THE PLANNING AREA**

- Replace structural water-conveyance devices with alternatives that allow for recreation improvements.
- Develop boater access points and portages with safe, flexible, and functional designs that meet water trail user needs at different flow levels of the river and that accommodate boating parties of varying sizes and skill levels.
- Use a sloping riverbank boat access design for boat access points on the Jordan River. This design allows for variable stream flows and stream levels, is easy to maintain, is inexpensive, and does not trap river debris. Concrete sloping ramps are preferred.
- Develop portages around navigational hazards such as diversion dams.
- Locate bridges and boater access points in areas that already have human impacts and are easily visible from both the river and shore for surface and water trail users.
- Consider the proximity of one facility to another as part of the leasing process, even though no minimum spacing is stipulated for recreation infrastructure such as board access points.
- Maintain or improve aesthetic beauty when designing new recreation facilities.
- Promote lake-to-lake boat trips with associated boater access points.
- Consider developing a boater slalom course with hydraulic features and timing gates.
- Promote the planning area as an urban bird watching area.
- Limit new bridges and dams because they tend to degrade the experience of boaters on the river.
- Ensure that recreation infrastructure protects as much native and sensitive habitat as feasible; enhance developed areas when needed with additional planting of native vegetation.
- Avoid sensitive environments and encourage new recreation infrastructure construction in previously disturbed areas.
- Choose recreation infrastructure (sustainable, green infrastructure) that maintains river function and wildlife habitat.
- Ensure recreation infrastructure accounts for flooding.
- Install trash and recycling receptacles near recreation infrastructure and at other places where users approach the river.



- Avoid creating barriers to wildlife movement with new recreation infrastructure.
- Use the NPS’s *Design Guide for Canoe and Kayak Launches* (2004) as well as water trail guidelines in the *Jordan River Trail Master Plan* (Salt Lake County 2008) as information sources for boat launch specifications, portages, and signage. However, decision-making should take into account local conditions when using the NPS guide.
- Consider the preferred concept for boater access points, which includes associated parking with room for boat trailers, safe access to a concrete ramp such as wood stairs or gentle slopes, retention of structures along the ramp to protect banks, appropriate ramp slopes for boat launching and/or take-out, planting of vegetation to protect banks and provide aesthetic beauty, a nearby area for portable restrooms and waste bins, and convenient access to the Jordan River Parkway Trail (for bicycle shuttle use).

Illustration courtesy of G Brown Design.

**Figure 3.8.** Best management practices for recreation in the planning area.

## Access

Access to Jordan River sovereign lands is inherent in their status. Management goals and objectives generally seek to facilitate safe access while protecting private landowners' rights adjacent to the river. Proper spacing and minimizing impacts resulting from intense access are a priority for FFSL. In support of public safety, private landowner access in the form of trails, boat docks, boat ramps, etc. are generally not permitted. Table 3.12 presents management goals and objectives for access.

**Table 3.12.** Access Management Goals and Objectives Common to All Classes

<b>Access Goal 1: Balance needs for access with river protection.</b>
<b>Objective:</b> Evaluate access points in an area before approving new access as part of an authorization application process.
<b>Objective:</b> Support development of new public access points where appropriate.
<b>Objective:</b> Minimize the impacts of new access points on the river environment through appropriate design and siting during the authorization application process.
<b>Objective:</b> Work with cities, counties, and communities to identify the most appropriate locations for new access facilities, and encourage the sharing of access points to minimize new infrastructure (e.g., bridges).
<b>Management Agencies:</b> FFSL, local cities and counties, DSPR
<b>Permitting Agencies:</b> FFSL, DWRI, Salt Lake County Flood Control
<b>Intersecting Agencies:</b> JRC, utility and infrastructure companies

<b>Access Goal 2: Through the permitting process, ensure that new development does not unnecessarily impede access.</b>
<b>Objective:</b> Evaluate authorization applications to confirm that projects do not limit, conflict with, or prevent current or future access (e.g., a low clearance bridge may stop boaters, and construction of an outfall structure could prevent access for flood control).
<b>Objective:</b> Support siting new river access points in areas that connect to other trails and public transit.
<b>Management Agency:</b> FFSL
<b>Permitting Agency:</b> FFSL, DWRI, Salt Lake County Flood Control
<b>Intersecting Agencies:</b> Utility and infrastructure companies, Salt Lake County Flood Control
<b>Access Goal 3: Where possible, remove obstacles that limit or prevent access.</b>
<b>Objective:</b> Improve water trail access, and increase the mobility of boats on the river through the removal of navigational hazards, installation of new portages, and the use of signage.
<b>Objective:</b> Support public access infrastructure that adheres to Americans with Disabilities Act accessibility guidelines and other design specifications.
<b>Objective:</b> Work to mitigate <i>Phragmites</i> infestations and other non-native species that may impede river access.
<b>Management Agency:</b> FFSL, local cities and counties, DSPR, DWR
<b>Permitting Agency:</b> FFSL
<b>Intersecting Agencies:</b> JRC

BMPs for access in the planning area are listed in Figure 3.9 and shown in Figure 2.49.

**BEST MANAGEMENT PRACTICES FOR ACCESS IN THE PLANNING AREA**

- Encourage accessibility of the planning area through appropriate signage.
- Manage invasive and nuisance species through the permitting process where possible.
- Within permits, require restoration of vertical riverbanks to a more gentle relief using laying back dredge berms or levees where possible to reduce erosion and improve public access and safety.
- Locate bridges frequently enough to provide adequate access but not so frequently to affect riparian habitat and use of the water trail (see general infrastructure BMPs).
- Locate bridges and boater access points in areas that already have human impacts and are easily visible from both the river and shore for surface and water trail users.
- To allow passage of boats, ensure that the clear span of new bridges crosses the main channel without piers or other obstructions in the channel.
- Decommission bridges and boater access points located in low-value areas or that are poorly designed.
- Ensure that each boater put-in has a corresponding take-out site.
- Use the NPS’s *Design Guide for Canoe and Kayak Launches* (2004) as well as water trail guidelines in the *Jordan River Trail Master Plan* (Salt Lake County 2008) as information sources for boat launch specifications, portages, and signage. However, decision-making should take into account local conditions when using the NPS guide.
- Consider conflicting access uses when developing access points (e.g., boater access should not be placed where recreationists will be fishing).
- Work with local general plans and planning organizations and stakeholders in the site selection of new utility facilities; avoid siting utilities in areas with flood.
- Share rights-of-way with other utilities such as roads, canals, and railroads; use land adjacent to other infrastructure to minimize access points.
- Assist Salt Lake County Flood Control with access.



**Figure 3.9.** Best management practices for access in the planning area.

## Public Safety

The five river use classes are generally not important in terms of managing public safety because safety should be addressed along the entire river, regardless of class. However, safety concerns may be lower in Class 5 and 6 areas because of the reduced presence of infrastructure. In addition, some safety measures may not be applicable in Class 5 and 6 areas because of limited compatibility with resource preservation goals. Table 3.13 presents management goals and objectives for public safety.

**Table 3.13.** Public Safety Management Goals and Objectives Common to All Classes

**Public Safety Goal 1: Improve water trail safety (boater safety) by addressing permanent and temporary navigational hazards.**

**Objective:** Collaborate with partners, including JRC and the recreation community on the installation of a consistent and clear signage system to identify potential navigational hazards in the river. Signs should be maintained and replaced if removal is necessary.

**Objective:** Support removal (or maintenance) of temporary navigational hazards such as large woody debris, garbage rafts, and eroding banks.

**Objective:** Remove permanent navigational hazards when possible or incorporate into restoration activities that allow for avoidance (e.g., installation of boater access points for portaging around an obstacle).

**Management Agencies:** FFSL, local cities and counties, infrastructure owners, DWR, DSPR

**Permitting Agencies:** FFSL, DWRI, Salt Lake County Flood Control

**Intersecting Agencies:** JRC

**Public Safety Goal 2: Evaluate new permit applications with public safety in mind and require any needed public safety measures.**

**Objective:** Require the installation of portages and related signage when appropriate.

**Objective:** Review new infrastructure design to reduce the potential for navigational hazards (e.g., water flow can expose buried pipes, bridge height can affect boater clearance) or other public safety concerns.

**Objective:** Evaluate new projects to determine if safety issues are adequately addressed (e.g., navigation, lighting, fire prevention, traffic, health, and project design specifications).

**Management Agency:** FFSL, local cities and counties, DSPR

**Permitting Agency:** FFSL, DWRI, Salt Lake County Flood Control

**Intersecting Agencies:** JRC

**Public Safety Goal 3: Address safety issues in the planning area.**

**Objective:** Coordinate with state and local agencies (e.g., law enforcement and public health departments) to address safety issues such as transient communities, fire, and flood.

**Objective:** Support crime prevention and enforcement/patrolling by coordinating with other entities providing such services.

**Management Agency:** FFSL, local cities and counties, public health departments, local law enforcement departments

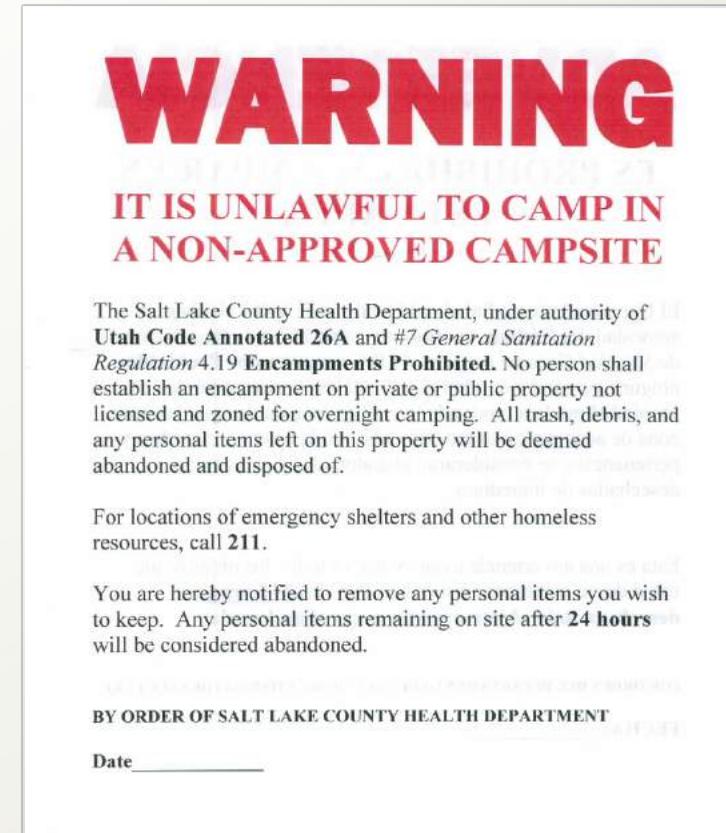
**Permitting Agency:** None

**Intersecting Agencies:** JRC

BMPs for public safety in the planning area are listed in Figure 3.10.

**BEST MANAGEMENT PRACTICES FOR PUBLIC SAFETY IN THE PLANNING AREA**

- Carefully consider new infrastructure design to maintain enough clearance for water trail users and ensure maximum space for natural river movement (e.g., bridges can be constriction points and may cause flood control issues).
- Within permits, require restoration of vertical riverbanks to a more gentle relief using laying back dredge berms or levees where possible. These measures will help reduce erosion and improve public access and safety.
- Locate boater access points in river eddies of sufficient size to accommodate several boats to protect the boaters, ramps, and docks from the river current and reduce erosion. Avoid steep slopes.
- Develop portages around navigational hazards such as diversion dams to provide for boater safety.
- Use NPS or other agency design standards and the *Jordan River Trail Master Plan* (Landmark Design, Inc. 2008) as guidance for safe boater access points and portages, and consider appropriate signage. Decision-making should take into account local conditions.
- Design surface trail infrastructure (e.g., bridges) in the planning area with appropriate passing widths. Limit or eliminate blind corners.
- Encourage street name signage that is clearly visible from the water trail on appropriate bridges.
- Support adherence to Americans with Disability Act accessibility guidelines in project designs.
- Educate adjacent landowners on defensible space measures to protect against fire.
- Require bioengineering methods to stabilize shorelines (and protect vegetation) for sheltering put-ins and take-outs.
- Reduce stands of *Phragmites* and other non-native vegetation to lower the fire risk and to discourage the development of transient camps.
- Contact Salt Lake County Public Health Department Environmental Health Division to report encampments or other public health concerns (385-468-3860).
- Direct other public safety concerns to the local police departments.



**Figure 3.10.** Best management practices for public safety in the planning area.

## Education

Education about FFSL’s role and jurisdiction and the value of the Jordan River is important across all use classes. Table 3.14 presents management goals and objectives for education.

**Table 3.14.** Education Management Goals and Objectives Common to All Classes

<b>Education Goal 1: Support education about the importance of the Jordan River and the need to protect it as a healthy, functioning ecosystem.</b>
<b>Objective:</b> Support consistent and appropriate use of educational signage in the planning area, especially along the Jordan River Water Trail.
<b>Objective:</b> Support development of information and public awareness programs for adjacent landowners and land-use applicants on how to reduce negative impacts to the river.
<b>Objective:</b> Support partnerships, research programs, and school education programs in the planning area; integrate research results into management and planning.
<b>Management Agencies:</b> FFSL, DSPR, local cities and counties
<b>Permitting Agencies:</b> FFSL
<b>Intersecting Agencies:</b> JRC, Envision Utah
<b>Education Goal 2: Expand informational material regarding FFSL’s role in management, jurisdiction, and application of multiple-use management strategies of the Jordan River.</b>
<b>Objective:</b> Provide potential land-use applicants with a clear permit application process through the FFSL website and other media.
<b>Management Agency:</b> FFSL, land-use applicants, local cities and counties
<b>Permitting Agency:</b> FFSL
<b>Intersecting Agencies:</b> JRC

### Education Goal 3: Provide education on recreation opportunities and safety along the Jordan River when appropriate.

**Objective:** Support development of information and public awareness programs for boaters about the water trail, including consistent, clear signage on the water trail itself.

