FINAL BEAR RIVER COMPREHENSIVE MANAGEMENT PLAN

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

OCTOBER 2017

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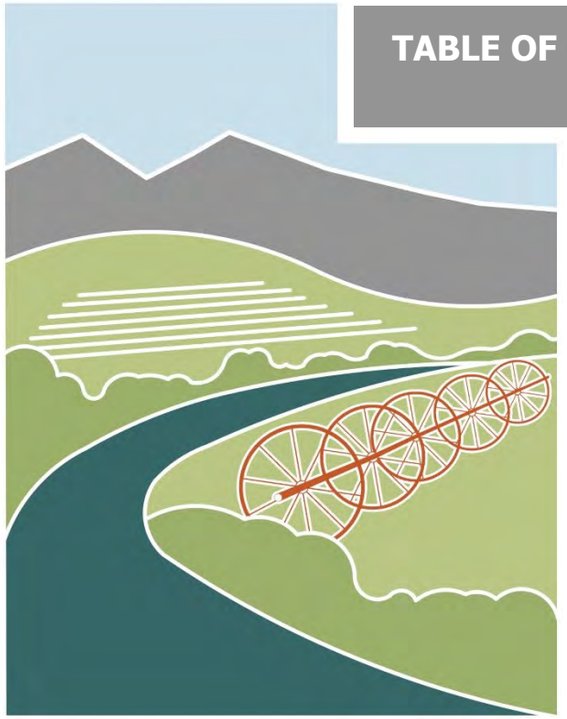

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ABBREVIATIONS

A	allowable
A.D.	anno Domini
A-1	Agricultural Zone
AC	Amalga City
ACPP	Amalga cheese plant pond
BMP	best management practice
BR	Bear River 2400 W Bridge
BR2	Bear River 3800 N Bridge
BRCMP	Bear River Comprehensive Management Plan
BRO	Bear River Oxbow 3000 N Black Rock Road
BRR	Bird Refuge Road
CAP	conservation action plan
CB	Corinne Bridge
CBC	Christmas Bird Count
CC	Cutler Canyon
CFR	Code of Federal Regulations
cfs	cubic feet per second
CR	Cutler Reservoir Cache Junction
CR2	Cutler Reservoir below the dam
CS	Species receiving special management under a Conservation Agreement to preclude the need for federal listing
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
E-ESA	endangered under the ESA
ESA	Endangered Species Act
FAC	facultative (occurs in wetlands and non-wetlands)
FACU	facultative upland (usually occurs in non-wetlands, but may occur in wetlands)
FACW	facultative wetland (usually occurs in wetlands)
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FFSL	Utah Division of Forestry, Fire & State Lands
GIS	geographic information system
HC	Hampton Crossing State Route 30

I-15	Interstate 15
IBAs	important bird area
N	not allowable
NFIP	National Flood Insurance Program
NI	non-indicator
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OBL	obligate (almost always occurs in wetlands)
OE	observed/expected
OHWM	ordinary high water mark
P	potentially allowable
PDF	portable document format
R-1/R-2	Residential Zone
RDCC	Resource Development Coordinating Committee
RT-2	Retail Zone
SB	Swallow Bridge
SGCN	species of greatest conservation need
SHPO	Utah State Historic Preservation Office
SLO	Wetland sensitive land overlay
SPC	species of concern
SR	state route
SWCA	SWCA Environmental Consultants
SWReGAP	Southwest Regional Gap Analysis Project
TB	State Route 142 Trenton Bridge
TDS	total dissolved solids
T-ESA	threatened under the ESA
TMDL	total maximum daily load
UDAF	Utah Department of Agriculture and Food
UDEQ	Utah Department of Environmental Quality
UDOT	Utah Department of Transportation
UDSH	Utah Division of State History
UPL	upland (almost never occurs in wetlands)
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USU	Utah State University
UTM	Universal Transverse Mercator
WIA	walk-in-access areas
WMA	wildlife management areas
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 *Bear River Comprehensive Management Plan* (BRCMP) to prescribe management goals and objectives for sovereign lands along the Bear River in Cache and Box Elder Counties, Utah (Figure 1.1)[1]. The BRCMP has also been developed to ensure that navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality (Public Trust values) are given due consideration and balanced with the benefits to be derived from any proposed use, pursuant to Utah Administrative Code R652-2. Together, the bed and banks of the Bear River make up a sovereign land body that extends through Box Elder and Cache Counties. 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 balance and sustain the use of 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 BRCMP planning process is as follows:

> The State of Utah, through the Equal Footing doctrine, claims fee title ownership of the bed and banks of Bear River. FFSL has direct management jurisdiction over lands lying below the ordinary high water mark (i.e., the top of bank) of navigable bodies of water at statehood. FFSL recognizes the importance of the Bear River ecosystem and its agricultural, 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 Bear River include coordination in planning and actions by other agencies with jurisdictional and management responsibility over these resources.

The Bear River is a valuable ecosystem of statewide importance. Sustainable management in the context of multiple use of the Bear River will ensure that the ecological health (e.g., water quality, bank stability, riparian zones, aquatic organisms, wildlife, and wetlands), irrigation, scenic attributes, and recreation opportunities (e.g., fishing, hunting, birding, 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 Bear River's resources will provide a lasting benefit to the Public Trust.

[1] Bear River sovereign lands in Utah only extend from the Idaho border to Great Salt Lake. Certain segments of the Bear River in Rich and Summit Counties are not considered sovereign lands.

Introduction

To meet our land management mandates, FFSL's overarching goal for the BRCMP process is to ensure that we maintain clear and consistent guidance regarding management objectives, permitting requirements, and best management practices (BMPs) for implementing projects that may affect Bear River sovereign lands. Specifically, the objectives for the BRCMP process are as follows:

- Create the first comprehensive management plan for Bear 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 ecosystem, water, and community resources.
- Integrate existing information, data, public involvement, and scientific research that have been developed on the Bear River into clear and consistent management practices.
- Coordinate with Utah Department of Natural Resource divisions, Utah Department of Environmental Quality (UDEQ) divisions, local government, stakeholders, and other interested parties regarding management, permitting, maintenance, planning, and research on the Bear River.

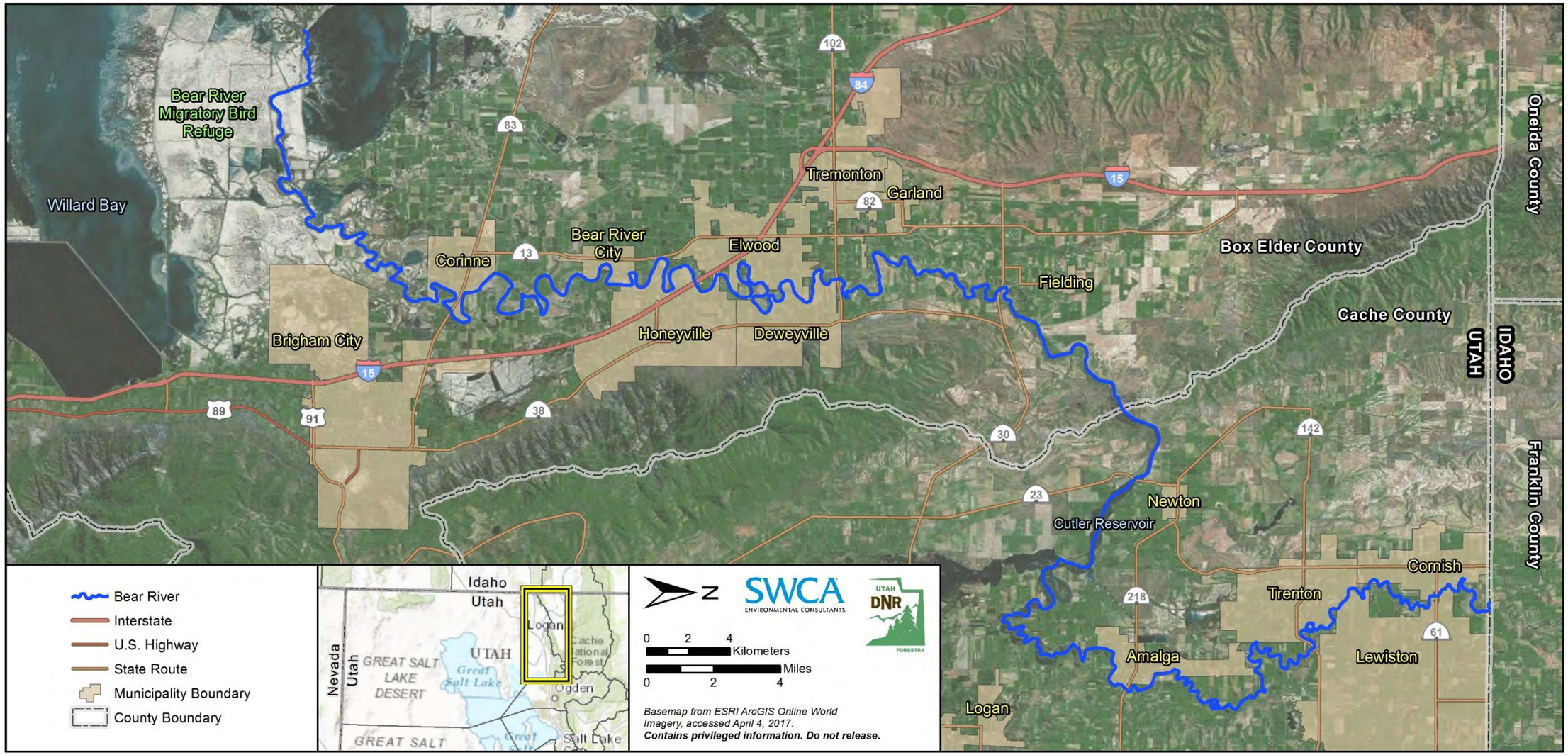


Figure 1.1. Bear River Comprehensive Management Plan planning area.

Drafting the Plan

Existing information and previously established management practices for the Bear River were reviewed to inform the development of the BRCMP. This review ensured that the BRCMP would build on previously compiled data sources and current management strategies instead of "reinventing the wheel." Throughout the BRCMP, colored boxes called "Further Reading" are used to refer the reader to other Bear River–related documents or websites. These include primary documents, information, and management practices that were used in this planning process. Chapter 4, Literature Review, is a complete list of sources used in the plan.

In addition to existing data, development of the BRCMP relied on feedback from the public, municipalities, counties, 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 BRCMP. For a summary of the public outreach process and a summary of FFSL's responses to public comments, see Appendix A. Several individuals from consulting firms were involved in preparing the BRCMP, including the project manager, deputy project manager, resource specialists, graphic designers, technical editors, and formatters. A list of these individuals is provided in Appendix B.

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

Table 1.1. Bear River Comprehensive Management Plan Planning Team

First Name	Last Name	Representing	Title
Todd	Adams	Utah Division of Water Resources	Deputy director
Mike	Allred	Utah Division of Water Quality	Watershed protection
Will	Atkin	Utah Division of Water Rights	Regional engineer
Laura	Ault	Utah Division of Forestry, Fire & State Lands	Sovereign lands program coordinator
Don	Barnett	Bear River Commission	Engineer-manager
Margie	Borecki	Utah State University Extension	Upper Bear River watershed coordinator
Clint	Brunson	Utah Division of Wildlife Resources	Aquatic habitat restoration biologist
Matt	Coombs	Utah Division of Forestry, Fire & State Lands	Sovereign lands coordinator
Zac	Covington	Bear River Association of Governments	Planner
Marisa	Egbert	Utah Division of Water Resources	Project manager
Chris	Hansen	State Historic Preservation Office	State Historic Preservation Office compliance, preservation
Bracken	Henderson	Utah Department of Agriculture and Food	Resource coordinator
Pam	Kramer	Utah Division of Wildlife Resources	Habitat biologist
Chris	Merritt	State Historic Preservation Office	Deputy antiquities coordinator
Chase	Pili	Utah Division of State Parks and Recreation	Assistant manager
Paul	Thompson	Utah Division of Wildlife Resources	Aquatics program manager
Laura	Vernon	Utah Division of Forestry, Fire & State Lands	Sovereign lands planner

The BRCMP 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 information. In accordance with Utah Administrative Code, the revision process is open to the public for comment.

How to Use the Plan

The BRCMP is intended to facilitate access to data, river use class information, and BMPs to assist stakeholders in planning and implementing projects that may affect Bear 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 map book at the end of this chapter (Figure 1.8 [maps 1–13]) provides an accessible visual reference of the river's use classes as described in Utah Administrative Code R652-70-200. Chapter 2 summarizes the current conditions of the river and focuses on ecosystem, water, and community resources. This, in combination with public outreach, 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, adjacent landowners, and private entities. Chapter 4 provides a list of literature cited for the plan.

Information in the BRCMP is supported by three online resources: 1) a BRCMP interactive portable document format (PDF), 2) a BRCMP 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 BRCMP, understand the regulatory context behind the BRCMP, 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 Bear 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 BRCMP; 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.
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 Bear River and provide important information such as river use classes and current conditions. Resource maps are static but do 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 BRCMP.
3. GIS spatial data viewer: To view all GIS spatial data compiled and catalogued for the BRCMP, 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 Bear 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 Bear River. GIS data layers are found in colored boxes throughout the plan.

1.2 Ownership, Regulatory, and Management Context

Bear River Bed and Bank

Because the Bear River was navigable at statehood in 1896, the State of Utah claims fee title ownership to the bed and bank of the river by virtue of the Equal Footing Doctrine. Exceptions may exist in certain locations where unique title issues are present, and 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 Bear River is generally considered by the State of Utah to be "sovereign land." 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 Bear River, as part of a permit authorization process, a case-by-case demarcation of the OHWM may be required.

Bear River Sovereign Land Boundaries

The boundary of sovereign land underlying a river is intrinsically more difficult to define than that of a lake 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, natural and artificial processes of erosion, reliction, avulsion, and accretion[2] 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.

Currently, FFSL is not planning to initiate a boundary settlement process for the Bear River as it has done at Utah Lake and Bear Lake. FFSL has settled boundaries of other sovereign land resources with some adjacent upland landowners on a case-by-case basis and plans to continue with this approach as boundary issues along the Bear 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). The doctrine establishes the right of the public to use Public Trust resources, and 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 for the citizens of the new state (Slade et al. 1997).