**Objective:** Support development of information, signage, and public awareness programs for other recreation opportunities in the planning area (e.g., fishing and wildlife viewing).

**Management Agency:** FFSL, DSPR, local cities and counties

**Permitting Agency:** FFSL

**Intersecting Agencies:** JRC

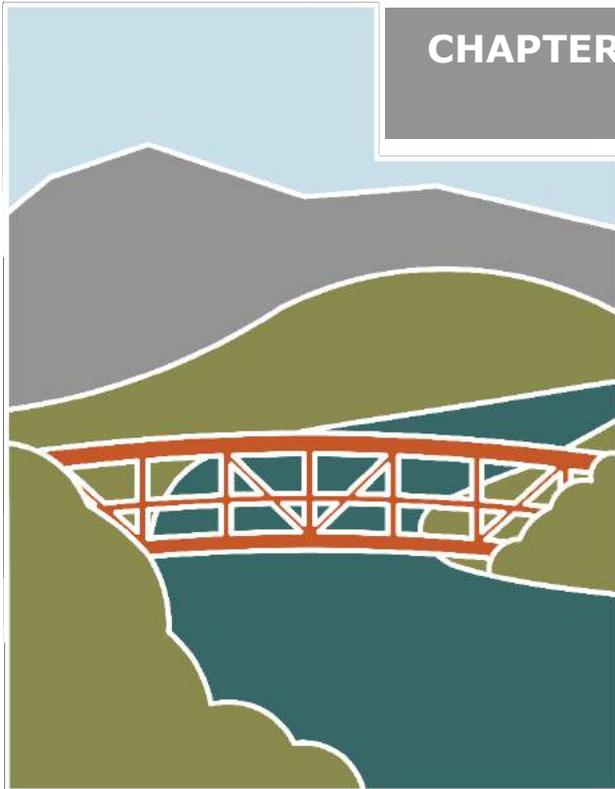
BMPs for education in the planning area are shown in Figure 3.11.

### BEST MANAGEMENT PRACTICES FOR EDUCATION IN THE PLANNING AREA

- Provide a list of good practices for adjacent landowners regarding dumping, oil changes, use of native landscaping, herbicide/pesticide use, etc.
- Coordinate with other agencies and establish partnerships to meet education and research goals and objectives.
- Use education requirements as potential mitigation for development projects.
- Regularly identify any research needs that could result in better management of the planning area.



**Figure 3.11.** Best management practices for education in the planning area.



### 3.5 Coordination Framework

Multiple cities, counties, and state and federal agencies are involved in management and permitting in the planning area. Although FFSL has management jurisdiction from top of bank to top of bank, we are responsible for considering the protection of navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality in keeping with the Public Trust. Because of this, FFSL has an interest in improving coordination with other agencies and

Jordan River stakeholders with respect to management, permitting, and research. Permitting new activities can have important implications on the management of the Jordan River. Research can inform and improve Jordan River management objectives and actions. Currently there is a need for more frequent coordination between and within these spheres. Table 3.15 shows the primary role of state, federal, and other regulatory and coordinating bodies in permitting, management, and research on the Jordan River.

Broader geographic coordination is also required. As described in Chapter 1, FFSL has jurisdiction over Utah Lake and Great Salt Lake, in addition to the Jordan River. Each of the three sovereign land areas has some form of associated government commission, although the mandate of each may vary. In some cases, management activities, e.g., weed treatment, should be implemented at a scale that extends beyond the Jordan River.

**Table 3.15.** Primary Role of State, Federal, and other Regulatory and Coordinating Bodies in Permitting, Compliance, Management, and Research on the Jordan River

Agency		Permitting and Compliance	Management	Research
Utah Department of Natural Resources	FFSL	X	X	X
	DWR		X	X
	DSPR		X	
	DWRi	X	X	
	DWRre		X	X
Other state agencies	DWQ	X	X	X
	UDOT		X	
	SHPO	X	X	X
Federal agencies	USACE	X		
	USFWS		X	X
	NPS			X
	EPA		X	
Local government	Utah County		X	
	Salt Lake County	X	X	
	Davis County		X	
	Municipalities		X	
Coordinating bodies	JRC			X

The JRC is a mix of governmental and non-governmental members who work to increase and improve the implementation of projects identified in *Blueprint Jordan River*, raise public awareness, and help promote coordination among stakeholders. FFSL, together with the commission (which also oversees a technical advisory committee), can provide a long-term management vision that affects not only the Jordan River itself but the watershed and upstream and downstream ecosystems.

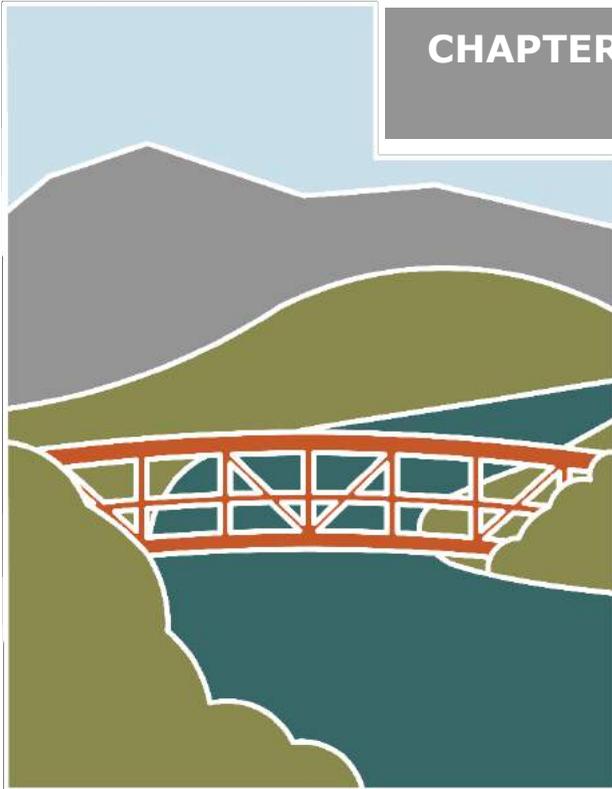
### ***Permitting and Compliance***

As illustrated in Figure 1.2 in Chapter 1, multiple entities have jurisdiction over the Jordan River and its immediate environs. At this time, each entity requires a different permit, in part because each focuses on a different aspect of river management, e.g., DWRi on water rights and recreation and USACE on placement of fill below the OHWM. During the public involvement process, stakeholders recommended consolidating permits. FFSL will review the practicality of this relative to our mandate of sovereign lands management. Often associated with permitting is compliance with permit conditions, as per federal, state, and local regulations. Additional agencies, e.g., SHPO, who do not have permitting authority provide compliance oversight services.

### ***Research and Management Implementation***

Current research on the Jordan River ranges from water chemistry processes to fisheries and bird population inventories and is implemented by academic researchers, state agencies, local governments, and stakeholder groups. Much of this research has practical application and may inform future management of flows and restoration to improve water quality and habitat condition among other aspects of the Public Trust. Ongoing coordination of research and management implementation is necessary for the success of projects such as *Phragmites* treatment, navigational hazard removal, and bank stabilization. For large projects, especially those with multiple components like Big Bend and Three Creeks, partnerships are needed, with different actors taking on roles as champion, planner, funder, and installer. Although this plan does not prioritize specific projects, FFSL supports those projects that improve conditions of the Public Trust: water quality, navigation, fish and wildlife habitat, public recreation, and aesthetic beauty.

## CHAPTER 4 – LITERATURE CITED



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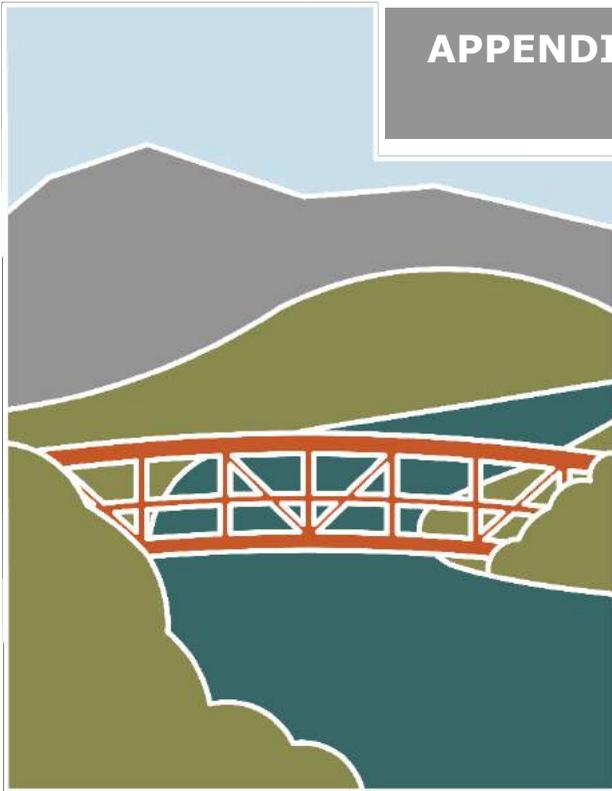
## Literature Cited

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## **APPENDIX A. REVIEW OF EXISTING INFORMATION**



## APPENDIX A – REVIEW OF EXISTING INFORMATION



### Introduction

A comprehensive review of existing information for the Jordan River was conducted to inform the development of the Jordan River Comprehensive Management Plan (JRCMP). This review ensured that the JRCMP would build on previously compiled data sources and current management strategies, instead of “reinventing the wheel.” A summary of reviewed documents and data is provided in Table A1 at the end of this appendix. In general, the existing information review provided details for the following:

- Current conditions of the Jordan River (e.g., bed and bank, hydrology, water quality, wildlife habitat, riparian vegetation, and problem areas or areas of degradation).
- Current management practices for the Jordan River (e.g., visions, goals, and guidelines for river management; best management practices [BMPs]; city ordinances).
- Existing authorizations (e.g., leases and permits), points of diversions, outfalls and bridges, flood control, and water rights.
- Existing and planned public river uses (e.g., trails, trailhead development, boating and navigation, and public facilities).
- Open space and preservation goals.
- Previous public involvement processes and outcomes.

*Blueprint Jordan River* (Envision Utah 2008) and *Best Practices for Riverfront Communities* (Jordan River Commission 2013b) provide foundational information for the JRCMP. Although written for different purposes and planning extents—i.e., the JRCMP only extends from the top of bank to the top of bank—the three documents used in tandem are important planning tools to guide management of the Jordan River.

### Blueprint Jordan River

*Blueprint Jordan River* (Blueprint), written in 2008, is a public vision for the future of the Jordan River corridor. It is a macro-scale planning document that provides “big ideas” and lays out a framework for accomplishing the ideas (Envision Utah 2008). To aid in developing the Blueprint, input from cities and counties along the river, from the general public, and from other interested parties was collected during a public involvement process. Three common priorities emerged from this input gathering process: 1) environmental and natural components of the river, 2) recreational activities, and 3) use of the river to build community and support economic development.

The resulting public vision developed for the Blueprint states that the Jordan River corridor will be a regional amenity consisting of a continuous system of natural areas, recreation and nature trails, and parks that provide opportunities for people to experience and learn about the natural world and enjoy the outdoors. This system or greenway would also provide an abundance of important wildlife habitats and would function as a wildlife migration corridor. The vision also includes the redevelopment of rundown areas into river centers that could become places for community gathering and renewal. The Blueprint provides ten guiding principles that encapsulate the public vision, as well as an action plan with specific goals for rehabilitating the river and connecting and building communities (including recreation, tourism, and education elements).

### Best Practices for Riverfront Communities

*Best Practices for Riverfront Communities* is a micro-scale planning document that provides a set of tools and guidelines, or best practices, to assist communities in creating consistent, flexible management of the Jordan River corridor (Jordan River Commission 2013b). It was developed for the Jordan River Commission and also included a public involvement process with planning, parks, and public works staff, as well as community stakeholders and the general public. This document serves as a basis for counties and cities to develop their own river policies and ordinances. The types of best practices in *Best Practices for Riverfront Communities* consist of the following:

- Land use: land use and zoning tools to shape development and protect the river
- Environment: restoration practices to protect and enhance the river corridor and its function
- Recreation: practices to foster stewardship and integrate recreation features in a river-friendly manner
- Stormwater: practices for existing facilities and new development that improve water quality
- Utilities: practices to mitigate the effects on the river of new facilities and improvements to existing facilities

Four land use zones are described in *Best Practices for Riverfront Communities*: 1) river (the active river corridor), 2) natural environment buffer (the area adjacent to the river left in an undeveloped state), 3) manicured open space or agriculture (parks, golf courses, and agricultural lands adjacent to natural spaces or the river that are actively managed), and 4) the built environment (residential, office, commercial, utility, and industrial land uses close to the river or natural lands adjacent to the river). Different best practices may apply in each land use zone; this document provides guidance on which best practices apply to particular land use zones. For the JRCMP, best practices that apply to the river land use zone are most applicable to the planning area.

**Table A1.** Existing Information Overview

Document or Data	Author	Date	Update Planned?	Contact	Jordan River Management Nexus	Relevant Components to JRCMP
<i>Jordan River Stability Study</i>	CH2M Hill Prepared for Salt Lake County	1992	No	–	<ul style="list-style-type: none"> <li>Management activities related to bed and bank stabilization and dredging.</li> </ul>	<ul style="list-style-type: none"> <li>Maps of dredging locations, channel stabilization locations, and utility line crossings.</li> <li>Information on long-term degradation (progressive lowering of channel bottom) of the Jordan River due to artificial straightening, which is the cause of most other stability problems like bank erosion, bridge scour, and loss of riparian vegetation.</li> <li>Information on specific locations and costs of relevant management activities.</li> </ul>
<i>The Jordan River Natural Conservation Corridor Report</i>	National Audubon Society Prepared for the Mitigation Commission and U.S. Fish and Wildlife Service	2000	No	–	<ul style="list-style-type: none"> <li>Mitigation Commission has authority to acquire wetlands; USFWS has responsibility for migratory birds.</li> <li>Desired future conditions include significant acreages of wetland, native vegetation, wildlife habitat; management of human use areas to complement natural areas; and maintenance of minimum streamflow.</li> </ul>	<ul style="list-style-type: none"> <li>Data for current conditions discussion (e.g., geomorphological features).</li> <li>Current condition maps highlighting natural areas and wetlands.</li> <li>Utah Division of Water Quality classifications.</li> <li>Hydrology and ecology for seven selected areas along the river.</li> <li>Recommended native plants table.</li> <li>Recommendations to address nine issues of concern (four recommendations specifically discuss the Utah Division of Forestry, fire &amp; State Lands [FFSL]).</li> </ul>
<i>Jordan River Corridor Preservation Study</i>	JE Fuller/Hydrology & Geomorphology and CH2M Hill Prepared for the City of Saratoga Springs	2007	No	–	<ul style="list-style-type: none"> <li>Multiple recommendations for management measures to include in a river management plan.</li> <li>Recommends the creation of erosion hazard zones by each municipality.</li> </ul>	<ul style="list-style-type: none"> <li>Information and descriptions of river Erosion Hazard Zones.</li> <li>Data and information regarding BMPs and design guidelines for utility lines, bridges, and stormwater outfalls.</li> <li>Maps and information of geomorphic “hot spots” (e.g., cut banks, high erosion areas) on the river.</li> </ul>
<i>Blueprint Jordan River</i>	Envision Utah	2008	No	Gabe Epperson, Envision Utah	<ul style="list-style-type: none"> <li>River should be a continuous system of natural areas, recreation and nature trails, and parks.</li> <li>River should be returned to more historic natural conditions (e.g., flow, quality, meanders, and wetlands).</li> <li>River should have regional transportation access.</li> </ul>	<ul style="list-style-type: none"> <li>Generally good graphics and photographs.</li> <li>Public involvement process (including a map analysis) in Chapter 2.</li> <li>Chapter 3 Vision maps (may be helpful to determine what type of BMPs should be recommended where).</li> <li>Specific actions to implement 10 guiding principles (could be included in BMPs [10 guiding principles can more broadly inform BMPs]).</li> <li>Specific goals (e.g., for flood control/hydrology, stormwater, and vegetation/habitat) in action plan that could inform BMPs.</li> </ul>

## Review of Existing Information

**Table A1.** Existing Information Overview

Document or Data	Author	Date	Update Planned?	Contact	Jordan River Management Nexus	Relevant Components to JRCMP
<i>Salt Lake Countywide Watershed – Water Quality Stewardship Plan</i>	Salt Lake County, Stantec Consulting Inc., Brown & Caldwell Engineers, Cirrus Ecological Solutions, LC, Dan Jones & Associates, Sullivan’s Solutions, URS Corporation, Wikstrom Economics and Planning Consultants	2009	Yes	–	<ul style="list-style-type: none"> <li>Describes the issues, main stressors, goals, and management measures associated with water quality in the Jordan River.</li> </ul>	<ul style="list-style-type: none"> <li>Good source for data on water quality issues (atlas of opportunities, Chapter 5).</li> <li>Information on BMPs and management measures.</li> <li>Maps and descriptions of priority areas for implementation on the Jordan River.</li> <li>Detailed habitat analysis (Chapter 4) for the Jordan River Corridor to describe desired riparian habitats, BMPs, etc.</li> <li>Predictions of future characteristics of the Jordan River corridor.</li> <li>Good graphics.</li> </ul>
<i>Guidance Document for Stormwater Management in the Jordan River Corridor</i>	University of Utah (Civil and Environmental Engineering) Prepared for Jordan River Commission	2012	No	John Vogelsang, Student Engineering Associates manager	<ul style="list-style-type: none"> <li>Details for stormwater management in the Jordan River.</li> </ul>	<ul style="list-style-type: none"> <li>Contains relevant BMPs and their associated unit costs.</li> <li>Clear and informative “fact sheets” on stormwater.</li> <li>Informative selection guidance matrices for “site control,” “roadway stormwater,” and “end-of-pipe” management measures.</li> <li>Example applications of stormwater management measures that could be used as “how-to” graphics.</li> </ul>
<i>Jordan River Total Maximum Daily Load Water Quality Study – Phase 1</i>	Cirrus Ecological Solutions, LC. and Stantec Consulting Inc. Prepared for the Utah Division of Water Quality	2013	Yes	Hilary Arens	<ul style="list-style-type: none"> <li>Guidance for management of point and nonpoint sources that affect water quality in the Jordan River.</li> </ul>	<ul style="list-style-type: none"> <li>Management measures should try to align with the phased approach taken in the total maximum daily load (TMDL).</li> <li>Use BMPs until there is enough information to determine more targeted approaches.</li> <li>Align BMP choices with impairments for the segment (1–8) of the Jordan River that the activity occurs in, and all downstream impairments (e.g., an activity that occurs in Segment 5 should use BMPs that reduce E. coli and TDS loads, and keep water temperatures low. However, BMPs should also reduce total organic matter loads for the impairments downstream in Segments 1–3 that are impaired for dissolved oxygen).</li> <li>Stormwater was identified as the major contributor of total organic matter to the Jordan River; JRCMP should therefore include outfall locations and a BMP decision flowchart for stormwater.</li> <li>JRCMP should include a map of all segments and impairments.</li> <li>JRCMP should be updated with new TMDL information as new phases are complete and new management practices are identified.</li> </ul>

**Table A1.** Existing Information Overview

Document or Data	Author	Date	Update Planned?	Contact	Jordan River Management Nexus	Relevant Components to JRCMP
<i>Best Practices for Riverfront Communities</i>	Jordan River Commission	2013	No	Corey Rushton, Chair, Governing Board of JRC	<ul style="list-style-type: none"> <li>Provides management tools and strategies for the river corridor.</li> <li>Of the four land use zones (river, natural environment buffer, manicured open space/agriculture, and built environment), the river zone shares jurisdiction with FFSL.</li> <li>Of the five types of land management goals (land use, environment, recreation, stormwater, and utilities), stormwater and utilities are especially applicable.</li> </ul>	<ul style="list-style-type: none"> <li>Helpful best practices graphic and regulatory context graphic in the Introduction.</li> <li>Numerous best practices and how-to-steps to inform JRCMP BMPs.</li> <li>The idea of a checklist as a useful tool.</li> </ul>
<i>Best Practices for Riverfront Communities</i> public involvement process	EPG for the Jordan River Commission	2013	No	–	<ul style="list-style-type: none"> <li>Best Practices for Riverfront Communities and the JRCMP both have public involvement elements to inform development of the document.</li> </ul>	<ul style="list-style-type: none"> <li>Surveys of planning staff and public works staff in 17 to 18 cities and counties.</li> <li>Summary spreadsheets including each county and city's response to survey questions; helpful data such as sample effective best practices.</li> <li>May be able to obtain collected current practices and standards from each city/county.</li> </ul>
Authorization (e.g., leases and permits) information	FFSL	NA	Yes	–	<ul style="list-style-type: none"> <li>Authorization data pertain directly to easements, general permits, and rights-of-entry on the Jordan River.</li> </ul>	<ul style="list-style-type: none"> <li>Illustrates the types of projects authorized by FFSL that affect river management.</li> <li>Illustrates the locations of projects that affect river management.</li> </ul>
Long range transportation plans	UDOT and Wasatch Regional Council, and Mountainland Association of Governments	Various	Yes	–	<ul style="list-style-type: none"> <li>Planned regional transportation connections to the river.</li> </ul>	<ul style="list-style-type: none"> <li>Indicates future areas of potential public access to the river.</li> <li>Indicates areas where permitting may be required.</li> </ul>
Stream alteration permit data	Utah Division of Water Rights	NA	Yes	Chuck Williamson	<ul style="list-style-type: none"> <li>Permit data pertain directly to projects on the banks of the Jordan River and/or within the river corridor.</li> </ul>	<ul style="list-style-type: none"> <li>Illustrates the type of projects authorized by the Utah Division of Water Rights that affect river management.</li> <li>Illustrates the location of projects that affect river management.</li> </ul>
Water rights data	Utah Division of Water Rights	NA	Yes	Teresa Wilhelmsen	<ul style="list-style-type: none"> <li>Identifies points of diversions along the Jordan River.</li> </ul>	<ul style="list-style-type: none"> <li>Could be method to cross-check FFSL authorizations information.</li> <li>May be synonymous with navigational hazards, bank stability issues, etc.</li> <li>Adds to the complex picture of Jordan River flows and hydrology.</li> <li>Illustrates the location of projects that affect river management.</li> </ul>

## Review of Existing Information

**Table A1.** Existing Information Overview

Document or Data	Author	Date	Update Planned?	Contact	Jordan River Management Nexus	Relevant Components to JRCMP
Salt Lake County Flood Control permit data	Salt Lake County	NA	Yes	Tim Beavers	<ul style="list-style-type: none"> <li>Permit data pertain directly to projects on the banks of and within the Jordan River.</li> </ul>	<ul style="list-style-type: none"> <li>Illustrates the type of projects authorized by Salt Lake County that affect river management.</li> <li>Illustrates the location of projects that affect river management.</li> </ul>
<i>Salt Lake County Jordan River Trail Master Plan</i>	Landmark Design, Inc. Prepared for Salt Lake County Parks and Recreation	2008	Yes (2016)	SL County Parks and Recreation, 801-468-2299	<ul style="list-style-type: none"> <li>Jordan River is a public, navigable waterway.</li> <li>Jordan River is identified as an "Urban Water Trail" and a key recreational element.</li> <li>Uses on, beneath, or above beds of navigable waterways need to be regulated.</li> <li>Current and potential future hazards and impassable elements need to be regulated.</li> </ul>	<ul style="list-style-type: none"> <li>Strategies (Section 2) include developing a continuous river trail, reducing or avoiding hazards, developing designated launches and portages, and discouraging private or unofficial water access points.</li> <li>Urban Water Trail (Section 4) describes river segments, navigational hazards, and provides recommendations for improvement and development.</li> <li>Section 5 discusses development standards to meet plan objectives: water access facilities, water trailheads, water trail signage.</li> <li>Section 6 includes environmental guidelines for the river, banks, and floodplain that may intersect with FFSL authorities.</li> </ul>
Municipal Plans for the Jordan River Corridor, e.g., South Jordan, City of South Salt Lake	–	–	–	–	<ul style="list-style-type: none"> <li>Plans for development, recreation, open space, etc. along the Jordan River.</li> </ul>	<ul style="list-style-type: none"> <li>May identify areas where FFSL permitting would be needed.</li> <li>May identify future water quality issues along the Jordan River.</li> <li>Provide overviews of a city's vision for the river.</li> </ul>
<i>East West Recreational Trails Master Plan</i>	Salt Lake County	In process	–	–	<ul style="list-style-type: none"> <li>Planning for east-west trails and corridors in Salt Lake County that cross or connect with the Jordan River and Jordan River Parkway.</li> </ul>	<ul style="list-style-type: none"> <li>Identifies preferred trail/corridor alignments.</li> <li>Will identify possible trailhead locations and determine rights-of-way.</li> <li>Will define trail connection opportunities to TRAX and FrontRunner stations.</li> </ul>

**Table A1.** Existing Information Overview

Document or Data	Author	Date	Update Planned?	Contact	Jordan River Management Nexus	Relevant Components to JRCMP
<i>Jordan River Basin Planning for the Future</i>	Utah Division of Water Resources (with input from the State Water Plan Coordinating Committee)	2010	–	–	<ul style="list-style-type: none"> <li>Part of the Utah State Water Plan series that provides comprehensive water planning. Intended to guide and direct water-related planning and management in the Jordan River Basin (which includes the Jordan River).</li> </ul>	<ul style="list-style-type: none"> <li>Provides an overview of the Jordan River Basin.</li> <li>Estimates available water supply, identifies water use trends, and makes projections for future water use and needs; data may be applicable to water flows in the Jordan River.</li> <li>Provides a municipal and industrial water conservation goal; summarizes community water conservation plans.</li> <li>Includes a list of BMPs for water conservation.</li> <li>Promotes conjunctive management of surface and groundwater.</li> <li>Includes a section on developing Jordan River water (Chapter 7).</li> <li>Includes a short section on TMDLs in Jordan River (Chapter 8); summarizes some of the pollution issues.</li> <li>Has a map of wetlands in the Jordan River Basin.</li> </ul>
Salt Lake City Riparian Overlay District Ordinance	Salt Lake City Council	2008	–	–	<ul style="list-style-type: none"> <li>Ordinance applies to all property located within 100 feet of the annual high water level of the aboveground portion of the Jordan River (RCO District).</li> </ul>	<ul style="list-style-type: none"> <li>Requires a riparian protection permit for a use or development within the RCO district.</li> <li>Permitted uses are defined in three zones (no disturbance area; structure limit area, buffer transition area). The no-disturbance area abuts FFSL sovereign lands</li> <li>Application process flowchart and permitted use tables may be useful for the JRCMP (FFSL permitting process).</li> </ul>
Municipal plans for the Jordan River Corridor, e.g., South Jordan, City of South Salt Lake	–	–	–	–	<ul style="list-style-type: none"> <li>Plans for development, recreation, open space, etc. along the Jordan River.</li> </ul>	<ul style="list-style-type: none"> <li>May identify areas where FFSL permitting would be needed.</li> <li>May identify future water quality issues along the Jordan River.</li> <li>Provides overviews of a city’s vision for the river.</li> </ul>

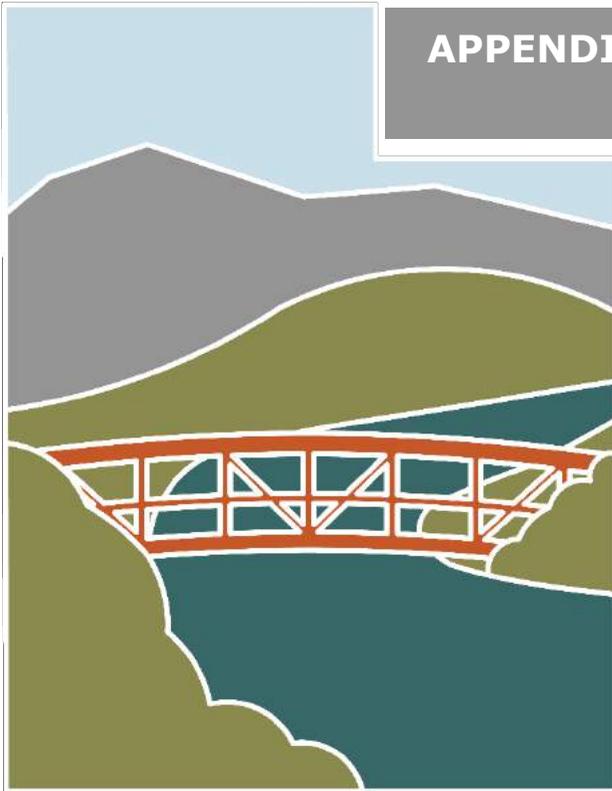
## Review of Existing Information

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## **APPENDIX B. PUBLIC INVOLVEMENT AND PUBLIC CONCERNS**



## APPENDIX B – PUBLIC INVOLVEMENT AND PUBLIC CONCERNS



### Public Involvement

The outreach process for the Jordan River Comprehensive Management Plan (JRCMP) was structured to capture the input and comments from four groups: 1) the general public, 2) stakeholders, 3) municipalities, and 4) the Jordan River Commission. A summary of the outreach process for each group and of the input received is presented below.