[2] *reliction* = gradual recession of water, leaving land permanently uncovered; *avulsion* = rapid abandonment of a river channel and the formation of a new river channel; *accretion* = the gradual deposition of sediment along the edge of a channel.

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 Bear River is included in this category of navigable waters and is 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). Recognition of this evolution in the Public Trust Doctrine is found in the following text from Utah Administrative Code R652-2: "… so that the protection of navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality will be given due consideration."

Bear River Management

The Utah State Legislature has designated FFSL as the executive authority for the management of sovereign lands in Utah, including the Bear River. Because the precise location of the OHWM at the time of statehood is not known for the entire Bear River, FFSL generally manages the river from the top of the riverbank to the top of the opposite riverbank, as illustrated in Figure 1.2. 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.

FFSL supports partnerships and collaborations with other agencies that have jurisdiction and/or management authority on the Bear River (see Figure 1.2 and Sections 1.3, 1.4, and 1.5), as well as with interested stakeholders, to improve overall river management and decision-making.

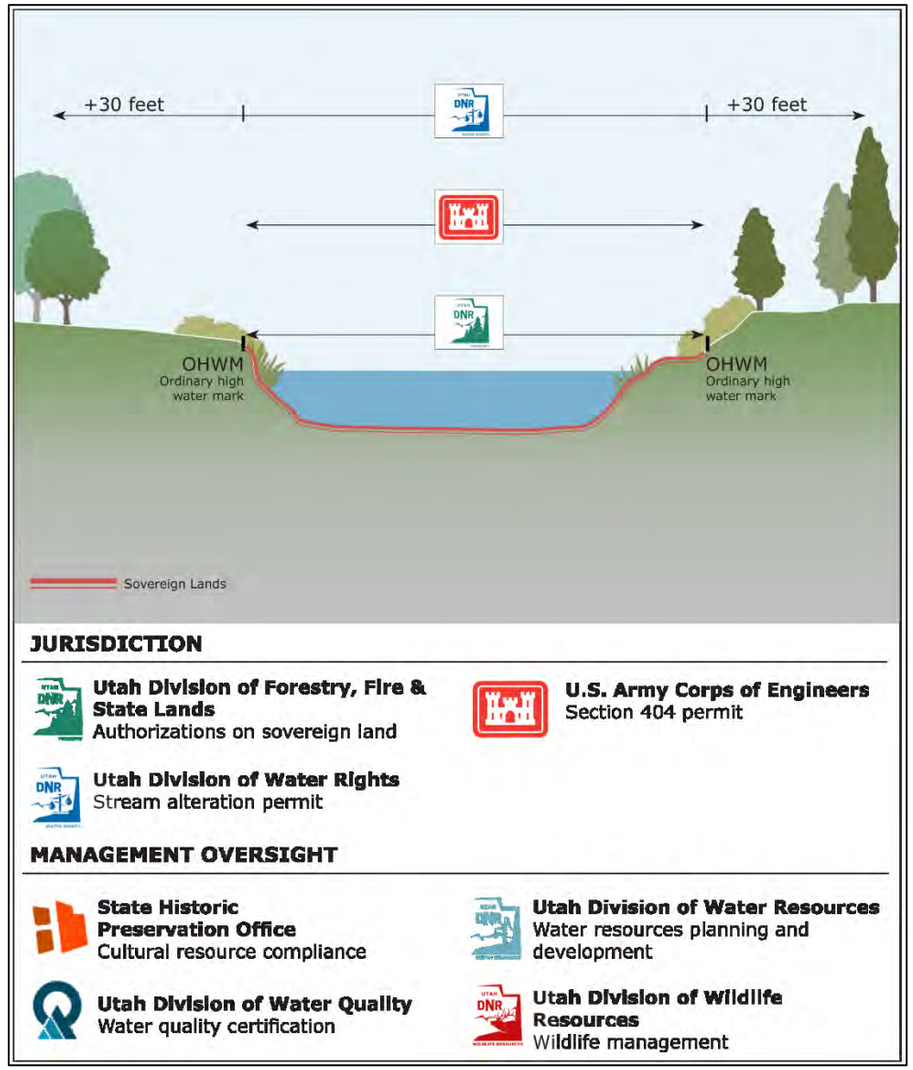


Figure 1.2. Bear River cross section showing agency management jurisdiction for the river.

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 Public Trust resources. As a trustee, FFSL must also strive for an appropriate balance among compatible and competing uses on the Bear River.

1.3 Utah Department of Natural Resources Management Responsibilities

Utah Division of Forestry, Fire & State Lands

The State of Utah claims fee title ownership of the sovereign lands of the bed of the Bear River. FFSL has direct management jurisdiction from top of bank to top of bank of the river (see 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 ecological and cultural values of Bear River sovereign lands. Other sovereign lands connected to or close to the Bear River are Great Salt Lake and the Utah portion of Bear Lake, respectively. Holistic management of these three waterbodies is recommended.

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 Bear River, and has the authority to regulate dams to protect public safety. All projects within twice the width of the Bear 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 Cutler Dam, which is operated by PacifiCorp, dba Rocky Mountain Power (Cutler Dam and the associated Cutler Reservoir are located in Box Elder and Cache Counties).

FFSL does not adjudicate water rights in Utah, and nothing in the plan is intended to, nor shall it be construed to, revoke, cancel, suspend, limit, modify, regulate, affect, or impair any existing appropriated, decreed, contract, or other water right duly approved and recognized by DWRi that is owned by the holder of a permit issued under the BRCMP, and/or any right or interest of the permittee under any such water right, including the right to impound, store, divert, and use water as authorized under any such regulate or affect any vested water right. When FFSL requests that 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 where it has jurisdiction.

Utah Division of Water Resources

The mission of the Utah Division of Water Resources (DWRe) and the Board of Water Resources is to plan, conserve, develop, and protect Utah's water resources, pursuant to Title 73 of the Utah Code. DWRe conducts studies and planning for water use within the Bear River watershed. The Board of Water Resources appoints Utah's interstate stream commissioner to the Bear River Commission. The interstate stream commissioner for Utah is DWRe's director.

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." DWR also manages lands and access areas along the Bear River for the benefit of the public. As part of this responsibility, DWR implements restoration projects to enhance fish and wildlife habitat and to increase fish and wildlife population numbers.

1.4 Other State and Local Entities Management Responsibilities

Utah Department of Agriculture and Food

The Utah Department of Agriculture and Food's (UDAF) mission is to promote the healthy growth of Utah agriculture, conserve natural resources, and protect the food supply. It accomplishes this through administration of Utah's agricultural laws that mandate a variety of activities such as inspections, loan issuance, pest and disease control, and public information programs. Relevant to Bear River sovereign lands are UDAF's grazing improvement, noxious weed detection and control, environmental stewardship certification, and agricultural land preservation programs among others. Utah conservation districts are under the purview of UDAF.

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 Bear River. Although there are no specific guidelines or regulations associated with the Bear River, UDOT recognizes the importance of maintaining environmental quality for citizens of Utah and implements measures to minimize harm to the environment.

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 completed a total maximum daily load (TMDL) report for the middle Bear River and Cutler Reservoir (SWCA 2010; implementation is ongoing) and for the lower Bear River from Great Salt Lake to Cutler Dam (DWQ 2002). 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 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 with an opportunity to comment on those actions. Section 106 of the National Historic Preservation Act (codified in Title 54 of the United States Code) 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.

Bear River Commission

The Bear River Commission is a composed of nine gubernatorial-appointed commissioners and one federal commissioner who carry out the provisions of the Bear River Compact, as follows:

> The major purposes of this Compact are to remove the causes of present and future controversy over the distribution and use of the waters of the Bear River; to provide for efficient use of water for multiple purposes; to permit additional development of the water resources of Bear River; to promote interstate comity; and to accomplish an equitable apportionment of the waters of the Bear River among the compacting States. (Bear River Commission 2017)

The compact states consist of Utah, Idaho, and Wyoming. Nothing in the BRCMP is intended to regulate, affect, or otherwise impair any rights or interests inuring to the compact states and the holders of individual appropriated, decreed, contract, or other water rights duly approved and recognized by the compact states.

Bear River Association of Governments

The Bear River Association of Governments, created in 1971 by Box Elder, Cache, and Rich Counties, is an intergovernmental organization that implements federal, state, and local programs to benefit the region. The association is most relevant in maintaining and enhancing conditions in and along the Bear River in its capacity as a regional planning entity and through heritage preservation and tourism.

Local Government

Cities and counties with jurisdiction over lands abutting the Bear 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, tourism, land use and planning, and weed management among other initiatives.

General Public

FFSL manages Bear River sovereign lands for the benefit of the general public in accordance with the Public Trust. Feedback from the public is always welcome. Community involvement in ongoing sovereign lands management (e.g., service projects involving restoration or education) is encouraged, assuming efforts are coordinated with and approved by FFSL.

1.5 Federal Agencies Management Responsibilities

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 Bear 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 Bear River as required by the Endangered Species Act. USFWS also conducts scientific investigations to document and remedy contaminant-related problems for fish and wildlife and monitors long-term contaminant trends, among other services. USFWS manages the Bear River Migratory Bird Refuge and engages in adaptive management of habitat (including water), invasive species, and fire.

Federal Emergency Management Agency

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP), which is fundamental to reducing flood loses. 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 Bear 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 are responsible for administering and enforcing local floodplain management regulations within their jurisdiction (see Figure 1.2).

Federal Energy Regulatory Commission

The Federal Energy Regulatory Commission (FERC) is an independent agency that regulates the interstate transmission of electricity, natural gas, and oil. Of most relevance to the Bear River is FERC's responsibility to license and inspect private, municipal, and state hydroelectric projects. In this capacity, FERC oversees environmental and recreation matters, among other things, associated with Cutler Dam and Reservoir, which are owned and operated by PacifiCorp, dba Rocky Mountain Power.

Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS) provides farmers and ranchers with financial and technical assistance to apply conservation practices "on the ground" that not only help the environment but also agricultural operations, including those in the BRCMP planning area. In Utah, the NRCS administers many Farm Bill Programs such as Agriculture Management Assistance, Agricultural Conservation Easement, and Small Watershed.

1.6 County and Municipal Zoning

The Bear River is a waterway in an agricultural setting bordering 10 municipalities and two counties. Each municipality and county entity along the Bear River has the authority to authorize land uses up to the OHWM. However, the biological and physical systems of the Bear 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 infrastructure expansion continue in the Cache Valley area, a range of land uses will continue to occur and change. Although currently surrounded by open space and agricultural land uses, development in and around the Bear River will 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 Bear River while recognizing that local governments need to provide services to their constituents, e.g., transportation, utilities, and recreation 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 "greenbelts" and development patterns is an ongoing discussion for the wellbeing of adjacent residents and for the river.

The BRCMP 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 BRCMP and FFSL have no authority over regulations on any lands adjacent to the river. The information provided here is intended to summarize the current and planned conditions and how they inform the BRCMP and to summarize decisions made by FFSL for the Bear River.

The counties and municipalities use their own land use zoning designations to indicate the allowed uses for properties adjacent to the Bear 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.

Box Elder County

Approximately 64 miles of the river corridor are in Box Elder County. Of these miles, 25 miles are within or adjacent to one of four municipalities with jurisdiction over adjacent land uses:

1. Corinne City
2. Bear River City
3. Elwood Town
4. Deweyville

The remaining 39 miles are under the jurisdiction of the county. The communities of Brigham City, Tremonton, Garland, and Fielding are near the river, but they do not directly share a boundary with the river. The annexation intent boundary of Brigham City extends to the river.

Information regarding planning and zoning was received for the following municipalities.

Corrine City currently has four different zoning categories in place along the river corridor: Residential Zone (R-1/R-2), Retail Zone (RT-2), Agricultural Zone (A-1), and a Wetland sensitive land overlay (SLO). Most of the parcels adjacent to the river fall under the SLO zone. Two additional zoning categories exist—development (D-Z) and business (B)—but they are separated from the Bear River by other zoning categories.

Elwood Town classifies zoning under three categories: Residential, Commercial, and Industrial. All parcels adjacent to the Bear River fall under the Residential zone. The land use map of the general plan indicates a designation of Open Space along the river corridor, with Residential uses adjacent.

Deweyville classifies zoning under three categories: Residential, Agricultural, and Commercial.

Cache County

Approximately 43 miles of the river corridor are in Cache County. Land use planning and zoning along the river are under the jurisdiction of the county and of the following four municipalities:

1. Amalga Town
2. Trenton
3. Lewiston City
4. Cornish

A range of land uses and zoning occurs adjacent to the river, with 16 miles of the river within or adjacent to a municipality. The communities of Newton, Logan, and Smithfield are in the county, but they do not directly share a boundary with the river.

Information regarding planning and zoning was received for the following municipalities.

Amalga Town currently has a Wetland zone in place along the river corridor. Nearby properties are zoned Agricultural, Residential-Agricultural, or Light Industrial.

Lewiston City uses five zones within its boundaries: two Commercial zones and one each for Residential, Manufacturing, and Agriculture.

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 state law, administrative rules, and the Public Trust Doctrine and must adhere to multiple-use, sustained-yield principles. Each authorization (easement, general permit, or right-of-entry) must also comply with this BRCMP. 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. Without a comprehensive management plan, the authorization process requires site-specific studies.

Types of Authorizations

EASEMENTS

An easement (Utah Administrative Code R652-40) across the Bear 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.

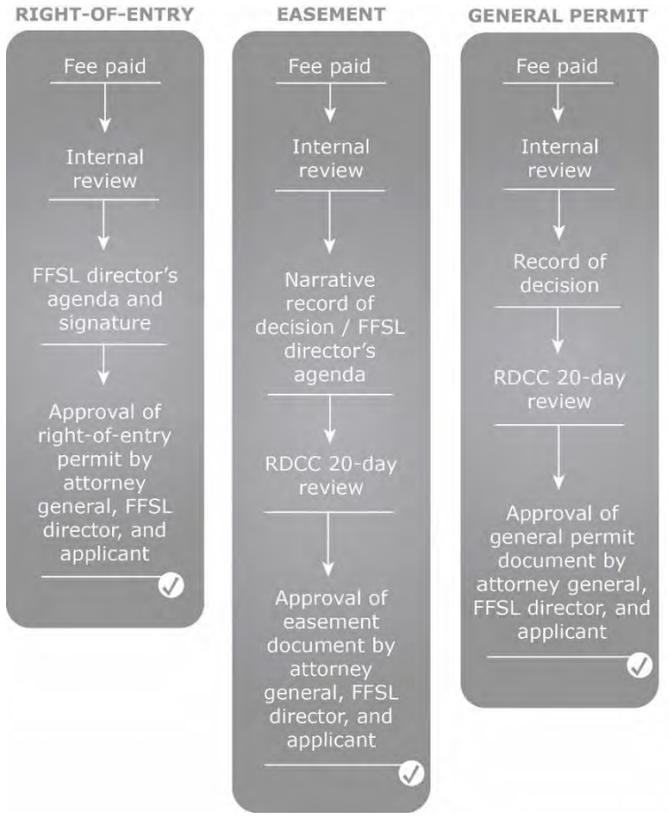


Figure 1.3. Authorization process diagram.