#### General Public

Two groups of public participants were invited to the public open house meetings. The first group comprised adjacent property owners. The second group comprised the general public, which consists of a range of people who care for or use the river in myriad ways.

### OPEN HOUSE SERIES #1: PROJECT KICKOFF

The first general public open house series was held during the scoping and information gathering phase of the plan. Three individual open houses were held—one in each of the three counties through which the river flows—and participants were allowed to attend any time during the meetings.

#### PUBLIC OPEN HOUSE: Davis County

**Date and Time:** Thursday, June 11, 2015; 6pm to 8pm

**Location:** North Salt Lake City Hall

**Attendance:** Approximately 14 individuals signed in to this meeting.

#### PUBLIC OPEN HOUSE: Salt Lake County

**Date and Time:** Tuesday, June 16, 2015; 6pm to 8pm

**Location:** Day-Riverside Branch Library

**Attendance:** Approximately 41 individuals signed in to this meeting.

#### PUBLIC OPEN HOUSE: Utah County

**Date and Time:** Tuesday, June 17, 2015; 6pm to 8pm

**Location:** Saratoga Springs Fire Station

**Attendance:** Approximately 13 individuals signed in to this meeting.

During these open houses, materials available for review and comment included eight segment maps that covered the entire length of the river corridor. Participants were asked to participate in any or all of three “questions,” each with a different question or prompt designed to get input concerning their relationship and awareness of the Jordan River and its management. Categories for comments were each tied to a different sticker, as shown in Figure B1 and described below. The same three questions and digital aerial segment maps were also posted on the project webmap, which was available through the project website ([www.jordanrivercmp.com](http://www.jordanrivercmp.com)). The online webmap was open for receiving input and comments from June 4, 2015, to December 21, 2015. Comments were entered by visitors to the website beginning on June 4, 2015; the final comment was logged on August 14, 2015.

A welcome table was set up to greet visitors, to help them understand the purpose of the open house meeting, and to provide them with a general project overview and an understanding of the next steps for the project. An aerial map was provided to allow participants to indicate with a sticker where they live and/or do business in relation to the planning area. This welcome table included a project overview board with the schedule and key dates. Boards with historic images of the Jordan River, its environs, and human interaction with the river were also provided.

## Public Involvement and Public Concerns

### Question #1: Describe your Interaction with the Jordan River

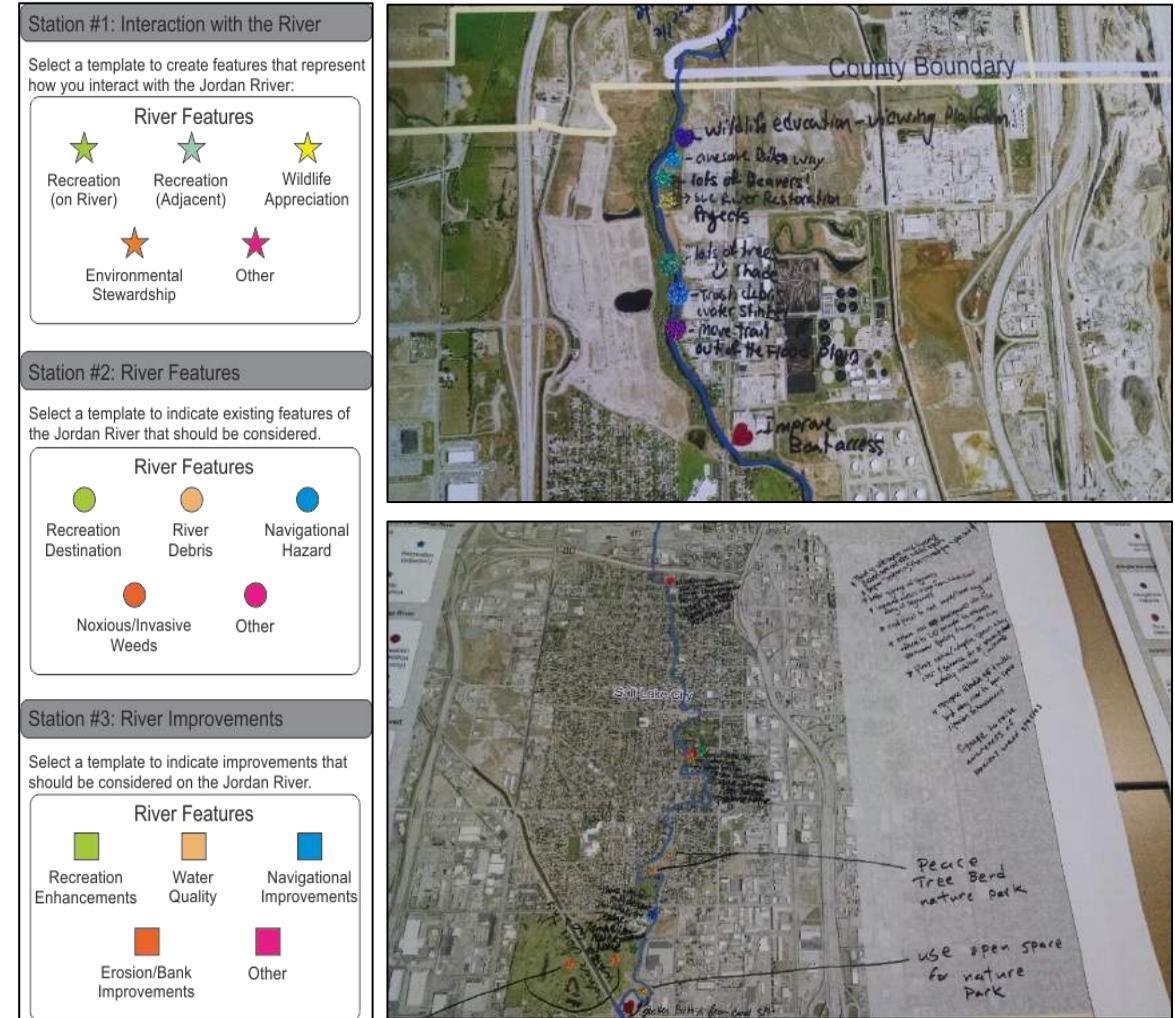
*Description:* Large-format aerial maps were placed on tables with key prompt words and phrases to allow participants to describe how they use and interact with the Jordan River. Categories for comments on types of interaction with the river included the following, each tied to a different sticker, as indicated in parentheses:

- Environmental stewardship (orange star)
- Other (purple star)
- Recreation adjacent to river (blue star)
- Recreation on the river (red star)
- Wildlife appreciation (green star)

### Question #2: Indicate the Conditions of the Jordan River

*Description:* Large-format aerial maps were placed on tables with key prompt words and phrases to allow participants to indicate their knowledge of current conditions of the Jordan River. Categories for comments on current conditions of the river included the following, each tied to a different sticker, as indicated in parentheses:

- Navigational hazards (black circle)
- Other features (purple circle)
- Recreation destination - river only (red circle)
- River debris (orange circle)
- Vegetation stands (green circle)
- Water quality (blue circle)



**Figure B1.** Comment categories and sample photographs of large-format aerial maps from an open house.

**Questions #3: Explain how the Jordan River can be Improved**

*Description:* Large-format aerial maps were placed on tables with key prompt words and phrases to allow participants to indicate their perspectives on how the Jordan River can be improved.

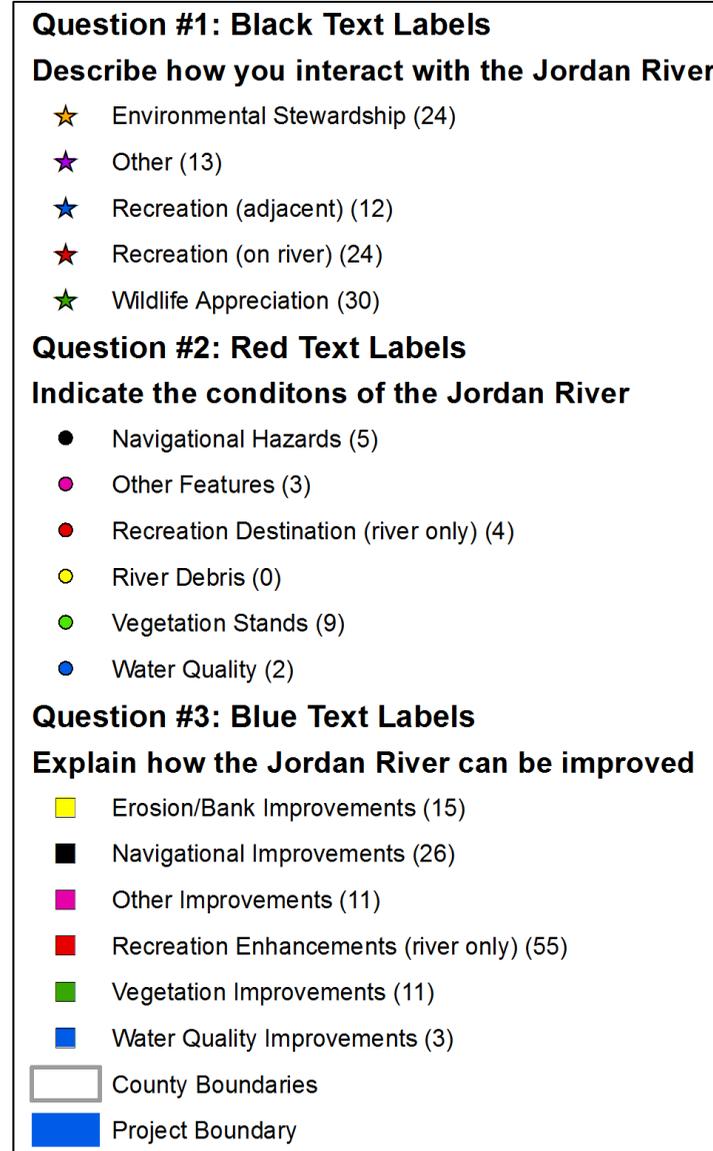
Categories for comments on desired improvements included the following, each tied to a different sticker, as indicated in parentheses:

- Erosion and bank improvements (orange heart/square)
- Navigational improvements (black heart/square)
- Other improvements (purple heart/square)
- Recreation enhancements – on river only (red heart/square)
- Vegetation improvements (green heart/square)
- Water quality improvements (blue heart/square)

Between the public open houses and the online webmap, approximately 280 unique markers were placed on the map related to one of these three questions, with counts for each question listed as follows:

- Question #1: 112 Markers and suggestions
- Question #2: 35 Markers and suggestions
- Question #2: 133 Markers and suggestions

A numerical breakdown of comments for each question’s subcategory is listed in Figure B2. The unique markers are one of the colored stickers (or online equivalent) as noted in the question descriptions above. Comments from the open house #1 series and comments provided online are on Figure B3. Note that no online comments during this initial public scoping session were received after August 15, 2015.



**Figure B2.** Question and subcategory breakdown.

### Additional Written Comments

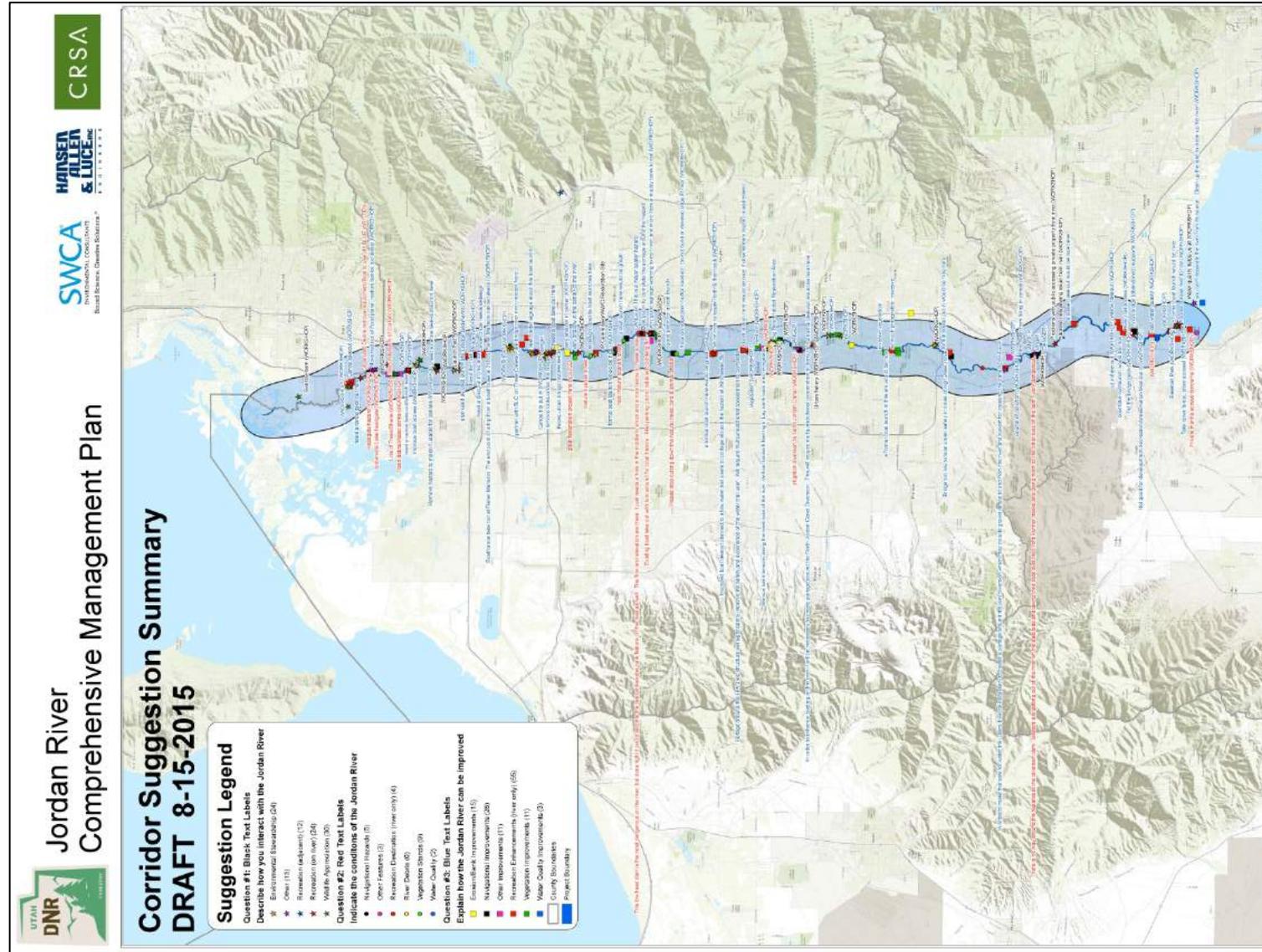
The following written comments were provided on the maps but were not necessarily tied to any specific segment or unique markers:

- Think of alternative ways to manage Russian olives and other invasive species.
- Before “restoring” the river, there is a need for a plan and monetary follow-up.
- Better signage for all segments.
- Improved access and linkage from school sites along all segments.
- Need places to rent kayaks and canoes along the river.
- Ensure new developments within Salt Lake County Parks adhere to low-impact development principles to enhance stormwater quality flowing into river.
- Plant native/adaptive species along the river and enhance for Monarch Butterfly Exhibit (Milkweed).
- Repurpose Glendale Golf Course & Public Land along river to open space riparian enhancements.
- Signage to raise awareness of noxious weed species.
- Need launch sites at reasonable intervals with comprehensive user map noting skill level and hazards. Float trips of hour-long segments, and segments for different user types (skill levels). Without this, users are afraid of accessing river.
- The Salt Lake City area still has too many homeless. Plans are needed to help the homeless relocate.

### Applicability to Comprehensive Planning Process

Although there were many unique comments considered, the planning emphasis focused initially on understanding the overall themes from the process. Coupled with direction provided by FFSL’s steering committee and planning team, general themes informed the baseline for the management strategies in the JRCMP document. Suggestions may have been made that, although perhaps popular, were in conflict with best management practices considered for appropriate management. Suggestions received as the result of the outreach process were organized into the following general categories.

- Invasive plant species are a problem along the river
- Enhance native plant species and improve vegetation
- Lack of signage along river for river users/hard to find information about the river
- Lack of access put in/take out along many segments of river
- Fix hazards on the river
- Encroachment on private property by users a nuisance



**Figure B3.** Comments per map segment from the Public Open House #1 series and from online comments submitted from June to December 2015.

## OPEN HOUSE SERIES #2: DRAFT PLAN REVIEW

After the draft plan was created, a second open house series was held to provide the public an opportunity to learn about the format and structure of the draft plan and how suggestions made during the outreach process informed the plan. Three individual open houses were held, one in each of the three counties through which the river flows. At each open house, an overview presentation was given outlining the contents of the draft plan and the process for creating it.

### PUBLIC OPEN HOUSE: Davis County

**Date and Time:** Thursday, May 26, 2016; 6pm to 8pm

**Location:** North Salt Lake City Hall

**Attendance:** Approximately 2 individuals signed in to this meeting.

### PUBLIC OPEN HOUSE: Salt Lake County

**Date and Time:** Tuesday, May 31, 2016; 6pm to 8pm

**Location:** Day-Riverside Branch Library

**Attendance:** Approximately 28 individuals signed in to this meeting.

### PUBLIC OPEN HOUSE: Utah County

**Date and Time:** Wednesday, May 25, 2016; 6pm to 8pm

**Location:** Saratoga Springs Fire Station

**Attendance:** Approximately 8 individuals signed in to this meeting.

## Stakeholders

Groups and agencies with a defined or established relationship with the Jordan River were invited to participate in a separate stakeholder workshop series.

## WORKSHOP #1: PROJECT OVERVIEW, OCTOBER 7, 2015

At the first stakeholder workshop, 25 individuals signed in representing 23 different organizations, agencies, or departments. At the beginning of the workshop, Laura Vernon from the Utah Division of Forestry, Fire & State Lands (FFSL) provided an overview of the project and the objective of the plan, touching on the following key points:

- State oversight of the Jordan River
- Project schedule and timeline
- Classification system for the Jordan River

A small group workshop format was used to engage stakeholders in a roundtable discussion to provide input and to hear the input of others. Stakeholders were seated at one of five tables with one facilitator and two to four other stakeholders. Facilitators supported the discussion with information on public input to date and information acquired from meetings with municipalities.

Facilitators asked each stakeholder to share the following:

- Current perspectives of each stakeholder's interest in the river
- Desirable strategies for the JRCMP to include and address

A series of three prompt questions and the objectives to achieve were used to facilitate the discussion, as follows:

**Question 1:** What is your group's relationship to the river? Describe the ways your group interacts with the river.

*Objective:* Have the group gain a general understanding of each stakeholder's relationship to the river (utilities, recreation, nature and the environment, etc.).

**Question 2:** Discuss access to and use of the river and what strategies the JRCMP can include to improve the experience. What's working? What's missing? What needs changed?

*Objective:* Gain a more specific understanding of each stakeholder's use of the river (utilities, recreation, nature and environment, etc.). Begin to suggest strategies for the JRCMP.

**Question 3:** Discuss perspectives regarding conditions and areas along the river corridor (areas of interest and areas of concern and what strategies the JRCMP can include that would improve and/or maintain these conditions). What's working? What's missing? What needs changed?

*Objective:* Gain a more specific understanding of each stakeholder's knowledge of the river's conditions (bank erosion, noxious weeds, runoff, debris and hazards, wildlife, etc.) and how their role and relationship as a stakeholder impact the river.

Following this discussion session, stakeholders were then asked to view the eight segment maps, which reflected public input to date, and add any location-specific knowledge about the following:

- Types of interaction they have with the river
- Any known projects that might affect the river
- Knowledge of existing features related to the stakeholder's interaction with the river
- Desired future conditions for the river
- Suggestions on improvements or desired strategies for the JRCMP to include and/or address for management of the river

Key discussion topics and input included the following:

- Water quality
- Toxins and impact on fishing along the river as it flows north
- Access for recreational users
- Hazards on the river for recreational users; safe passage
- Agricultural uses along the river; agriculture/urban agriculture preservation initiative
- Balancing restoration and recreational use of the river
- Respect for the river; improve the perception of the river
- Water rights (delivery to users downstream)
- Education
- Safety (lighting, transient community)
- Visibility
- Bank erosion; pulling banks back for better access, water quality, etc.
- Tributaries
- Native vegetation; invasive plants
- Preservation of critical lands along the river corridor
- Bridges and structures over the river
- Dredging's impacts

Desired outcomes for the JRCMP included the following:

- A document that provides guidance
- Best management practices are only as good as their maintenance and implementation
- Consistency
- Balancing restoration and recreation
- Capture intended future use and conditions framework

### **WORKSHOP #2: REVIEW THE DRAFT PLAN, JUNE 9, 2016**

At the second stakeholder workshop, 17 individuals signed in representing 16 different groups and agencies. Four formal comments were submitted.

A presentation was given that outlined the structure of the plan, the three sections for management of the river's resources, and the system and categories used for classifying the river.

Comments:

1. Clarification sought on restrictions for power pole heights and ensuring conformity with the National Electric Safety code.
2. Inquiry if there was a map or diagram that showed where along the river protected areas are located adjacent to segments of the river that are classified as Class 6.
3. Utah Transit Authority has rail crossings and needs to double-track Front Runner in the Narrows.
4. Concern that the draft plan has not fully addressed the boating community. Feels the outreach to this group of stakeholders was lacking and the boating community has not responded to the public meetings.

### ***Municipalities***

Key members of municipalities were met with individually during the scoping and information gathering phase of the plan and then collectively presented with the draft plan at a joint meeting.

### **DRAFT PLAN OVERVIEW MEETING: JUNE 14, 2016**

At this joint municipal meeting, a presentation providing an overview was given. Seven people from five different municipalities attended. Primary questions and concerns regarding the draft plan were the river classifications and how they related to current and future land uses adjacent to the river. Attendees provided clarification on the current and/or future planned land uses adjacent to the river for the segments in question.

### ***Jordan River Commission***

SWCA and FFSL presented at two monthly Jordan River Commission meetings on May 21, 2015, and on August 4, 2016, to present the project and to describe the content in the draft JRCMP, respectively.

## Public Concerns

The formal 45-day public comment period for the draft JRCMP began on May 23, 2016, and ended on July 8, 2016. Comments could be submitted at the second open house series, online at the FFSL JRCMP website, or by mail. FFSL received eight letters commenting on the draft JRCMP.

Numerous verbal comments were also received at the open house series and at stakeholder workshops. Comments pertain to wildlife species, recreation, access, and public safety, to name a few. From the eight letters, 321 individual comments were extracted for review of acceptance or non-acceptance. Individual comments are numbered per letter number (1–8; Table B1). These individual comments are part of the project record and are available from FFSL upon request. Verbal comments were generally consistent with those provided in the comment letters. All comments are consolidated into 45 public concern statements, accompanied by the individual comment numbers and a response from FFSL. These are organized below by JRCMP chapter and section: General Comments, Chapter 1 Introduction, Chapter 1 River Classification, Chapter 2 Existing Conditions, Chapter 3 Management Goals and Objectives, and Chapter 4 Literature Cited.

**Table B1.** Comment Letter Numbers and Commenter

Comment Letter Number	Extracted Comment Submission Numbers	Commenter
1	1.1–1.3	Metropolitan Water District of Salt Lake & Sandy, Provo River Water Users Association, Utah Lake Distributing Company
2	2.1–2.4	North Jordan Irrigation Company
3	3.1–3.268	Great Salt Lakekeeper
4	4.1–4.21	Elliott Mott, Recreation Stakeholder
5	5.1–5.2	Rocky Mountain Power
6	6.1–6.18	Salt Lake County Fish & Game Association
7	7.1	Todd Stonely, River Basin Planning Section Manager, Utah Division of Water Resources
8	8.1–8.4	Utah Lake Water Users Association

## General Comments

### PUBLIC CONCERN 1

FFSL should provide opportunities for community involvement such as community group stakeholder meetings, public participation in the management of the Jordan River, service projects, and a community steering committee to oversee the JRCMP), evaluate the JRCMP, and raise funds. Further, FFSL should ensure that the JRCMP is consistent with previous plans and should recommend cooperation with related groups such as the Jordan River Watershed Council.

Associated Individual Comments: 3.3, 3.5, 3.6, 3.11, 3.13, 3.15, 3.16

Response: FFSL has met the requirements for public involvement and review under Utah Administrative Code R652-90-600 and has provided opportunities for community involvement as described earlier in this appendix. FFSL has added the Jordan River Watershed Council to Chapter 1. Several previous plans are already discussed in the JRCMP; one additional plan has been added to the Further Reading box in Chapter 1.

### PUBLIC CONCERN 2

FFSL should ensure that the plan creates adequate goal, objective, and strategy statements. Mechanisms for evaluating efforts to fulfill goals and complete objectives, for evaluating various permits, for reporting plan actions, and for allocating resources for implementation of the JRCMP should be clearly defined.

Associated Individual Comments: 3.2, 3.14, 3.17, 3.18, 3.19, 3.20, 3.21

Response: The legal parameters governing FFSL and the JRCMP are well defined. The JRCMP is not required to create mechanisms for plan evaluation, reporting, and resource allocation. Criteria and standards regulating proposals, easements, rights-of-entry, and general permits are summarized in sections 1.7 and 3.1 of the JRCMP. In addition, the JRCMP addresses goals and

objectives in appropriate terms for this level of planning and the planning area, which are limited to sovereign lands associated with the Jordan River. FFSL resources for the permitting process are already in place.