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 lists and describes the river use classes used to guide management and use on the Bear River. River use classes are applied to specific locations along the Bear River based on multiple parameters, including municipal and county zoning adjacent to the Bear River, existing authorizations, environmental factors, and established deed restrictions or conservation easements. Table 1.2 also describes the specific parameters used to designate river use classes along the Bear River. The distribution of river use classes by river segment in percentages is found in Chapter 2, Table 2.1.

Table 1.2. Classification of Sovereign Lands along the Bear River

River Use Class*	Description*	Example along the Bear River	Percentage Based on Acreage of each Class	Parameters
Class 1	Manage to protect existing resource development uses	Authorized water diversion structures Cutler Reservoir FERC Management Area	15%	Areas with existing authorizations Areas within FERC management overlay
Class 2	Manage to protect potential resource development options	Interstate 15 (I-15) bridge over the Bear River	1%	Areas zoned for commercial or industrial Established, permanent structures without a current easement from FFSL
Class 3	Manage as open for consideration of any use	Hansen Park in Elwood, Utah	2%	Areas zoned residential or for development with a trail, landscaped park, or golf course
Class 4	Manage for resource inventory and analysis	Class 4 is not applied to the BRCMP planning area.		
Class 5	Manage to protect potential resource preservation options	East Tremonton Agricultural Protection Area	70%	Conservation of agricultural uses or cultural resources Areas zoned open space or greenbelt Identified areas of sensitive environmental resources (e.g., sensitive wetlands, floodplains, established habitat for special-status species)
Class 6	Manage to protect existing resource preservation uses	Bear River Bottoms Conservation Easement Bear River Migratory Bird Refuge property adjacent to sovereign lands	12%	Local, county, state, or federal conservation protection areas Restoration and mitigation sites Parcels holding conservation easements

* Data from Utah Administrative Code R652-70-200.

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, areas along the river with existing, permitted bridges and utilities (items 1 and 12 on Figure 1.5) are considered Class 1 reaches of the river. Areas or reaches nearby or between Class 1 areas and unauthorized permanent infrastructure are generally reserved as Class 2 areas to encourage the concentration of future utilities and infrastructure. Segments of the river with adjacent residential development or low impact uses such as parks (item 4 on Figure 1.5) that are not zoned specifically as open space or greenbelts are considered Class 3 areas. Finally, reaches of the river associated with zoned open space or warrant protection of cultural resources or agriculture uses (item 5 on Figure 1.5) and those afforded legal conservation protection (item 9 on Figure 1.5) are considered Class 5 and Class 6 areas, respectively.

Segments of the river that are associated with agriculture are zoned Class 5 and are managed to protect potential resource (agriculture) preservation options. This classification was selected because agriculture in Box Elder and Cache Counties is a key economic activity; is of regional and state-wide importance; and informs the history, lifestyle, and culture of both counties. During a planning process for Cache Valley to develop a vision and vision strategy to address growth issues, 66% of participants indicated that land conservation should work toward an emphasis on water quality, working farms and ranches, and viewshed protection (Envision Cache Valley 2010). One of the vision principles developed during the Envision Cache Valley process is to protect, preserve, and improve agricultural land. In addition, zoning agricultural areas as Class 5 helps protect important habitat for wildlife species.

Where Table 1.2 lists the river use classes, Figure 1.8—a map book of the Bear River made up of 13 individual maps—shows the reader the specific locations of these river use classes along the Bear River along its entire stretch from Box Elder County to Cache County. Figure 1.7 provides a map book index showing the entire planning area. 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 map book 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.

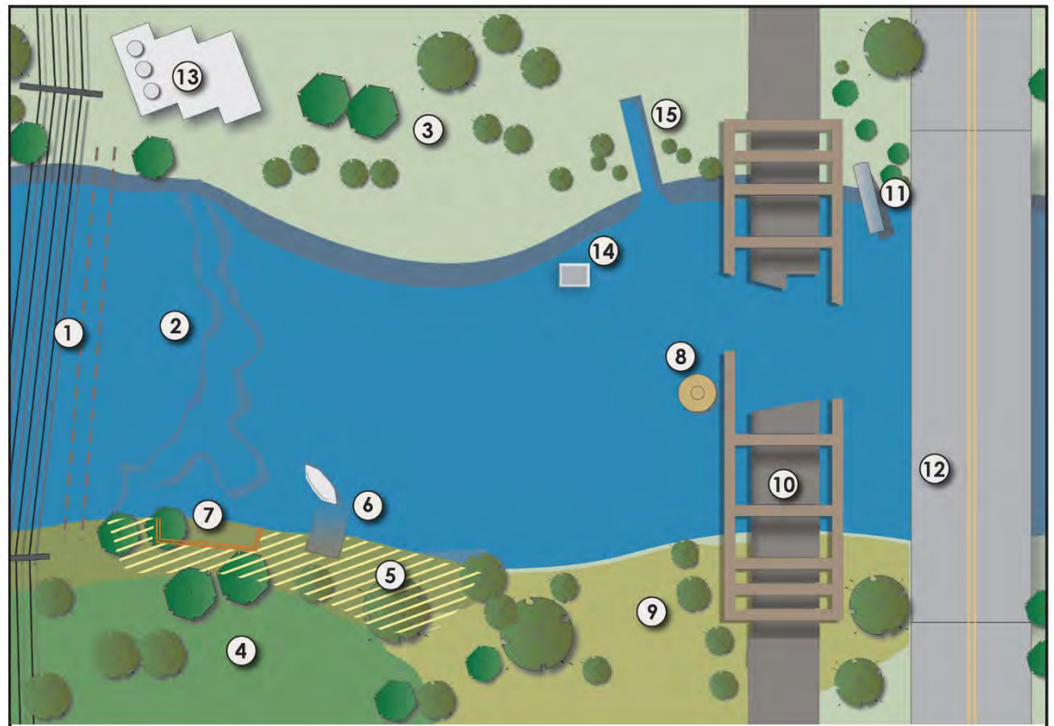


Figure 1.5. Bear River plan view showing conceptual river uses.

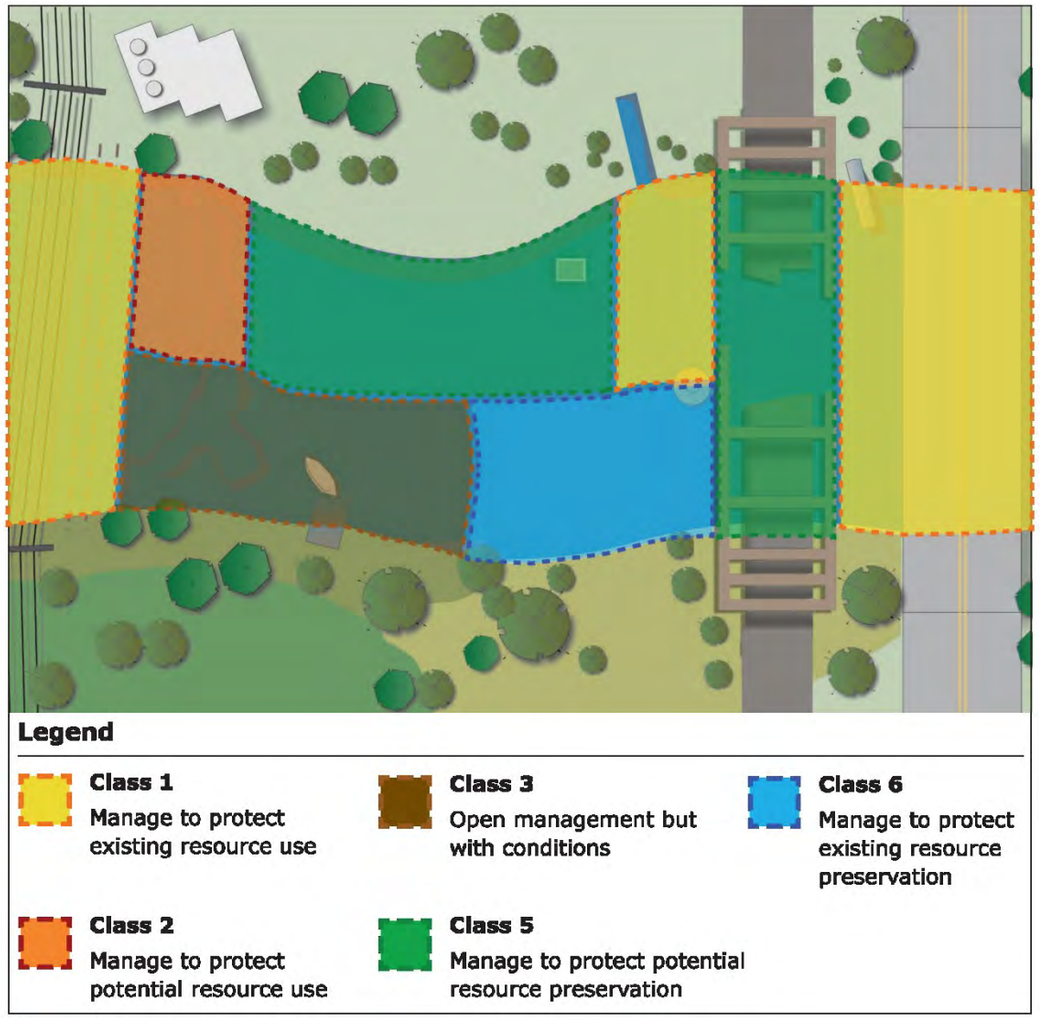


Figure 1.6. Bear River plan view showing conceptual river use classes.

Further Reading

Alternative Futures for the Bear River Watershed (Toth et al. 2005)

Bear River Basin: Planning for the Future (Utah Division of Water Resources 2004)

Bear River Baseline. Human and Biophysical Attributes of the Bear River Corridor in Cache and Box Elder Counties (Utah Division of Forestry, Fire & State Lands 2015)

Bear River Watershed Historical Bibliography (Utah State University 2011a)

Inventory, Assessment and Preliminary Management Planning for Utah's Sovereign Land along the Bear River (Coombs 2017a)

Geographic Information System Data Layers

BRCMP River Segments, FFSL Authorizations, Landownership, Photographs, Political Boundaries, River Use Classes, stream Alteration Permits, Zoning

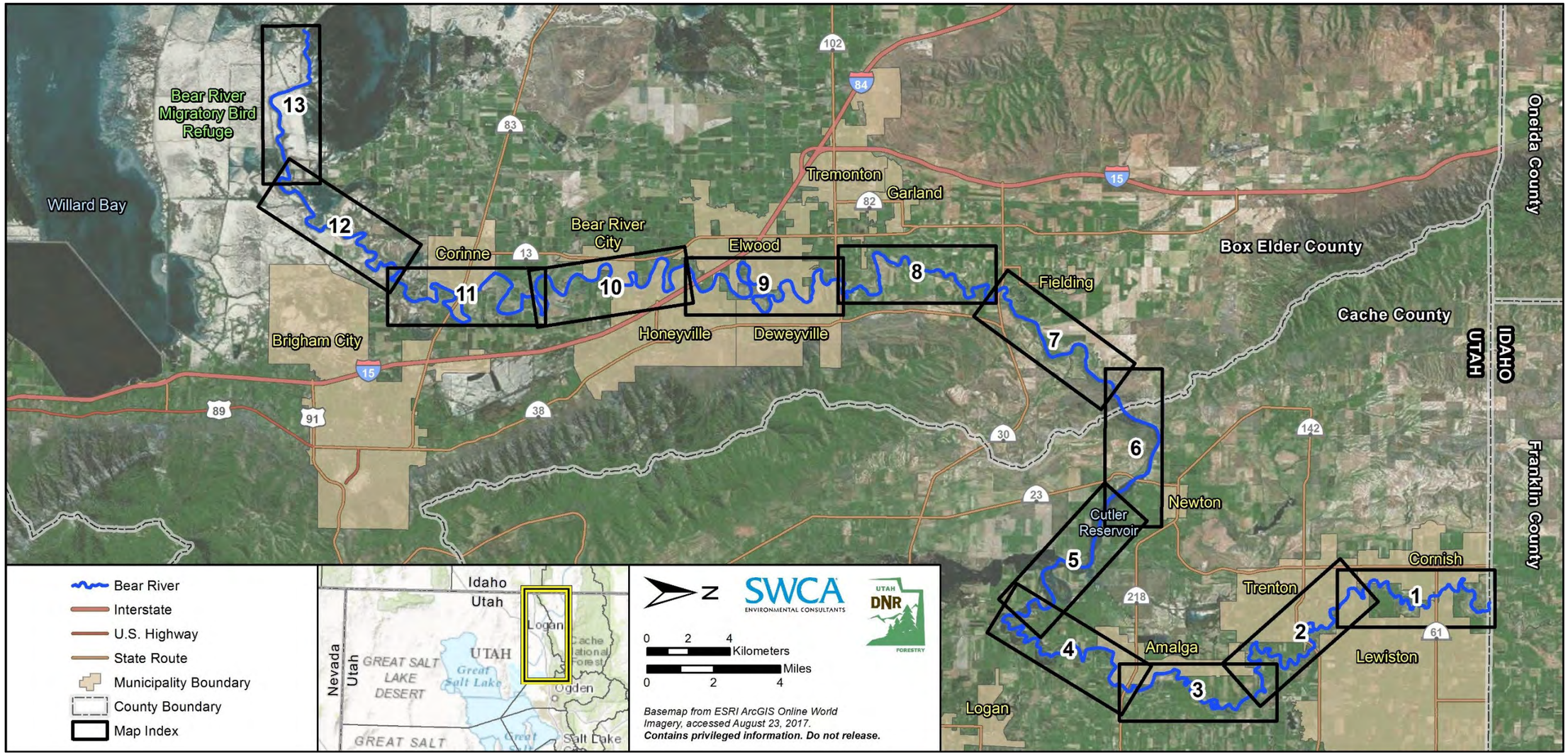


Figure 1.7. River use classes map book index for the Bear River Comprehensive Management Plan planning area.