### **PUBLIC CONCERN 3**

FFSL should adequately address additional environmental issues: climate change; threatened, endangered, and sensitive species; macroinvertebrates; navigational hazards; and acquisition of water rights for instream flows.

Associated Individual Comments: 3.7, 3.8, 3.9, 3.10, 3.12

Response: Language has been added to sections where information was missing on these topics (e.g., macroinvertebrates). Management strategies are adaptive in nature, which will allow consideration of climate change in planning processes. Section 2.2 of the JRCMP has a section for special-status wildlife and plant species; the level of detail is sufficient for this level of planning and the planning area. FFSL is unable to hold water rights for instream flows but provides support to the Utah Division of Wildlife Resources, which possesses that ability.

## ***Chapter 1 Introduction***

### **PUBLIC CONCERN 4**

FFSL should provide more information to explain the Public Trust Doctrine, Equal Footing Doctrine, and sustainable management and multiple use. The JRCMP does not identify criteria for meeting plan requirements to protect Public Trust Resources, and it needs to clearly explain the role, authority, and jurisdiction of FFSL in managing lands along the Jordan River (e.g., would FFSL challenge a decision by a local government about lands adjacent to the river if it were inconsistent with the Public Trust Doctrine?). Furthermore, FFSL should address the ownership of the Jordan River bed in relation to the Utah Supreme Court ruling applying a public right-of-way. Some specific multiple uses of the Jordan River were not listed in the JRCMP.

Associated Individual Comments: 3.22, 3.23, 3.24, 3.31, 3.32, 3.33, 3.34, 3.35, 3.36, 3.70, 3.71, 3.72, 3.77

Response: FFSL has added additional explanation for the Public Trust Doctrine, Equal Footing Doctrine, and sustainable management and multiple use in section 1.1. The JRCMP is not required to develop criteria for meeting plan requirements. By law, FFSL's sovereign lands jurisdiction extends from top of bank to top of bank; FFSL has no jurisdiction on adjacent lands beyond this boundary. Discussing legal authority in specific situations or legal remedies is beyond the scope of the plan. FFSL will apply existing law regarding public rights-of-way. The JRCMP is not designed to include an exhaustive list of multiple uses of the Jordan River.

### **PUBLIC CONCERN 5**

FFSL should provide Appendices A–D for public review and comment.

Associated Individual Comments: 3.25, 3.26, 2.27

Response: Appendices were not included in the draft JRCMP that was posted for public comment. As of May 23, 2016—the beginning of the public comment period—the placeholders for proposed appendices were Appendix A (Review of Existing Information and Management of the Jordan River), Appendix B (Summary of Public Involvement), Appendix C (Response to Comment Matrix), and Appendix D (Planning Team). Appendix A includes short document summaries and other information relevant to developing the JRCMP. These data were collated at the beginning of the planning process to better understand issues that might arise during the public involvement process. Appendix A is a shorter list of documents and data than what is presented in Chapter 4 Literature Cited, which was included in the draft JRCMP for public comments and which includes all references used to write the JRCMP. Information for Appendix B (Summary of Public Involvement) and Appendix C (Response to Comment Matrix) was partially finished at this time, with completion dependent on the public comment process. The planning team list proposed for Appendix D is now included in Chapter 1 of the JRCMP.

**PUBLIC CONCERN 6**

FFSL should review and update the JRCMP every 3 to 5 years as opposed to every 10 years.

Associated Individual Comments: 3.28, 3.128

Response: The JRCMP can be amended at any time. This has been clarified in section 1.1 under Drafting the Plan.

**PUBLIC CONCERN 7**

FFSL should more clearly explain the ordinary high water mark (OHWM) zone to clarify the natural river channel versus the modified river channel. Commenter notes that additional mapping of OHWM may be required for leasing and that each local government can authorize land use up to the OHWM.

Associated Individual Comments: 3.29, 3.30, 3.69

Response: Additional information regarding the OHWM has been added to the JRCMP in Chapter 1. The commenter is correct in stating that each local government can authorize land use up to the OHWM.

**PUBLIC CONCERN 8**

FFSL should provide more information on the relationship between FFSL and the U.S. Army Corps of Engineers (USACE), Utah Division of Natural Resources, Utah Division of Water Rights, Utah Department of Water Quality, U.S. Fish and Wildlife Service, Environmental Protection Agency (EPA), and other agencies. FFSL should clearly discuss which agency has authority over certain uses, regulation enforcement, fish and wildlife management, dam permits, Section 404 permits, and discharge permits.

Associated Individual Comments: 3.37, 3.38, 3.39, 3.40, 3.41, 3.42, 3.49, 3.60, 3.64, 3.65, 3.67, 3.68

Response: The authority of state and federal agencies is defined in statute. The JRCMP discusses the management responsibilities of multiple agencies, and additional language has been added for Utah Division of State Parks and Recreation in section 1.3. FFSL cooperates with USACE in permitting.

**PUBLIC CONCERN 9**

The JRCMP should clarify the role of FFSL in the Jordan River total maximum daily load (TMDL) in issuing Section 401 certifications, in issuing discharge permits, and in the EPA 319 program. FFSL should clarify who is responsible for monitoring water quality; responding to illegal discharges, accidents, and spills; and regulating contaminants.

Associated Individual Comments: 3.43, 3.44, 3.45, 3.46, 3.47, 3.48, 3.62

Response: FFSL is a commenting agency with regard to the Jordan River TMDL, issuance of Section 401 Certifications, issuance of discharge permits, and the EPA 319 program. The Utah Department of Environmental Quality is responsible for monitoring water quality and responding to illegal discharges, accidents, and spills. Language regarding U.S. Fish and Wildlife Services' ability to address contaminants was added to section 1.5 of the JRCMP.

**PUBLIC CONCERN 10**

FFSL should clarify the regulatory authorities and jurisdictions of the Utah State Historic Preservation Office, Jordan River Commission, Utah Department of Transportation, Utah Division of State Parks and Recreation, and local governments with regard to the Jordan River. Additional information explaining flood control authority, fire prevention and enforcement authority, and Salt Lake City's Riparian Corridor Overlay District Ordinance should be added to the JRCMP. More information should be added to the plan to clarify the authority of FFSL and individual counties with regard to flood control.

Associated Individual Comments: 3.50, 3.51, 3.52, 3.53, 3.54, 3.55, 3.56, 3.59, 3.73, 3.74, 3.75, 3.76

Response: Chapter 1 of the JRCMP provides a summary of agencies and stakeholders involved with the Jordan River. Because of the length of the river corridor and the complexity of management issues, it is beyond the scope of the plan to define the jurisdiction of every agency or stakeholder. A description of the management responsibilities of the Utah Division of State Parks and Recreation has been added in section 1.3. Table 3.15 has been edited to reflect that the Jordan River Commission does not have management authority (it is listed as an intersecting agency in Chapter 3). Flood control authority and fire responsibilities are defined in statute; FFSL and the counties share flood control authority. The Salt Lake City ordinance does not extend onto sovereign lands.

### **PUBLIC CONCERN 11**

FFSL has not included the Jordan River Watershed Council or the local mosquito abatement districts in the JRCMP planning effort.

Associated Individual Comments: 3.57, 3.58

Response: FFSL included members of the Jordan River Watershed Council as stakeholders in the JRCMP process and invited the mosquito abatement districts to participate in the planning process.

### **PUBLIC CONCERN 12**

FFSL should include the Migratory Bird Treaty Act and Endangered Species Act in the discussion of the U.S. Fish and Wildlife Service. Fish, in addition to birds, should also be included in this discussion. Further, the discussion of the National Park Service (NPS) should be changed to indicate that they do not provide funding.

Associated Individual Comments: 3.61, 3.63, 3.66

Response: FFSL has added text on the Migratory Bird Treaty Act and Endangered Species programs to section 1.5 of the JRCMP. Fish have also been included in the discussion. The language under NPS in section 1.5 has been modified.

### **PUBLIC CONCERN 13**

FFSL should provide more details about lease and permit requirements, processes, and fees, especially easement permit durations and easement review by the Resource Development Coordinating Committee (RDCC). FFSL should also provide more information about the criteria and permitting period for general and right-of-entry permits. The plan lacks detail about the public comment and input process for application and review of these permits, about permit suspension and revocation, and about existing non-permitted uses. In addition, the description of general permits for public and private uses of sovereign lands does not include all uses.

Associated Individual Comments: 3.78, 3.79, 3.80, 3.81, 3.82, 3.83, 3.84

Response: The FFSL permitting process, permit durations, and permit requirements are established by statute or rule. A summary of this information is contained in section 1.7 of the JRCMP. Statute, rules, and policy outline the notice requirements for issuance of permits, including right-of-entry permits and associated fees, and the length of time FFSL is authorized to issue permits for. Public review is not required for these types of easements and permits (a public comment period is currently not required by state law). FFSL would like to bring existing, non-permitted structures into compliance. The list of general permit use activities is not meant to be a comprehensive list, as indicated by use of the word “include,” which implies a partial list.

**PUBLIC CONCERN 14**

FFSL should clarify the parameters used to distinguish river classes and expand the descriptions of each river classification. Specifically, FFSL should address why existing Class 1 structures are protected without a lease. Further, Utah Administrative Code R652-70-200 does not address all categories of Table 1.1 in which it is cited.

Associated Individual Comments: 2.1, 3.85, 3.86, 3.87, 3.88, 5.1

Response: Parameters are only intended to provide an example of a parameter to FFSL during the classification process. FFSL intends to bring permanent structures without a lease into compliance. The JRCMP cites Utah Administrative Code R652-70-200 only for description of the use classes and does not make a link between examples and parameters and this section of the Utah Administrative Code. The parameters were developed as part of the planning process in an effort to classify segments of sovereign lands consistently along the river to the greatest extent possible.

**PUBLIC CONCERN 15**

The JRCMP should clarify the relationship of FFSL to local municipalities and local governments with regard to conditional uses, variances, projects on adjacent lands, master plans, and applications that impact river corridors.

Associated Individual Comments: 3.89, 3.90, 3.91, 3.92

Response: FFSL's permitting structure is specific to the division and to sovereign lands; proposed activities within this area must go through the FFSL permitting process. The FFSL permitting structure does not and is not required to share the same permitting process as local municipalities. FFSL will participate in local government decisions when requested or as necessary. Local governments will decide if FFSL designations should be included in master plans.

**Chapter 1 River Class Changes****PUBLIC CONCERN 16**

Various changes were requested in the river segment classifications. Clarification of specific classifications and the inclusion of additional structures along the river were also requested.

Associated Individual Comments: 1.2, 1.3, 2.2, 3.93, 3.94, 3.95, 3.96, 3.97, 3.98, 3.99, 3.100, 3.101, 3.102, 3.103, 3.104, 3.105, 3.106, 3.107, 3.108, 3.109, 3.110, 3.111, 3.112, 3.113, 3.114, 3.115, 3.116, 3.117, 3.118, 3.119, 3.120, 3.121, 3.122, 3.123, 3.124, 3.125, 3.126, 3.127, 5.2, 8.1, 8.2, 8.3, 8.4

Response: FFSL evaluated all comments regarding the river segment classifications and made changes that were deemed appropriate. For river classification, FFSL used the parameters outlined in Table 1.2. Additional explanation for each individual comment can be found in the comment matrix, which is available as part of the project record. FFSL also expressed willingness to attend commenter-requested meetings to discuss specific segment classifications.

**Chapter 2 Existing Conditions****PUBLIC CONCERN 17**

Commenters requested various changes to the seven planning area habitat descriptions (aquatic, wetland, annual grassland, agriculture, developed, shrubland, and riparian) contained in Figures 2.7–2.13. These comments mostly consisted of requests to add or remove specific animal and plant species from the lists, reorganize or change species categories, and to add scientific names to all common species names. Requests for clarification of the riparian habitat description were also included.

Associated Individual Comments: 3.129, 3.130, 3.131, 3.132, 3.133, 3.134, 3.135, 3.136, 3.137, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, 6.14

Response: FFSL vetted final plant and animal lists with state agency personnel and local experts. They have been modified as appropriate. Scientific names are included when a species is first mentioned in the plan, then the common name is used thereafter. Some figures were modified to reflect comments. Note that species lists in the figures are not intended to be complete, but to provide examples of wildlife or plants that occupy these habitat types. Designations of cold water and warm water fisheries are useful from a management perspective.

### **PUBLIC CONCERN 18**

FFSL should add more detail to the native plant species list and discussion. In addition, FFSL should expand the discussion of current conditions for introduced, invasive, and noxious plant species.

Associated Individual Comments: 3.138, 3.139

Response: Recommended species lists can be used as a guide when planning restorative projects (discussed further in Native Plant Species in section 2.2). Providing additional information on native species is beyond the scope of the JRCMP. FFSL has included some current condition information in Introduced, Invasive, and Noxious Weed Species in section 2.2, but further mapping of these species was outside the scope of this plan. Additional information was added for specifically requested invasive and noxious plants.

### **PUBLIC CONCERN 19**

FFSL should add information to the areas of focus description, including instream structure, head-cutting, and bank cut stabilization. There are areas of cut banks in Utah County Segment A, which are not represented in Figure 2.19. Additionally, quantification of degraded areas with a comparison to restored areas should be included in the JRCMP.

Associated Individual Comments: 3.140, 3.141, 3.142

Response: FFSL has selected areas of focus that are the most important for restoration but does not exclude other areas of potential restoration. Bank stabilization was added to Utah County Segment A of Figure 2.21 (formerly Figure 2.19). The quantification of degraded areas is beyond the scope and budget of the plan. Figure 2.21 shows areas with restoration potential and current or completed restoration and mitigation sites.

### **PUBLIC CONCERN 20**

A number of changes were requested to Tables 2.5–2.9 and Figure 2.2, which describe wildlife species along the Jordan River. These comments were mostly requests to make changes related to specific species on these lists, indicator species, questions regarding the sources of species counts, and some specific references to beaver and carp. Commenters requested that a beaver management plan be included in the JRCMP, that carp in the Jordan River be quantified, and that changes to the language describing methods of carp control be made.