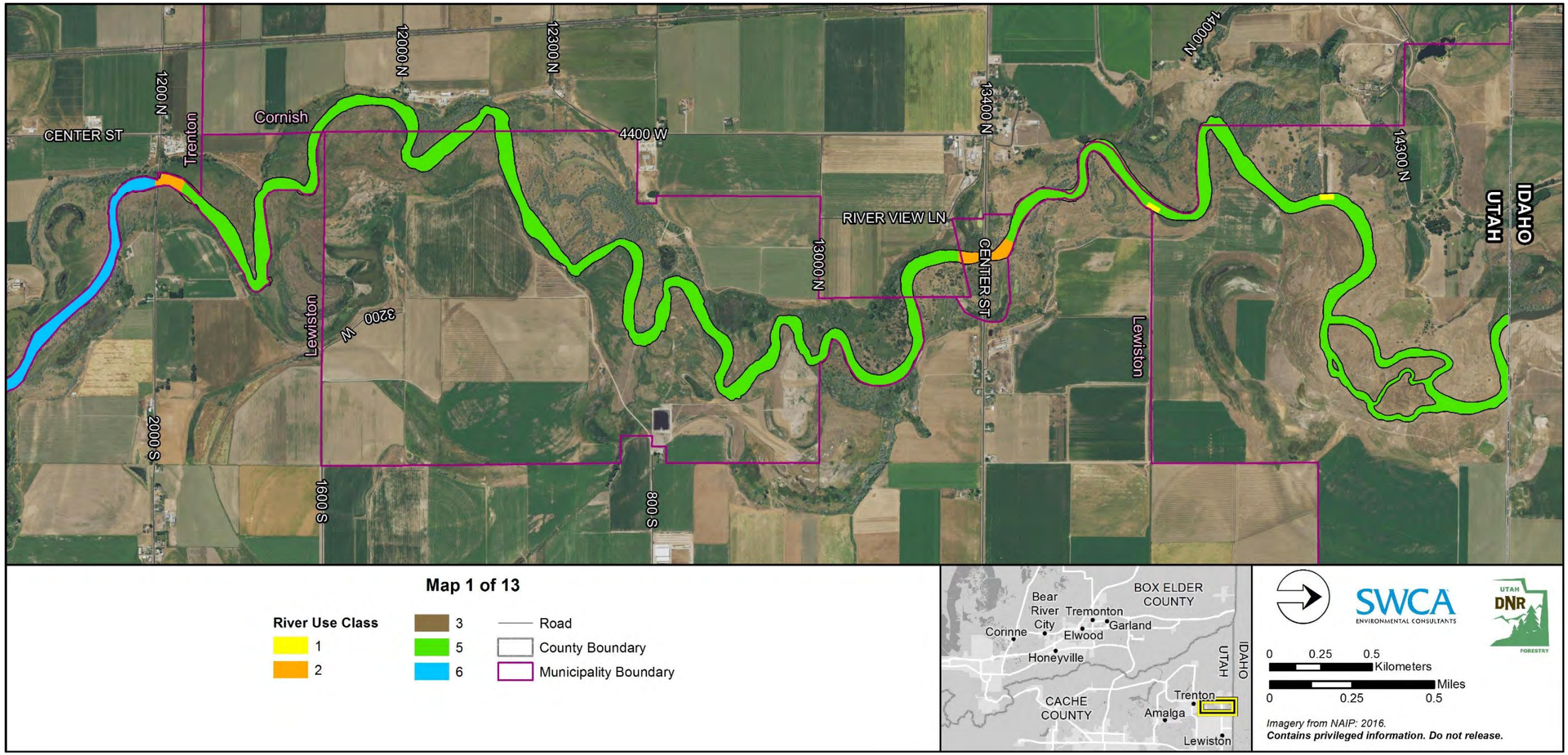


Figure 1.8. River use classes for the Bear River, Map 1.

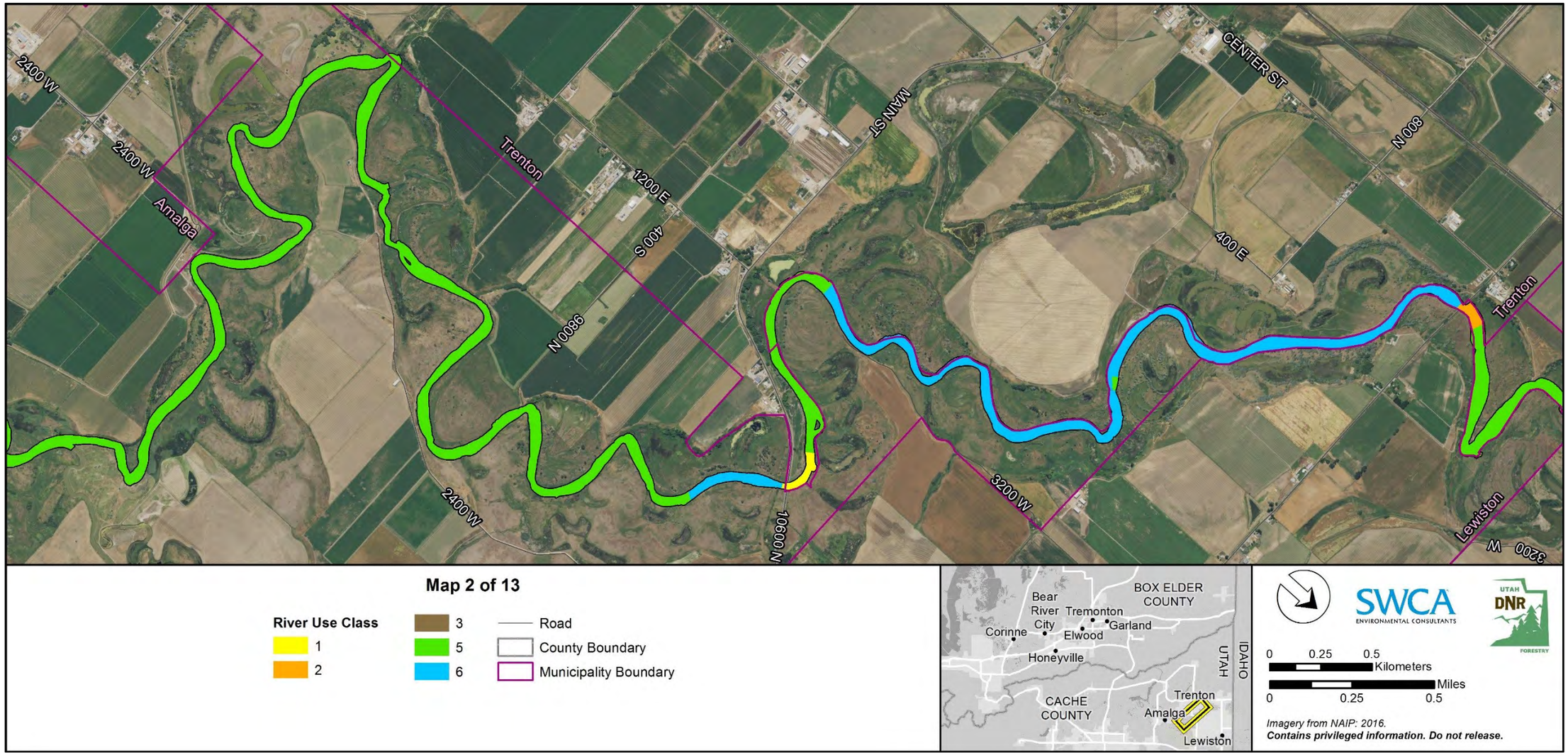


Figure 1.8. River use classes for the Bear River, Map 2.

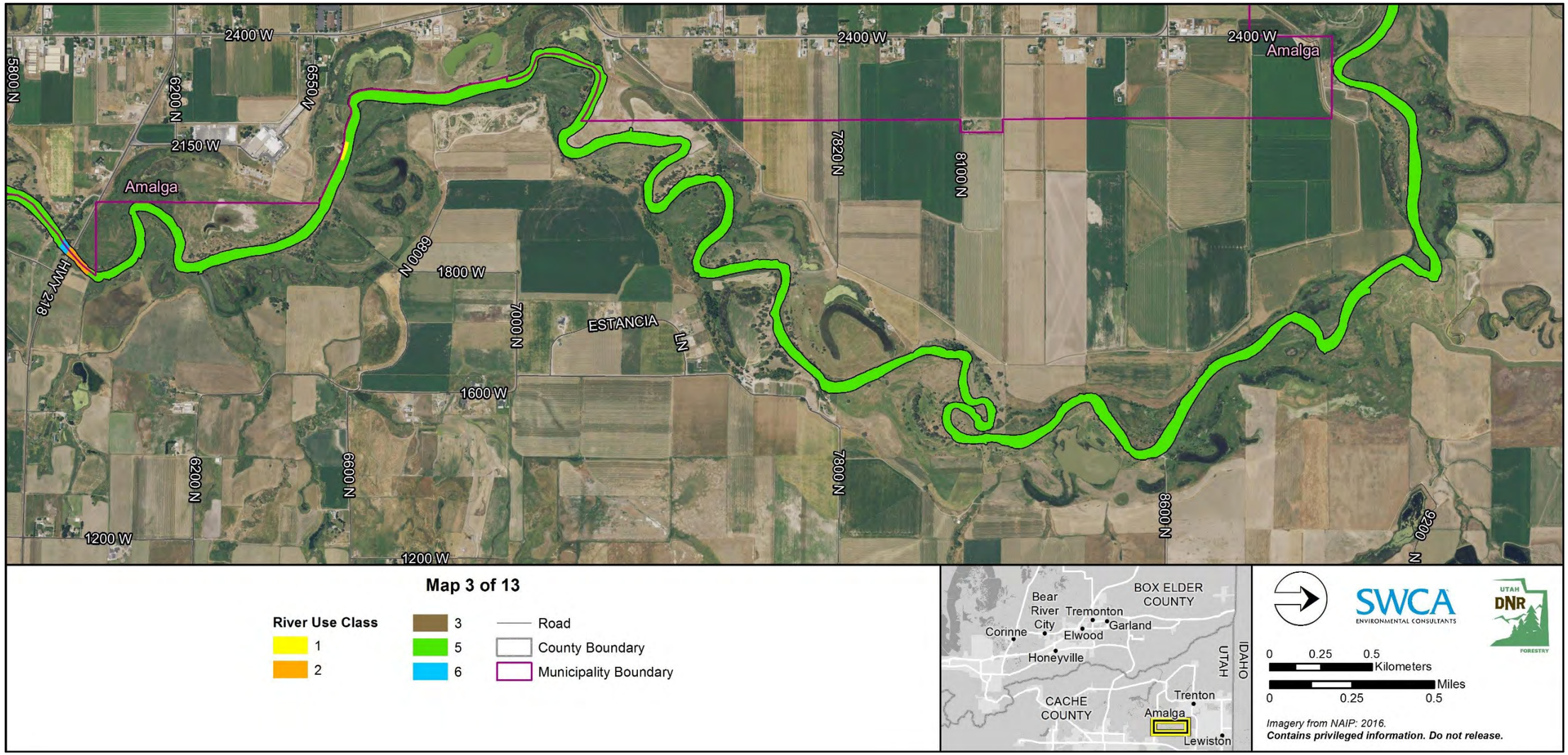


Figure 1.8. River use classes for the Bear River, Map 3.

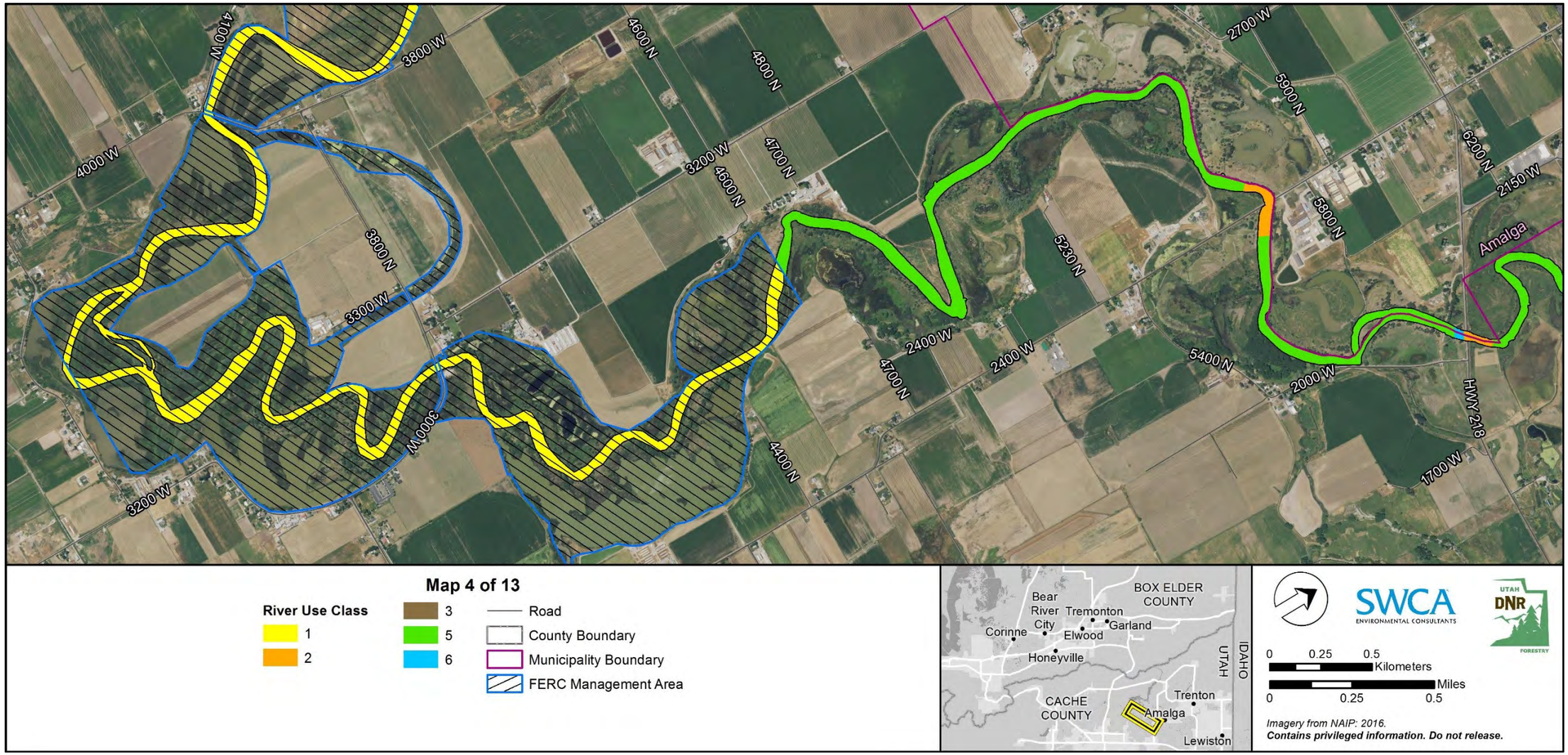


Figure 1.8. River use classes for the Bear River, Map 4.

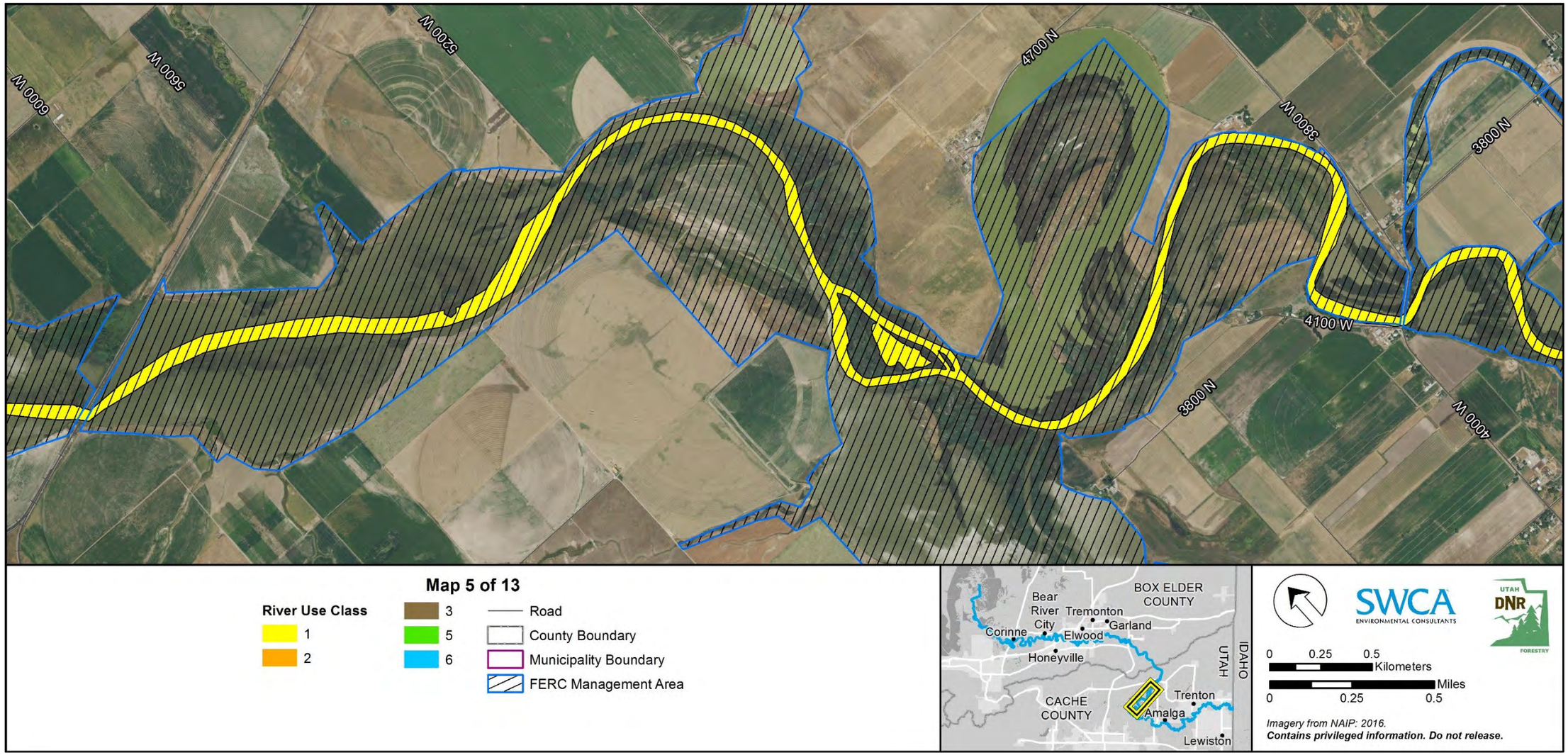


Figure 1.8. River use classes for the Bear River, Map 5.

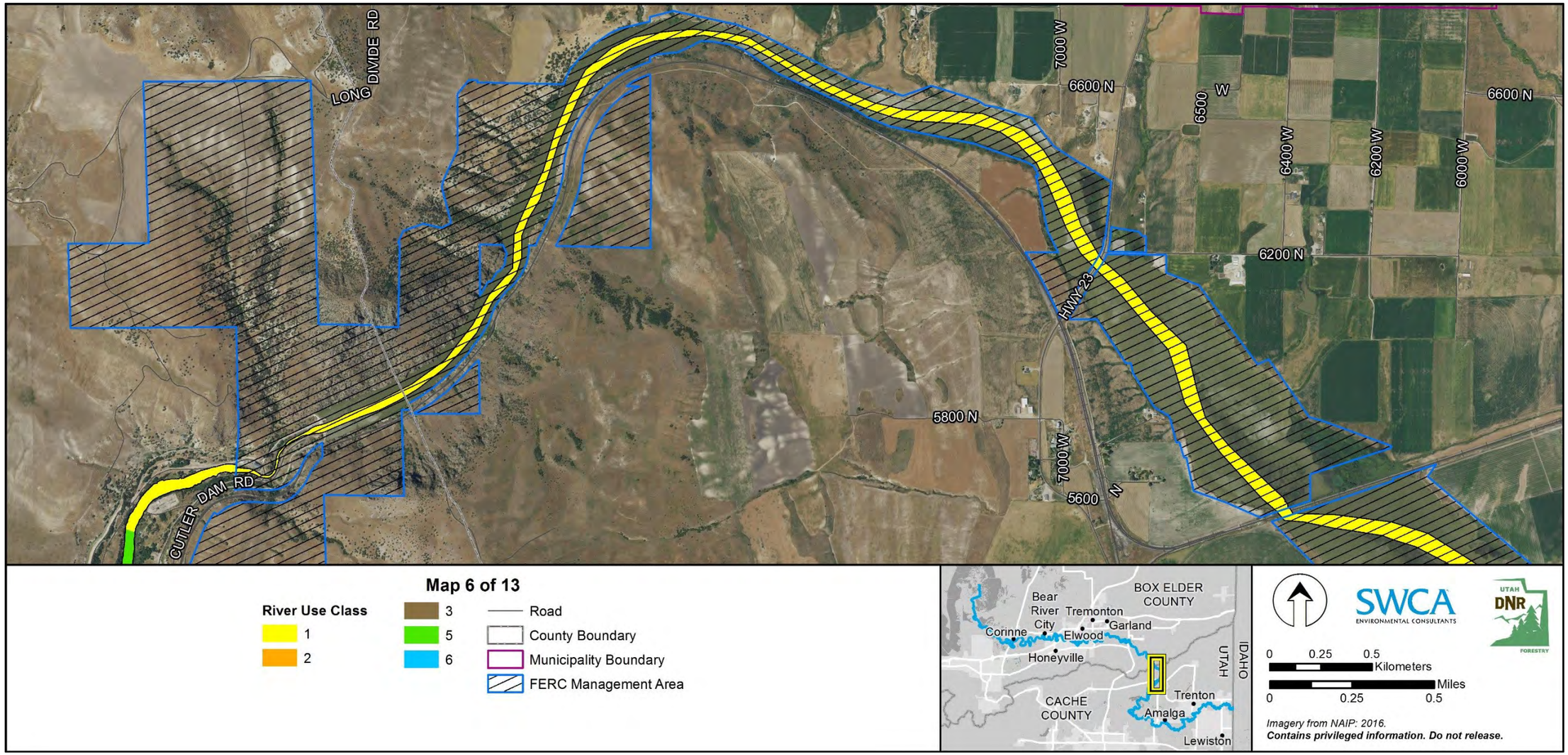


Figure 1.8. River use classes for the Bear River, Map 6.

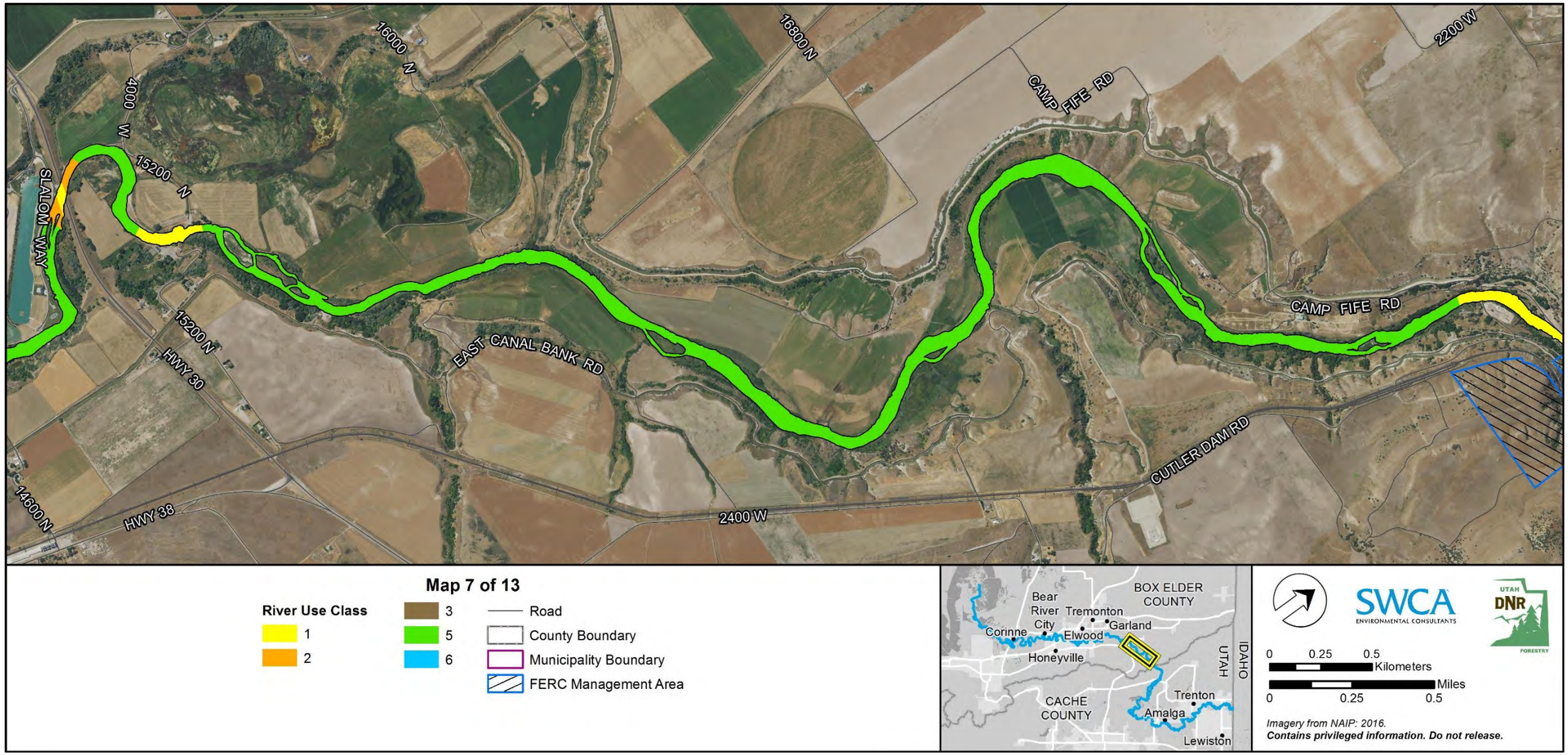


Figure 1.8. River use classes for the Bear River, Map 7.

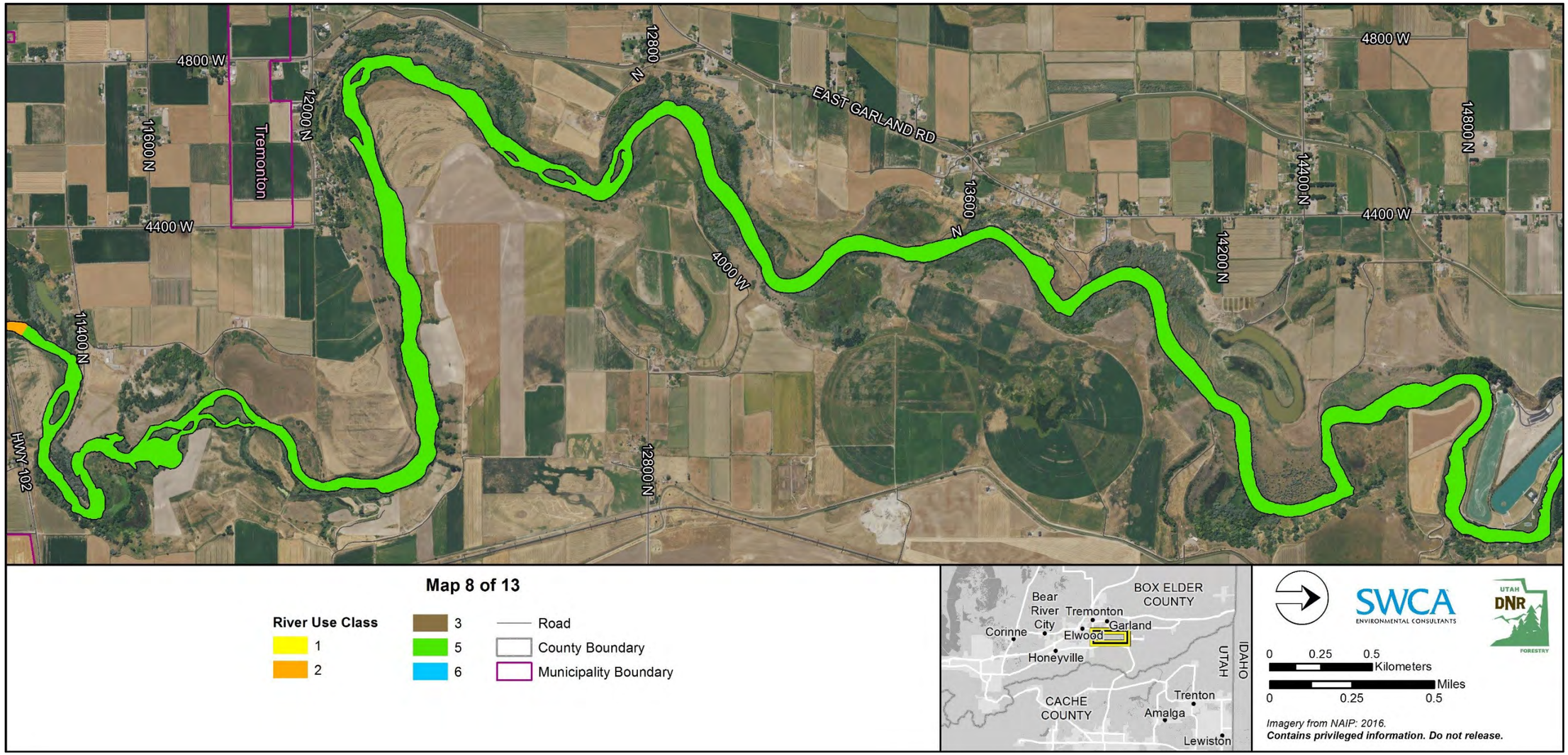


Figure 1.8. River use classes for the Bear River, Map 8.