Associated Individual Comments: 3.143, 3.144, 3.145, 3.146, 3.147, 3.148, 3.149, 3.150, 6.15, 6.16

Response: Information contained in the species lists, particularly the bird list, is not meant to be an all-inclusive. The lists represent the results of existing sampling data. FFSL has added two bird survey locations as requested (see JRCMP Figure 2.24 and Bird Species in section 2.2). Modifications have been made to species lists in section 2.2 for consistency, and requested edits have been made to differentiate between channel catfish and black bullhead (catfish). With regard to beaver, FFSL acknowledges that the addition of a beaver management plan would help reduce problems but notes that this is outside the scope of the JRCMP. Quantification of carp numbers is outside the scope of the plan, but additional language was added to clarify methods of carp control.

**PUBLIC CONCERN 21**

FFSL should add information related to historic channels, spring water, and irrigation to the JRCMP.

Associated Individual Comments: 3.151, 3.152, 3.153, 3.154

Response: The addition of historic river channel maps would not aid in management of today's river channel by FFSL. Spring information was added to Surface Water Flow in section 2.3.

**PUBLIC CONCERN 22**

FFSL should more clearly define the public and provide a list of who was invited to take part in the planning group. Further, FFSL should explain why the public was not invited to be part of the planning group.

Associated Individual Comments: 3.155

Response: The first few pages of this appendix (Appendix B) provide additional information on the stakeholder groups. All members of the public had opportunities to participate in the planning process; no one was excluded.

**PUBLIC CONCERN 23**

FFSL should acknowledge that poorly placed infrastructure can negatively impact the resource, inhibit navigation, and detract from aquatic beauty and the public recreation experience. Criteria for infrastructure placement should be established. Bridges along the Jordan River should be quantified. Utilities should be better defined and their danger discussed in detail. The effects of outfall structures and dams on recreational boating should also be discussed.

Associated Individual Comments: 3.156, 3.157, 3.158, 3.159, 3.160, 3.161

Response: Infrastructure placement will be evaluated on a permit-by-permit basis and will vary depending on the river class. Criteria for new infrastructure placement are included in the infrastructure best management practices (BMPs). Text has been modified in section 2.4 of the JRCMP to further address the impacts of bridges, outfalls, and dams. Bridge data will be available in the Esri story map and geographic information systems (GIS) spatial data viewer on FFSL's website; users of these features will be able to quantify the bridges. Clarification has been added to the text under Utility Crossings in section 2.4. Note that the BMPs for infrastructure in Chapter 3 state that new utilities crossing the river should be buried according to the below-grade utility BMPs. If above-ground utilities must be installed, they should be attached to existing infrastructure and not placed on the bed of the channel. The JRCMP is not intended to include an exhaustive list of safety or navigational hazards.

**PUBLIC CONCERN 24**

FFSL should expand the description of how levees affect river function and specify activity regulations along levees. USACE is involved with setting levee standards and regulations. FFSL should add missing portions of the levee system to Table 2.16.

Associated Individual Comments: 3.162, 3.163, 3.164

Response: This section of the JRCMP is designed to discuss current conditions and is not meant to be an explanation of how infrastructure impacts the river, which can be found in other sources. No additions were made to Table 2.16 because the levee information in the JRCMP consists of levees permitted by Federal Emergency Management Agency; unpermitted levees are not included.

### **PUBLIC CONCERN 25**

FFSL should clarify descriptions of boating, fishing, and other recreation activities. Specifically, language should be added to emphasize boaters' needs for a hazard-free, aesthetic, natural, and clean experience on the Jordan River. Boating and fishing should be discussed separately; swimming and wading should be listed in this section. Further, portages should be included as boater access points.

Associated Individual Comments: 3.166, 3.167, 3.168, 3.169, 3.171, 3.172. 4.21

Response: FFSL has added text to Recreation in section 2.4 to clarify the needs of recreational users; the JRCMP is not designed to provide an exhaustive list of the needs of boaters. Boating and fishing have been separated. Public safety and navigational hazards are discussed in Public Safety in section 2.4. Portages consist of two boater access points and are defined separately in the second paragraph under Boating in section 2.4. Swimming and wading are not considered major recreational uses of the Jordan River.

### **PUBLIC CONCERN 26**

FFSL should expand the discussion of the water trail system. Specifically, FFSL should include the navigational hazards assessment. In addition, a goal and objective should be added to update the preliminary water trail master plan within the *Jordan River Trail Master Plan* so that it becomes part of the planning done for other counties. One commenter stated that the *Jordan River Trail Master Plan* is largely out of date because communities have been built out since the publication of the plan.

Associated Individual Comments: 3.170, 3.173, 3.177, 3.178, 4.2

Response: FFSL incorporated available data for the water trail system, including information from the *Jordan River Trail Master Plan* (Landmark Design, Inc. 2008), information from local municipalities, unofficial water trail maps, and common boat access points received at the second round of open houses. The *Jordan River Trail Master Plan* contains a chapter on the water trail and a chapter on trail development standards, which includes the surface and water trail; FFSL believes it is an appropriate document to reference. FFSL was unable to find a copy of the unpublished Jordan River navigational hazards removal and recreational boating plan. There is no need to expand discussion of the water trail system or to add a goal to update the preliminary water trail master plan within the *Jordan River Trail Master Plan*, because FFSL is not responsible for the water trail master plan and is only responsible for the permitting of elements such as boat ramps that are part of the plan.

### **PUBLIC CONCERN 27**

FFSL should change the text describing the northern section of the river as “essentially a non-stop with numerous boater access points and portages” because it is not true. Commenters also requested several edits to Figures 2.41–2.46, including a change to the photograph chosen for Figure 2.43. One commenter noted that the fishing locations need to be edited.

Associated Individual Comments: 3.174, 3.175, 3.176, 3.179, 3.180, 3.181, 3.182, 3.184

Response: The source of the referenced comment is Bob Thompson, Program Manager, Salt Lake County, Watershed Planning and Restoration; the text has been modified. No particular edits were suggested for the figures, except for Figure 2.43; therefore, no changes were made. FFSL has already chosen a picture for Figure 2.43 (now Figure 2.49). No additional data on hot fishing spots were provided by the commenter or by other public comments; no change was made.

**PUBLIC CONCERN 28**

FFSL should amend the discussion of water quality to address its impact to public safety (the commenter stated that boating is a primary contact use). FFSL should also expand the discussion of public safety to include vegetation management strategies by local agencies and governments to increase visibility to reduce public safety concerns. The discussion of FFSL camping regulations needs to be clarified.

Associated Individual Comments: 3.183, 3.185, 3.186

Response: As discussed in Table 3.7, FFSL has water quality goals that focus on minimizing pollutant loads and promoting the antidegradation of Jordan River water quality. Water quality is part of FFSL's multiple-use framework. However, FFSL has no authority to decide the beneficial uses of the river. FFSL can only address landscaping and vegetation management strategies within their jurisdiction and has no authority over the actions of local governments and agencies outside of sovereign lands. The prohibition of camping refers to camping on the banks or bed of the river that are within FFSL jurisdiction (top of bank to top of bank).

**PUBLIC CONCERN 29**

FFSL should more clearly define education and the list of user groups that can benefit from education as described in Figure 2.48. FFSL should include the Jordan River Natural Areas Forum nature center master plan and the Great Salt Lakekeeper education program. The JRCMP should also include more research from wastewater treatment facilities, the U.S. Geological Survey, and universities.

Associated Individual Comments: 3.187, 3.188, 3.189, 3.190

Response: Education is explained in the first paragraph in Education in section 2.4. Signage and maps are also discussed in this section, and several educational facilities are listed. The list in Figure 2.54 (formerly Figure 2.48) is not intended to be all-inclusive but includes the primary groups. Text has been added to the Education section for the Jordan River Natural Areas Forum and its strategic plan. No information on educational programs was found on the Great Salt Lakekeeper website. However, information on Great Salt Lakekeeper canoe tours was added to Boating in section 2.4. A review of existing information and research was conducted as part of the development of the JRCMP. Key data were included in the JRCMP, and a summary is provided in Appendix A of the JRCMP.

**Chapter 3 Management Goals and Objectives****PUBLIC CONCERN 30**

FFSL should refine and improve the navigation, fish and wildlife, aesthetic, public recreation, and water quality strategies. Some strategies should be given more priority. The water quality strategy should be expanded to discuss beneficial uses, discharge permits, stormwater, pollution, and its relationship to recreation and wildlife.

Associated Individual Comments: 3.191, 3.192, 3.193, 3.194

Response: Most of the comments did not suggest a particular edit, so no changes were made. No single element of the Public Trust can be given more priority than another. The strategies are general and not intended to be detailed. Water quality is naturally tied to fish and wildlife habitat and recreation. Improved water quality will result in improved wildlife habitat and better recreation. This does not need to be discussed in detail.

### **PUBLIC CONCERN 31**

Multiple specific edits were requested to Table 3.1.

Associated Individual Comments: 3.195

Response: Table 3.1 has been modified to address additional proposed actions. Actions presented to FFSL not listed in Table 3.1 will be reviewed on a case-by-case basis to arrive at a use determination.

### **PUBLIC CONCERN 32**

FFSL should amend the language describing desired future conditions, goals and objectives, and BMPs. Specifically, desired future conditions should reflect what the resource should look like in the future, which is a return to natural conditions as much as practical. Goal and objective statements should be in a format that can be evaluated, and strategy statements should be added. The description of BMPs should address whether BMPs are equivalent to standards or criteria.

Associated Individual Comments: 3.196, 3.197, 3.200, 3.201

Response: The plan defines desired future conditions on the first page of Chapter 3; the desired future conditions in the JRCMP are consistent with this definition. A return to pristine natural conditions is impossible because of the developed nature of the Jordan River corridor. However, the desired future conditions for ecosystem resources recognizes the importance of diverse populations of native plant and animal species, as well as the importance of existing natural and wild areas. They also recognize the need to avoid anthropogenic disturbance to the extent practicable. The goal and objective statements in the JRCMP are appropriate for this level of planning and the planning area. The plan is not required to develop strategy statements. BMPs are methods or techniques that can be implemented to protect resources and the elements of the Public Trust. They can be structural or process related. Whether they are equivalent to standards or criteria depends on the definition for standards and criteria. Projects will be reviewed for adherence to BMPs.

### **PUBLIC CONCERN 33**

FFSL should expand the discussion of coordination with government agencies to better define coordination and to clarify the role of specific agencies and the public in this process.

Associated Individual Comments: 3.198, 3.199

Response: FFSL focuses primarily on state agencies in the Utah Departments of Natural Resources and Environmental Quality. Some other state and local entities are added as appropriate. The format has been effective in the Great Salt Lake Comprehensive Management Plan. Omission of specific entities does not preclude management coordination. In addition, the public is always welcome to provide input and has been encouraged to participate in this planning process. Note that coordination occurs between divisions as site-specific concerns arise and during the RDCC process.

### **PUBLIC CONCERN 34**

FFSL should revise Table 3.2 to include mitigation, BMPs, and specific management concerns for each river class.

Associated Individual Comments: 3.202

Response: BMPs are listed for each resource discussed in the JRCMP rather than for each class. This allows for more specific BMPs and the flexibility to implement a variety of BMPs for a particular permit. Mitigation is discussed as appropriate for each class and in the BMPs.

### **PUBLIC CONCERN 35**

FFSL should expand the goals and objectives related to wildlife habitat. Objectives should be more specific and measureable. BMPs for wildlife habitat are not specific enough and should include practices that manage use by people. FFSL should develop a plan for habitat protection and a plan for weed management.

Associated Individual Comments: 3.203, 3.204, 3.205, 3.206, 3.207, 6.18

Response: The goal and objective statements in the JRCMP are appropriate for this level of planning and the planning area, which is limited to sovereign lands associated with the Jordan River. The plan outlines broad goals and objectives to allow for management consistency, flexibility, and protection of the public trust. The objectives are measurable in qualitative terms, which is adequate for this level of planning and the planning area. The BMPs provide more specificity and have been written to provide consistency and flexibility during the permitting process, while protecting the resource. FFSL has chosen BMPs that will benefit wildlife habitat. FFSL generally does not have jurisdiction of the surface trail where many people recreate. Development of plans for habitat protection and weed management is outside the scope of this planning process.

### **PUBLIC CONCERN 36**

FFSL should expand the goals and objectives related to wildlife species. Objectives should be more specific and measurable. BMPs for wildlife species are insufficient to protect, enhance, and preserve native wildlife populations.

Associated Individual Comments: 3.208, 3.209, 3.205, 3.210, 3.211

Response: The goal and objective statements in the JRCMP are appropriate for this level of planning and the planning area, which is limited to sovereign lands associated with the Jordan River. The plan outlines broad goals and objectives to allow for management consistency, flexibility, and protection of the public trust. The objectives are measurable in qualitative terms, which is adequate for this level of planning and the planning area. The BMPs provide more specificity and have been written to provide consistency and flexibility during the permitting process, while protecting the resource. Recognizing the importance of native fisheries and migratory bird species and their habitats in the JRCMP indicates that this is a priority for FFSL.

### **PUBLIC CONCERN 37**

FFSL should expand the goals and objectives related to water resources, including hydrology and water quality. The lists of desired future conditions are not sufficient to protect water resources and should not include minimum instream flows. Objectives should be more specific and measurable. BMPs for water resources are not specific enough and do not establish criteria or standards. The language describing resource management by river class in Table 3.5 should be revised to clarify the impact on management.