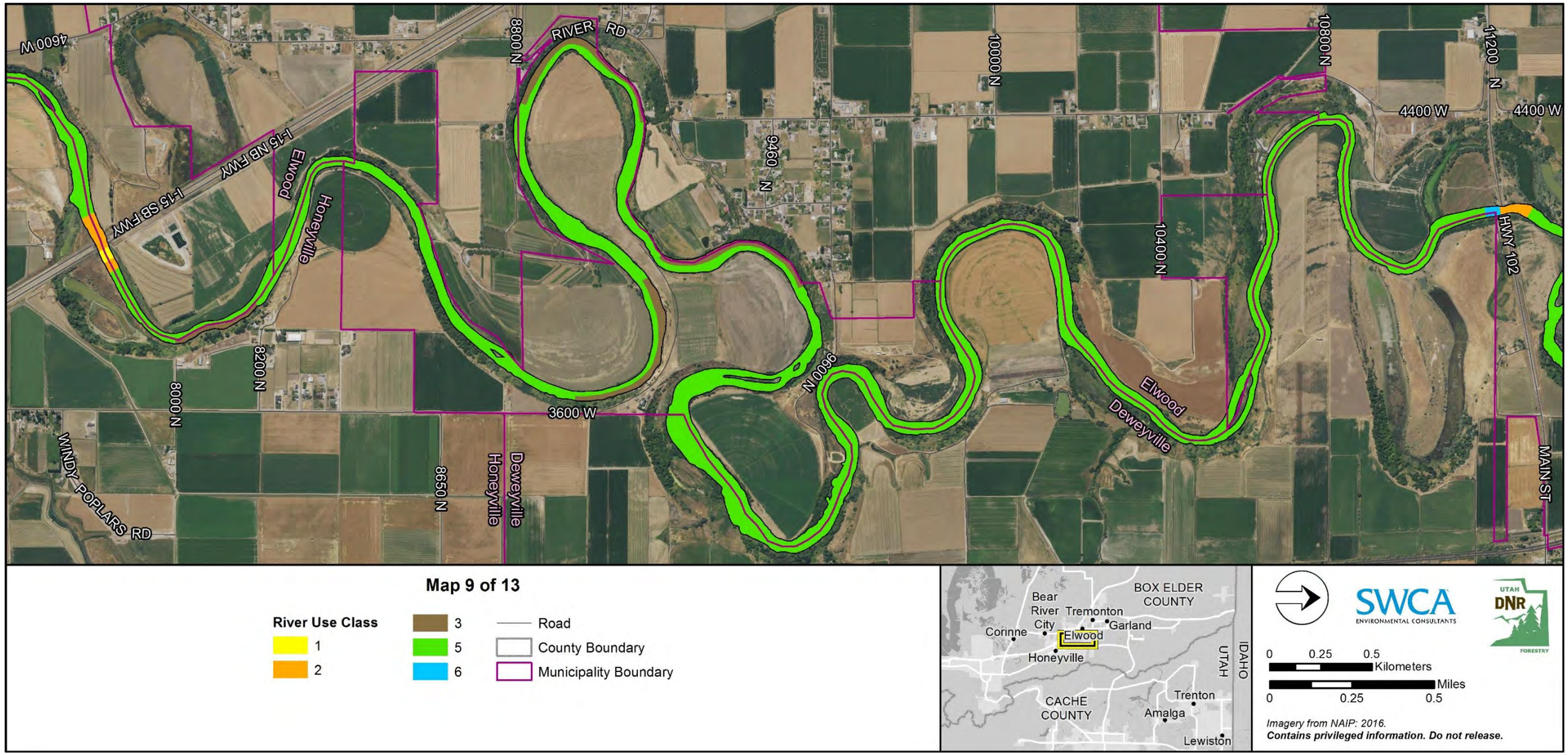


Figure 1.8. River use classes for the Bear River, Map 9.

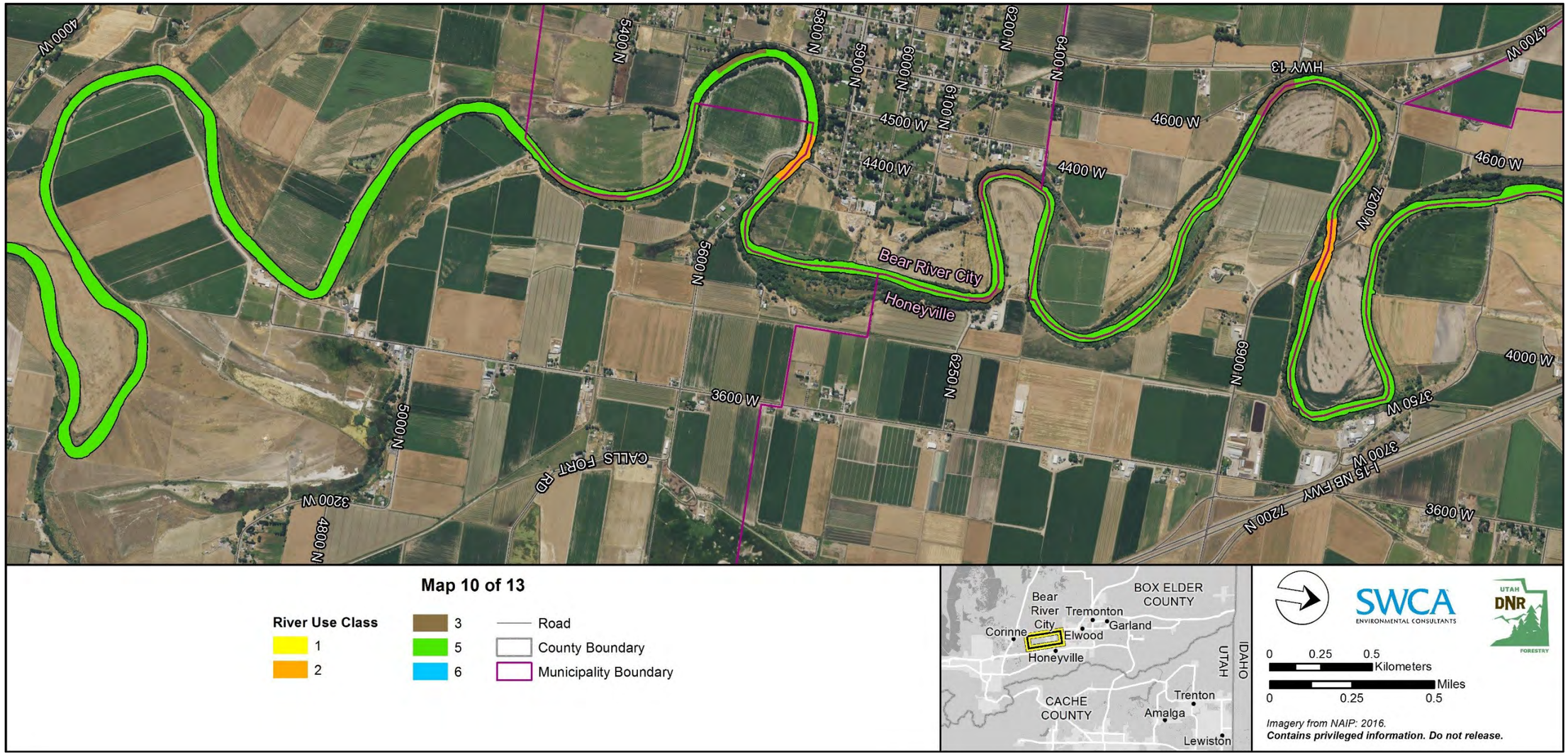


Figure 1.8. River use classes for the Bear River, Map 10.

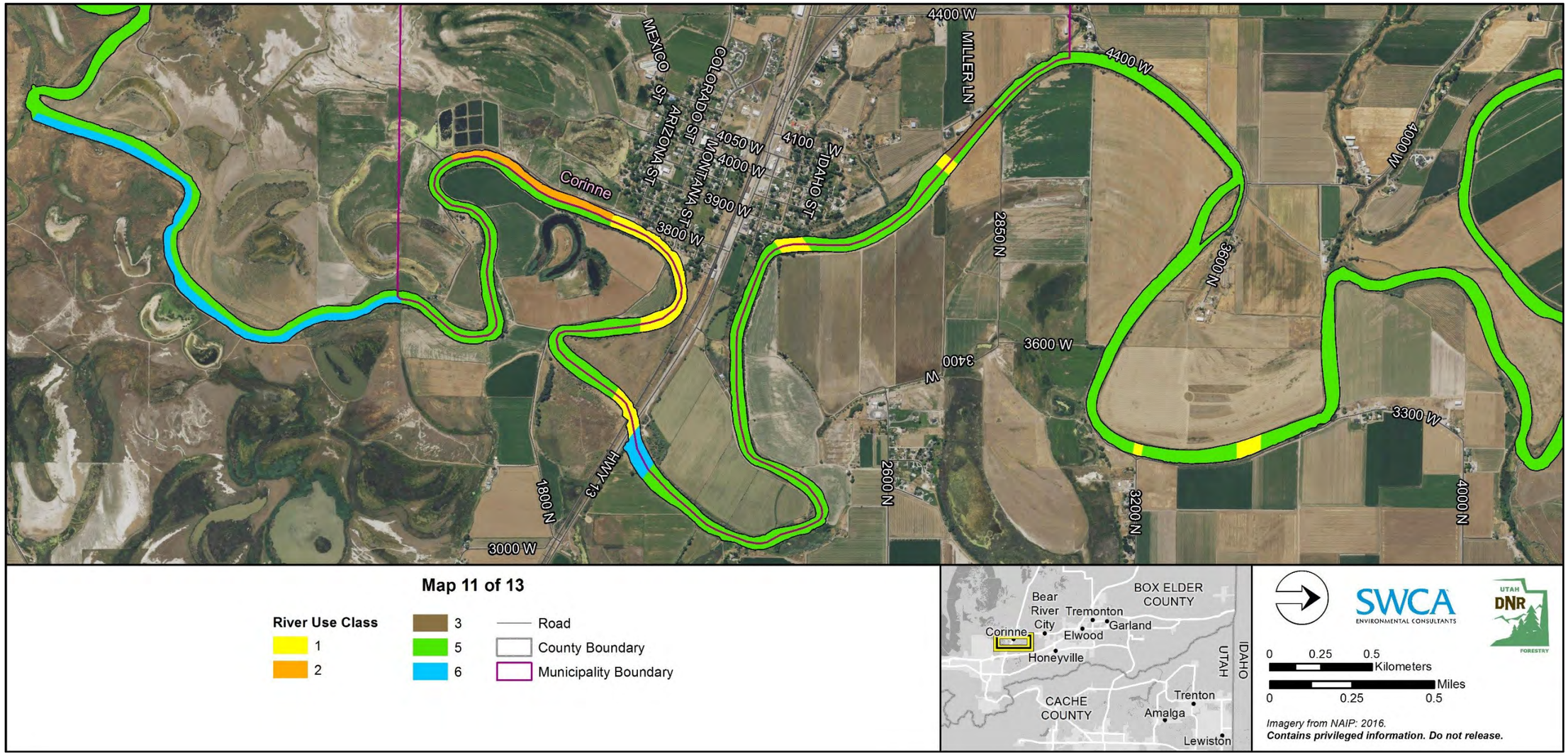


Figure 1.8. River use classes for the Bear River, Map 11.

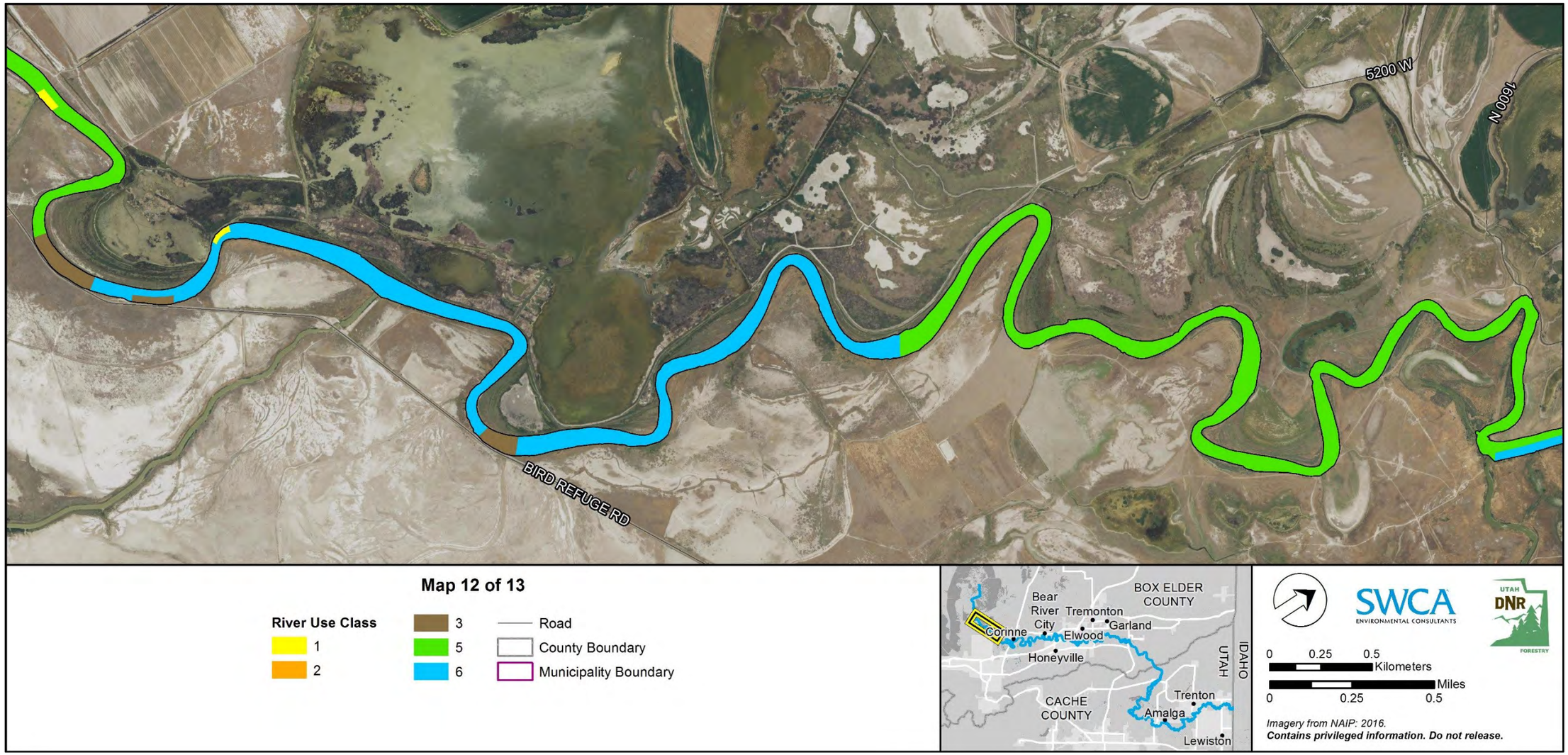


Figure 1.8. River use classes for the Bear River, Map 12.

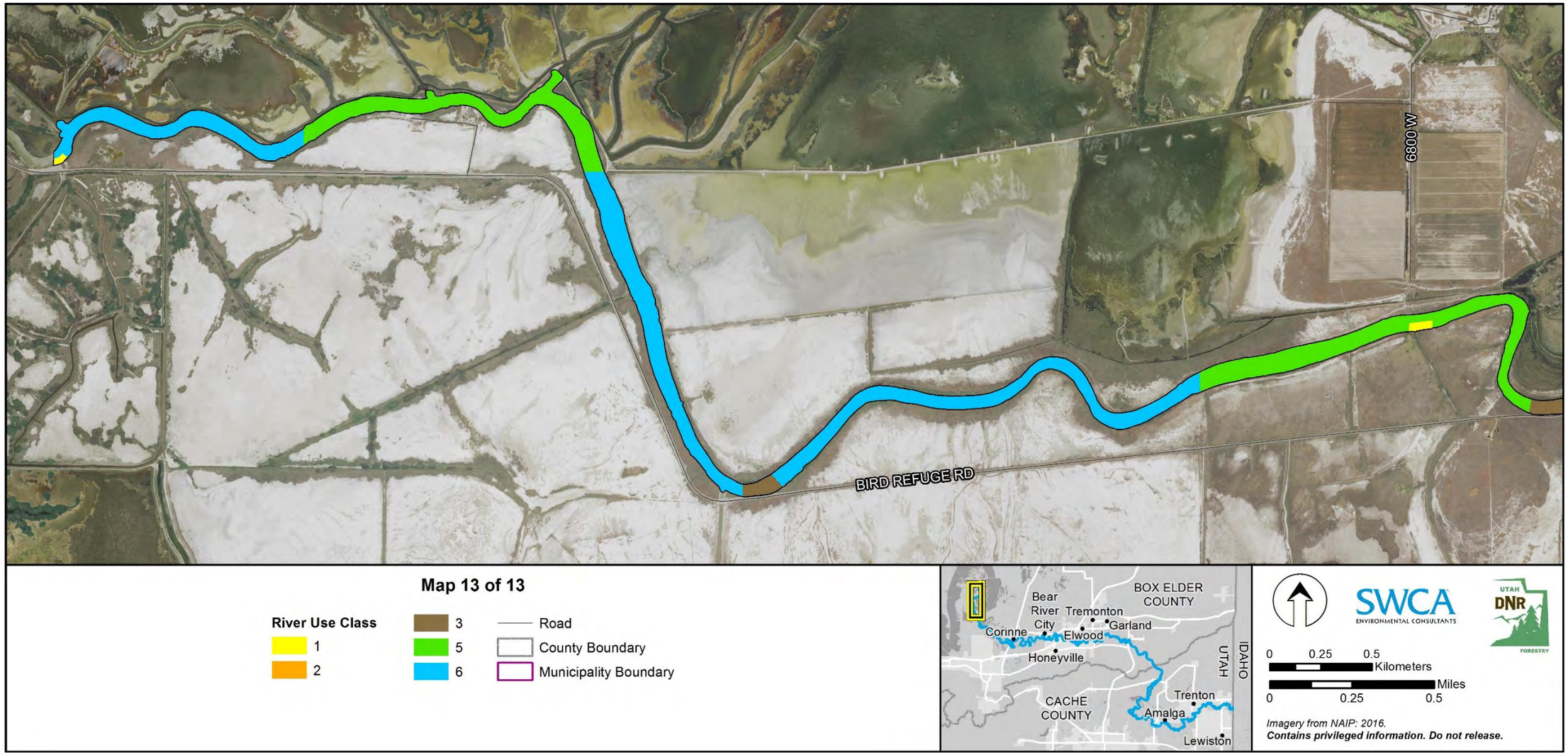
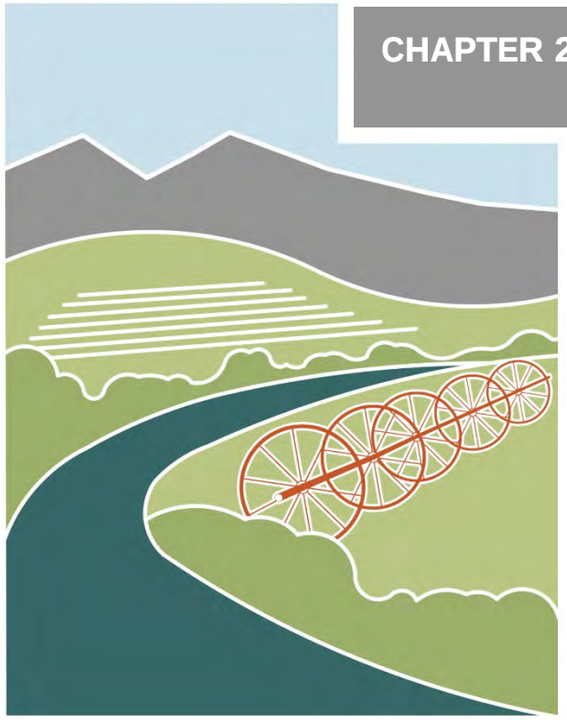


Figure 1.8. River use classes for the Bear River, Map 13.



2.1 Introduction

Originating on the north slope of the Uinta Mountains, the Bear River flows through Utah, Wyoming, and Idaho, and is the largest tributary, both length and volume, to Great Salt Lake. From the Idaho border to Great Salt Lake, the Bear River flows for over 100 miles through wetlands, towns, and agricultural landscapes. The Bear River has arguably been a focal point for humans since their initial arrival in Cache and Bear River Valleys thousands of years ago. Before Euro-American contact, areas surrounding the Bear River and the valleys of northern Utah were home to Western and Northwestern Shoshone bands (Heaton 2005). Over time, the river has provided the region's inhabitants with irrigation, transportation, food and water, and recreation, as well as hydropower and other community and ecosystem services.

In an excerpt from *An Expedition to the Valley of the Great Salt Lake of Utah*, Howard Stansbury, a major in the U.S. Army Corps of Topographical Engineers, recounts exploring the Bear River and Cache Valleys in 1849–1850:

> Following the same route which I had taken when coming up, we arrived at Bear River on the evening of the 11th, and encamped. The examination of Cache Valley occupied several days. Crossing over the range of low, rounded hills through which Bear River has cut a passage, we entered this beautiful and picturesque valley, which was then covered with a profusion of rich green grass, and adorned and diversified by numerous clumps of willows. Our attempt to cross it directly was frustrated by meeting with a deep, quiet stream, called the Muddy, which rises in the hills dividing the southern end of the valley from Ogden's Hole, and winds through the tall grass without banks, until it discharges its waters into Bear River, just before the stream enters the valley of the Salt Lake. We were in consequence driven some eight miles to the south, and effected our crossing where the valley is full of swampy springs, affording abundance of good sweet water, and excellent grass. Speckled trout of large size abounded in the streams. After crossing the Muddy, we skirted the eastern side of the valley for thirty-five miles in a northerly direction, crossing successively Blacksmith's Fork, Logan's Fork, High Fork, Gros Bois, and Rush Creek, all tributaries of Bear River, which latter stream traverses the valley from the north, until it breaks through the range forming its western boundary and enters that of the lake. (Stansbury 1855)

Both natural processes and human habitation have changed the conditions along the Bear River. The current conditions of the river's vegetation communities, flow regimes, channel location, and water quality continue to change and are different from what they were 1,000, 100, or even 10 years ago.

By the 1890s, the Bear River's first major diversion structure (Wheelon Dam) was built at Bear River Canyon between Box Elder and Cache Counties to support the Hammond Canal system (Figure 2.1). Irrigation benefits were also realized upstream of the river (e.g., at Cache Junction, Utah, in 1920; Figure 2.2). By the 1920s, Cutler Dam, which provided hydroelectric power in addition to irrigation water, was under construction and would eventually flood most of Bear River Canyon and would back water further up into Cache Valley (Figures 2.3 and 2.4).

Figure 2.1. Bear River Canyon, 1890s. Diversion dam (Wheelon Dam) was installed to put water in Hammond Canal system. This site was later flooded by Cutler Dam. Used by permission, Special Collections & Archives, Merrill-Cazier Library, Utah State University.

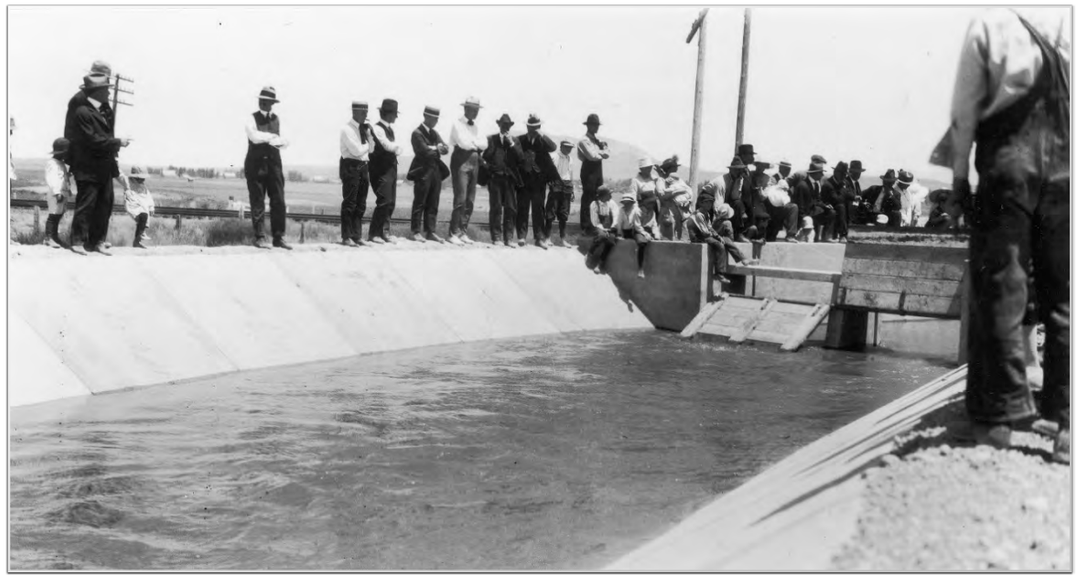


Figure 2.2. Group watching first water pumped from Bear River into canals at Cache Junction, Utah, 1920. Used by permission, Special Collections & Archives, Merrill-Cazier Library, Utah State University.

Figure 2.3. Cutler Dam construction in Bear River Canyon, Utah, 1925–1927. Used by permission, Special Collections & Archives, Merrill-Cazier Library, Utah State University.

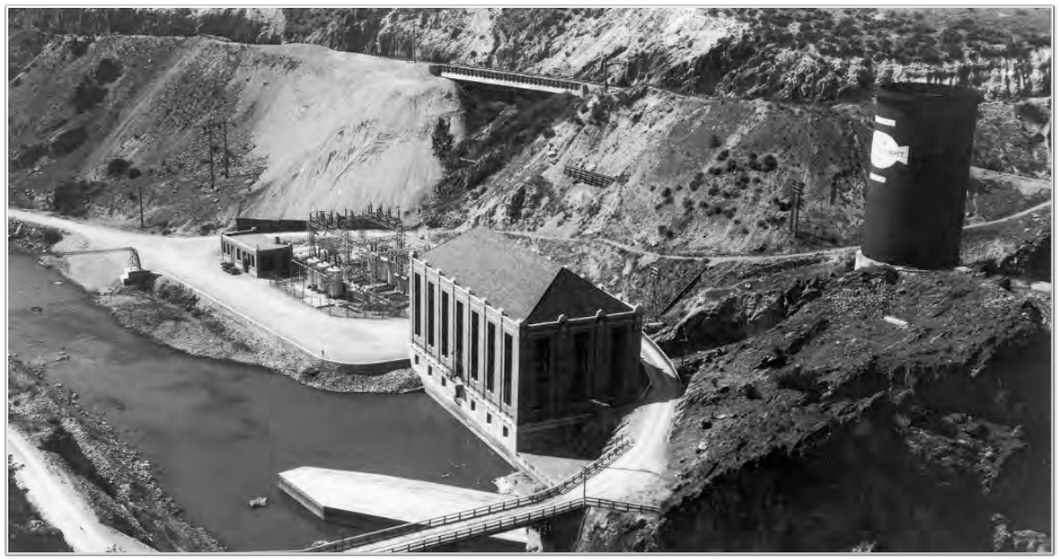


Figure 2.4. Cutler Dam hydroelectric plant, Bear River Canyon, Utah, 1920s. Used by permission, Special Collections & Archives, Merrill-Cazier Library, Utah State University.