Associated Individual Comments: 2.3, 3.212, 3.213, 3.214, 3.215, 3.216, 3.217, 3.218, 3.219, 3.220, 3.221, 3.222, 3.223, 3.224, 3.225, 3.226, 3.227

Response: Water quality is addressed in section 2.3 of Chapter 2. FFSL must work within the framework of the existing designated beneficial uses for desired future conditions; FFSL has no authority to designate beneficial uses. In addition, FFSL does not have jurisdiction over water rights as part of their mandate. On the matter of instream flows, FFSL supports naturalized seasonal flows in the river and establishment of minimum instream flows where water rights are available and if they were held by a suitable agency such as the Utah Division of Wildlife Resources.

The goals, objectives, and desired future conditions in the JRCMP are appropriate for this level of planning. FFSL believes that the goals, objectives, and desired future conditions are sufficient to protect the Public Trust. The JRCMP outlines broad goals and objectives to allow for management consistency, flexibility, and protection of the Public Trust. The objectives are measurable in qualitative terms, which is adequate for this level of planning and the planning area. The BMPs provide more specificity and have been written to provide consistency and flexibility during the permitting process, while protecting the resource. Language in Table 3.5 is consistent with management direction. When development is proposed in a certain class, FFSL will use the class management information to make appropriate decisions for that class and maintain consistency with all decisions.

### **PUBLIC CONCERN 38**

FFSL should expand the goals and objectives related to infrastructure. Objectives should be more specific, cover other resource topics, establish criteria, and be measureable. Goal 3 is not consistent with the 1971 Parkway Plan. BMPs for infrastructure are not specific enough and do not fully explain the issues related to dam design, location, and construction.

Associated Individual Comments: 3.228, 3.229, 3.230, 3.231, 3.232, 3.233, 3.234, 4.3, 3.235, 3.236, 3.237, 3.238

Response: The goals, objectives, and desired future conditions in the JRCMP are appropriate for this level of planning and the planning area, which is limited to sovereign lands associated with the Jordan River. FFSL believes that these goals and objectives are sufficient to preserve the Public Trust. Note that the JRCMP outlines broad goals and objectives to allow for management consistency, flexibility, and protection of the public trust. The objectives are measurable in qualitative terms, which is adequate for this level of planning and the planning area. Discussion of resource issues outside of infrastructure can be found in other sections of the JRCMP. The JRCMP recognizes the *Blueprint Jordan River* (Envision Utah 2008), and one of the goals of *Blueprint Jordan River* was to update the 1971 Parkway Plan. The BMPs have been written to provide consistency and flexibility during the permitting process, while protecting the resource. They are not expected to cover all issues related to infrastructure, but are designed to cover the most common issues and protect the Public Trust. FFSL will evaluate other infrastructure issues on a case-by-case basis. A BMP has been added to address unpermitted infrastructure (see Figure 3.6).

### **PUBLIC CONCERN 39**

FFSL should revise the cultural resource goal to better protect cultural resources and to lead to the creation of measurable objectives. Objective statements are not measurable and do not include groups such as the Native American tribes or institutions such as the University of Utah. Additional BMPs should be added to the cultural section to adequately protect the Public Trust resources. Also, the current conditions section should include cultural resource sites such as Galena property, Tithing Hill, and the bridge crossing in Lehi.

Associated Individual Comments: 3.165, 3.239, 3.240

Response: The goal and objective statements in the JRCMP are appropriate for this level of planning and the planning area, which is limited to sovereign lands associated with the Jordan River. The plan outlines broad goals and objectives to allow for management consistency, flexibility, and protection of the Public Trust. The objectives are measurable in qualitative terms, which is adequate for this level of planning and the planning area. Goals and objectives are also not meant to cover every issue individually. The BMPs provide more specificity. In addition, the objectives align with federal and state laws regarding cultural resources. The noted cultural sites are either outside of the JRCMP planning process Class I search area or are not documented historic properties/cultural sites or sites listed on the National Register of Historic Places.

### **PUBLIC CONCERN 40**

FFSL should expand the recreation objectives and goals to more clearly protect and restore recreational opportunities and to guide FFSL in its management responsibilities. Objective statements should have measureable outcomes that can be used to develop a comprehensive water trail map or a database of recreational infrastructure. Additional BMPs should be added to the recreation section to adequately protect the Public Trust resources. FFSL should develop an implementation plan for recreational infrastructure. In addition, FFSL should create standards and guidelines for interpretive signage that is consistent throughout the river corridor.

Associated Individual Comments: 3.241, 3.242, 3.243, 3.244, 3.245, 3.246

Response: The goal and objective statements related to recreation in the JRCMP are appropriate for this level of planning and the planning area, which is limited to sovereign lands associated with the Jordan River. The plan outlines broad goals and objectives to allow for management consistency, flexibility, and protection of the Public Trust. The objectives are measurable in qualitative terms, which is adequate for this level of planning and the planning area. The BMPs provide more specificity. In addition, goals, objectives, and BMPs are not meant to cover every

recreation issue individually. They were developed to cover the most common issues. This planning process will result in a publicly available GIS spatial data viewer and Esri story maps on the FFSL website that will show the locations of recreational infrastructure along the river, along with other data layers. Development of an implementation plan for recreational infrastructure is outside the scope of the JRCMP. Most of the surface trail is outside FFSL jurisdiction, as is the placement of most associated signage.

Note that FFSL must ensure that all uses on, beneath, or above the bed of the Jordan River are regulated to ensure protection of the Public Trust: navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality. No one element has priority. As long as protection of the Public Trust occurs, development can be permitted.

#### **PUBLIC CONCERN 41**

FFSL should revise the goals and objectives for access to be more specific and result in measurable outcomes, such as developing a database of access points. BMPs should be expanded to better address standards for design, location, and construction of access infrastructure. Bridges should be designed so that boards run perpendicular to the direction of travel and should not splinter or become slippery when wet. Owners of bridges should agree to be responsible for upkeep and maintenance. The BMPs for access and recreation are not sorted correctly.

Associated Individual Comments: 3.247, 3.248, 3.249, 3.250, 4.4, 4.5, 3.251, 3.252,

Response: The goal and objective statements in the JRCMP are appropriate for this level of planning and the planning area, which is limited to sovereign lands associated with the Jordan River. The plan outlines broad goals and objectives to allow for management consistency, flexibility, and protection of the public trust. Goals and objectives are not meant to cover every issue individually. The objectives are measurable in qualitative terms, which is adequate for this level of planning and the planning area. The BMPs provide more specificity. This planning process will result in a publicly available GIS spatial data viewer and Esri story maps on the FFSL

website that will show the locations of recreational infrastructure along the river, along with other data layers. BMPs for design, location, and construction of infrastructure are part of the JRCMP. With regard to the bridge suggestions, FFSL can comment on project design but their primary concern is protecting the Public Trust. Maintenance can be required by FFSL for new projects and leases on sovereign lands. BMPs that address limiting access and preventing clutter can be found in Figures 3.8 and 3.9. FFSL evaluated the access and recreation BMPs to ensure each is listed under the correct topic.

#### **PUBLIC CONCERN 42**

FFSL should modify the public safety goals and objectives to better address public safety concerns. BMPs should be expanded and are too scattered topically. Commenters also specified the following changes to public safety: 1) boat access and fishing access should not be combined; 2) NPS's *Logical Lasting Launches Design Guidance for Canoe and Kayak Launches* (NPS 2004) should only be viewed as an informational source because it is not designed to address local conditions; 3) floating boat docks should not be encouraged on the Jordan River; 4) boat access needs to be improved up and down the Jordan River; 5) boat access points should be placed near the Jordan River Trail so that boaters can use their bicycles; 6) pathways should be designed to address flooding issues, blind corners, bridge width, and bridge signage for water trail users; 7) areas upstream from low-head dams should be scheduled for regular dredging; 8) property owners of structures across the Jordan River with supporting pylons should agree to maintain clear and safe water trail lanes; and 8) low-head dams should be clearly identified and signed as water trail safety hazards.

Associated Individual Comments: 3.253, 3.254, 3.255, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.19, 4.20, 4.21

Response: The goal and objective statements in the JRCMP are appropriate for this level of planning and the planning area, which is limited to sovereign lands associated with the Jordan River. The plan outlines broad goals and objectives to allow for management consistency,

flexibility, and protection of the Public Trust. In addition, goals and objectives are not meant to cover every issue individually. Text and BMPs have been added and edited in Figures 3.8–3.10 and Table 3.13 to address the concerns identified by commenters. Text has also been added to Chapter 2, section 2.4.

In addition to the edits, removal of navigational hazards is addressed as an objective under Goal 1. Note that the infrastructure BMPs discuss standards for infrastructure development. FFSL evaluated the community resources BMPs to ensure each is listed under the correct topic. Dredging is primarily done by the Salt Lake County, although state code also provides this authority to FFSL. Maintenance can be required of land-use applicants by FFSL for new projects and leases on sovereign lands. FFSL’s permit requirements are defined by statute and rule and the Public Trust Doctrine, and FFSL typically does include maintenance requirements in their permits. Table 3.13 contains the objective of collaborating with partners on the installation of a consistent and clear signage system to identify potential navigational hazards in the river. Table 3.12 also contains an objective for signage.

### **PUBLIC CONCERN 43**

FFSL should expand the education goals and objectives to better guide FFSL in its management responsibilities. FFSL should add education objectives that are measurable, outcome-oriented statements that can be evaluated over time. BMPs for education are insufficient and need to be sorted and rewritten.

Associated Individual Comments: 3.256, 3.257, 3.258, 3.259, 3.260

Response: The goal and objective statements in the JRCMP are appropriate for this level of planning and the planning area, which is limited to sovereign lands associated with the Jordan River. The plan outlines broad goals and objectives to allow for management consistency, flexibility, and protection of the Public Trust. In addition, goals and objectives are not meant to cover every issue individually. The objectives are measurable in qualitative terms, which is adequate for this level of planning and the planning area. The BMPs provide more specificity.

### **PUBLIC CONCERN 44**

FFSL should modify the definition for the use determination “not allowable (N)”. The current definition for N, requiring a site-specific analysis to permit a proposed use, is more appropriate for the “potentially allowable (P)” use determination.

Associated Individual Comments: Verbal comment during discussions with stakeholders and the planning team

Response: The definition for N was changed to “the proposed use will not be permitted unless the JRCMP is amended.” The definition for P was changed to “a site-specific analysis is required to determine project feasibility and mitigation opportunities.” The use definition changes resulted in fewer uses categorized as N because of its restrictive nature.

## ***Chapter 4 Literature Cited***

### **PUBLIC CONCERN 45**

Commenters requested that several specific documents be added and referenced in the JRCMP. One commenter requested the addition of aerial photos of the historic Jordan River. One commenter requested an update to the final version of the Utah Division of Water Resources' *Jordan River Basin – Planning for the Future* document.

Associated Individual Comments: 3.263, 3.264, 3.265, 3.266, 3.267, 3.268, 7.1

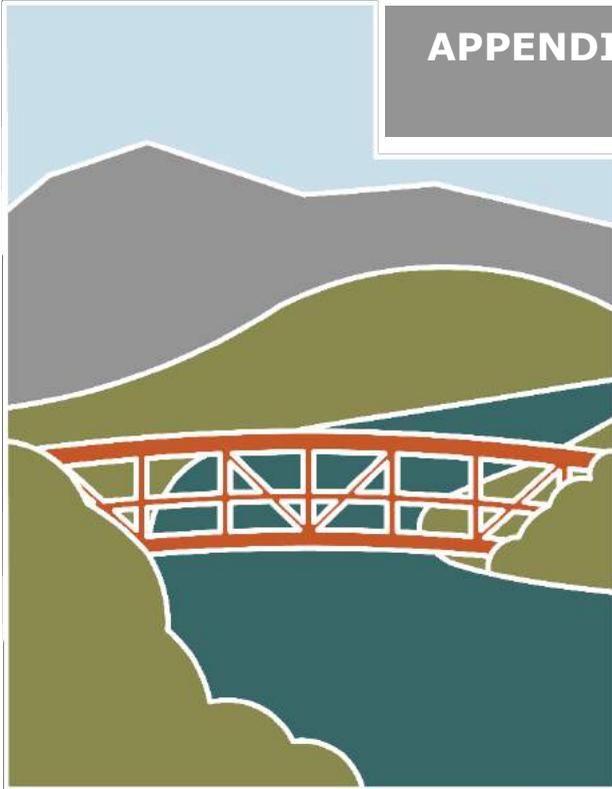
Response: *Literature cited* refers to documents used to develop the JRCMP. Studies that were not used to develop the plan were not added. Historic river channel maps, beyond what are already included, would not aid today's management of the river by FFSL, which is based on the current river channel; this addition is not necessary. FFSL made the requested update to citation for the *Jordan River Basin – Planning for the Future* document (Utah Division of Water Resources 2010).

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## **APPENDIX C. LIST OF PREPARERS**



## APPENDIX C – LIST OF PREPARERS



**Table C1.** List of Preparers for the Jordan River Comprehensive Management Plan

First Name	Last Name	Title
<b>SWCA Environmental Consultants</b>		
Brian	Nicholson	Project Manager
Gretchen	Semerad	Deputy Project Manager
Linda	Burfitt	Technical Editor
Kari	Chalker	Managing Editor
Lindsay	Hart	Graphic Designer
Rachel	Johnson	Geographic Information Specialist
Stephanie	Lechert	Cultural Resource Specialist
Lauri	Logan	Graphic Designer
Audrey	McCulley	Plant Resources Specialist
Anne	Oliver	Architectural Historian
Lucy	Parham	Water Resources Specialist
John	Pecorelli	Layout and Graphic Designer
Thomas	Sharp	Wildlife Resources Specialist
Debbi	Smith	Formatter
Allen	Stutz	Geographic Information Specialist
<b>CRSA</b>		
J. Kelly	Gillman	Senior Principal
Melissa	Fryer	Urban Planner and Landscape Designer
Susie	Petheram	Associate Principal, Planner
<b>Hansen, Allen &amp; Luce, Inc.</b>		
Greg	Poole	Water Resource Engineer/Principal

## List of Preparers

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