The growth of towns along the Bear River necessitated road and railroad crossings, as illustrated in Figures 2.5 and 2.6. The bounty of the Bear River and its adjacent wetlands extended—and continue to extend—beyond water resources to food and recreation, as illustrated by the dozens of hunter vehicles parked at the Bear River Migratory Bird Refuge in the late 1930s (Figure 2.7).

Figure 2.5. Stage Station at Hampton's Ford. Used by permission, Utah State Historical Society.

Figure 2.6. Southern Pacific bridge over the Bear River at Corrine, Utah, ca. 1905. Used by permission, Special Collections & Archives, Merrill-Cazier Library, Utah State University.

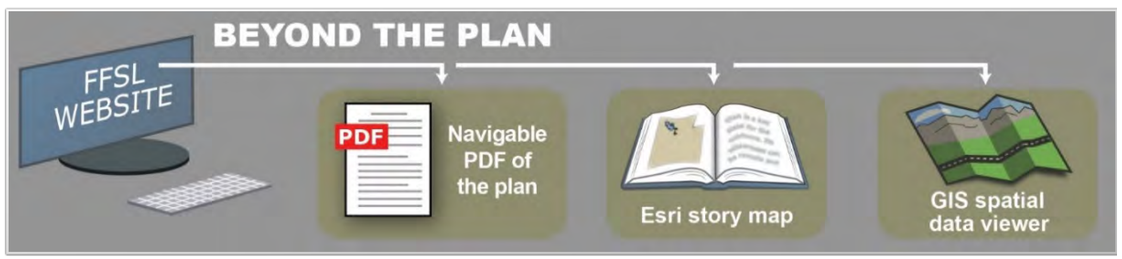
Figure 2.7. View from the observation tower shows many hunters' vehicles parked at the headquarters of the Bear River Migratory Bird Refuge, October 15, 1938. This panoramic view shows the surrounding salt marshes and mountains in the background. Used by permission, Special Collections & Archives, Merrill-Cazier Library, Utah State University.

There is considerable stakeholder interest in maintaining and enhancing current conditions of the Bear River, which can play a role in mitigating or possibly avoiding future impacts to Bear River sovereign lands. Unfortunately, unpermitted disposal of fill material on Bear River sovereign lands continues, as illustrated in Figure 2.8. The BRCMP focuses specifically on FFSL's mandate to manage state sovereign lands associated with the Bear River, but it implicitly includes community recognition of the value of the larger Bear River corridor and watershed.

Figure 2.8. Unpermitted disposal of fill material on Bear River sovereign lands.

This chapter provides a description of current conditions on Bear River sovereign lands and is broken down into three resource sections: Ecosystem Resources, Water Resources, and Community Resources. The current conditions reported here are based on best available data. FFSL recognizes that a management document cannot be a complete inventory of all information, and that there are still gaps in our understanding of the Bear River. Where applicable, the BRCMP 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 Wildlife Action Plan* (Utah Wildlife Action Plan Joint Team 2015), whereas readers interested in the effects of land use on water quality can review *Riparian Buffer Design Guidelines For Water Quality and Wildlife Habitat Functions on Agricultural Landscapes in the Intermountain West* (Johnson and Buffler 2008).

Information in this chapter 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 BRCMP can be updated accordingly in response. Planning documents like this typically provide comprehensive maps illustrating the resources and data presented. Because of the length of the BRCMP planning area, the number of resources, and the number of data layers, including a map book for each individual resource is too cumbersome to include in 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.



Finally, as an organizational construct, the Bear River has been broken into six segments, A, B, C1, C2, C3, and D, beginning at the Idaho border and terminating at Great Salt Lake. The six 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. For example, the boundary between Segments B and C1 at Cutler Dam is approximately at the Cache-Box Elder County line. Changes in hydrological characteristics of the river (e.g., Malad River confluence and Reeder Overflow Canal diversion) also correspond to segment breaks. That said, FFSL management decisions are more closely associated with river use *classes* rather 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 such as weed management and restoration efforts. Table 2.1 provides the distribution of river use classes by segment, expressed as percentages of the total area of each segment.

Table 2.1. River Use Class Percentages by River Segment

Segment	Class 1	Class 2	Class 3	Class 5	Class 6
A	21%	2%	0%	69%	8%
B	100%	0%	0%	0%	0%
C1	10%	1%	0%	89%	0%
C2	0%	2%	4%	93%	0%
C3	7%	2%	1%	80%	9%
D	1%	0%	4%	46%	50%

Note: Class 4 is not applied to the BRCMP planning area.

2.2 Ecosystem Resources

Ecosystem resources in the BRCMP 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 system of plant and animal communities, water, geography, elevation, and other environmental components that provide food and cover for individual species. The Bear River and its adjacent lands and tributaries form a corridor that provides wildlife species with food and cover and facilitates their movement throughout the landscape. A healthy river corridor provides migration routes for wildlife to move through contiguous habitats and 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, enhancing, and rehabilitating impaired habitats.

HABITATS

The *Utah Wildlife Action Plan* was created to manage native wildlife species in Utah and their habitats to help prevent them from being listed under the Endangered Species Act (Utah Wildlife Action Plan Joint Team 2015). The BRCMP planning area, defined as the bed and banks of the Bear River that extends through Box Elder and Cache Counties, contains four DWR high-priority key habitats for species of greatest conservation need (SGCN) according to the *Utah Wildlife Action Plan* (Utah Wildlife Action Plan Joint Team 2015). These key habitats are aquatic-forested, aquatic-scrub/shrub, emergent, and riverine. 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 BRCMP uses Southwest Regional Gap Analysis Project (SWReGAP) data to define the variety of cover types through which the Bear 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 landscape features like the Bear River. Using this readily available spatial 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] 2005). Similar land cover types have been grouped together into more generic habitats, resulting in seven wildlife habitats (Table 2.2). Aquatic wildlife habitat is associated with the Bear River itself and with open water that is adjacent to sovereign lands (e.g., Cutler Reservoir). The remaining habitat cover types in the planning area were derived from SWReGAP data, and percentages were calculated based on the cumulative length of each habitat type along the boundary of Bear River sovereign lands, i.e., bed and banks of the river.

Table 2.2. Habitat Types Adjacent to the Planning Area

Habitat Type	Length of the Planning Area (percentage)
Aquatic (DWR key habitat)*	58%
Wetland (DWR key habitat)†	18%
Annual grassland	< 1%
Agriculture	11%
Developed (open space to low intensity and medium to high intensity)	1%
Shrubland	1%
Riparian (DWR key habitat) ‡	12%

* Aquatic habitat is the approximately 107-mile-long Bear River and adjacent open water habitat and is comparable to DWR's riverine aquatic key habitat.

† Wetland habitat is comparable to DWR's emergent aquatic key habitat.

‡ Riparian habitat is comparable to DWR's aquatic-forested and aquatic-scrub/shrub key habitats.

Physical features and characteristic species of the seven planning area habitats are described and illustrated below (Figures 2.9 through 2.15). Characteristic species were developed with assistance from the BRCMP planning team and are sorted alphabetically by common name.

AQUATIC

Physical Features

Comprises the riverine portion of the planning area (the approximately 107-mile-long Bear River) and Cutler Reservoir.

Plant Species

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

Mammal Species

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

Bird Species

American coot (*Fulica americana*), American white pelican (*Pelecanus erythrorhynchos*), American wigeon (*Anas americana*), bald eagle (*Haliaeetus leucocephalus*), bank swallow (*Riparia riparia*), barn swallow (*Hirundo rustica*), belted kingfisher (*Megaceryle alcyon*), black tern (*Chlidonias niger*), black-crowned night-heron (*Nycticorax nycticorax*), blue-winged teal (*Anas discors*), Bonaparte's gull (*Chroicocephalus philadelphia*), cackling goose (*Branta hutchinsii*), California gull (*Larus californicus*), Canada goose (*Branta canadensis*), canvasback (*Aythya valisineria*), Caspian tern (*Hydroprogne caspia*), cattle egret (*Bubulcus ibis*), cinnamon teal (*Anas cyanoptera*), Clark's grebe (*Aechmophorus clarkii*), cliff swallow (*Petrochelidon pyrrhonota*), common goldeneye (*Bucephala clangula*), common merganser (*Bucephala clangula*), double-crested cormorant (*Phalacrocorax auritus*), Forster's tern (*Sterna forsteri*), Franklin's gull (*Leucophaeus pipixcan*), gadwall (*Anas strepera*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), green-winged teal (*Anas carolinensis*), horned grebe (*Podiceps auritus*), lesser scaup (*Aythya affinis*), mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), northern rough-winged swallow (*Stelgidopteryx serripennis*), northern shoveler (*Anas clypeata*), osprey (*Pandion haliaetus*), pied-billed grebe (*Podilymbus podiceps*), red-breasted merganser (*Mergus serrator*), redhead (*Aythya americana*), ring-billed gull (*Larus delawarensis*), ring-necked duck (*Aythya collaris*), ruddy duck (*Oxyura jamaicensis*), snow goose (*Chen caerulescens*), snowy egret (*Egretta thula*), sora (*Porzana carolina*), trumpeter swan (*Cygnus buccinator*), tundra swan (*Cygnus columbianus*), violet-green swallow (*Tachycineta thalassina*), western grebe (*Aechmophorus occidentalis*), and white-faced ibis (*Plegadis chihi*).

Fish Species

Black bullhead (*Ameiurus melas*), black crappie (*Pomoxis nigromaculatus*), bluegill sunfish (*Lepomis macrochirus*), brown trout (*Salmo trutta*), channel catfish (*Ictalurus punctatus*), common carp (*Cyprinus carpio*), common logperch (*Percina caprodes*), fathead minnow (*Pimephales promelas*), gizzard shad (*Dorosoma cepedianum*), green sunfish (*Lepomis cyanellus*), largemouth bass (*Micropterus salmoides*), longnose dace (*Rhinichthys cataractae*), mountain whitefish (*Prosopium williamsoni*), redside shiner (*Richardsonius balteatus*), sculpin species (*Cottus* sp.), smallmouth bass (*Micropterus dolomieu*), speckled dace (*Rhinichthys osculus*), Utah sucker (*Catostomus ardens*), and walleye (*Sander vitreus*)

Bluehead sucker (*Catostomus discobolus*) was historically present in the Bear River. Sampling efforts are ongoing to determine its presence.

Reptile and Amphibian Species

American bullfrog (*Rana catesbeiana*), common slider (*Pseudemys scripta*), desert night snake (*Hypsiglena torquata deserticola*), desert striped whipsnake (*Masticophis taeniatus taeniatus*), Great Basin gopher snake (*Pituophis catenifer deserticola*), Great Basin rattlesnake (*Crotalus viridis lutosus*), Great Basin skink (*Eumeces skiltonianus utahensis*), Great Basin whiptail (*Cnemidophorus tigris tigris*), Great Plains toad (*Bufo cognatus*), greesn frog (*Rana clamitans*), leopard frog (*Lithobates pipiens*), long-nosed leopard lizard (*Gambelia wislizenii*), northern desert horned lizard (*Phrynosoma platyrhinos platyrhinos*), northern sagebrush lizard (*Sceloporus graciosus*), regal ring-necked snake (*Diadophis punctatus regalis*), rubber boa (*Charina bottae*), short horned lizard (*Phrynosoma douglasii*), side-blotched lizard (*Uta stansburiana*), tiger salamander (*Ambystoma tigrinum*), valley gartersnake (*Thamnophis sirtalis fitchi*), wandering gartersnake (*Thamnophis elegans vagrans*), western (boreal) toad (*Anaxyrus* [syn. *Bufo*] *boreas*), western chorus frog (*Pseudacris triseriata*), western yellow-bellied racer (*Coluber constrictor mormon*), and Woodhouse's toad (*Anaxyrus* [syn. *Bufo*] *woodhousii*)

Figure 2.9. Physical features and characteristic species of aquatic habitat in the planning area.

WETLAND

Physical Features

Covers approximately 18% of the length of the planning area. Includes emergent marsh, wet meadow, playa, 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 arctic rush (*Juncus arcticus* var. *balticus*), broadleaf cattail (*Typha latifolia*), bulrushes (*Schoenoplectus acutus*, *S. americanus*, and *S. pungens*), common reed (*Phragmites australis*), duckweeds, knotweeds (*Polygonum* spp.), pondweeds (*Potamogeton* spp.), and reed canarygrass (*Phalaris arundinacea*)

Common vegetation occurring in sparsely vegetated playas includes basin wild rye (*Leymus cinereus*), greasewood (*Sarcobatus vermiculatus*), inland saltgrass (*Distichlis spicata*), iodinebush (*Allenrolfea occidentalis*), Lemmon's alkaligrass (*Puccinellia lemmonii*), and spiny hopsage (*Grayia spinosa*).

Shrubby wetland areas are 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

Common raccoon (*Procyon lotor*), little brown bat (*Myotis lucifugus*), long-eared myotis (*Myotis evotis*), long-legged myotis (*Myotis volans*), Muskrat, North American beaver, Townsend's big-eared bat (*Corynorhinus townsendii*), and western jumping mouse (*Zapus princeps*).

Bird Species

American avocet (*Recurvirostra americana*), American coot, bank swallow, barn owl (*Tyto alba*), barn swallow, black tern, black-crowned night-heron, black-necked stilt (*Himantopus mexicanus*), brown-headed cowbird (*Molothrus ater*), California gull, Canada goose, cattle egret, cinnamon teal, cliff swallow, common yellowthroat (*Geothlypis trichas*), Forster's tern, Franklin's gull, great blue heron, great egret, greater yellowlegs (*Tringa melanoleuca*), green-winged teal, killdeer (*Charadrius vociferus*), long-billed curlew (*Numenius americanus*), mallard, marbled godwit (*Limosa fedoa*), marsh wren (*Cistothorus palustris*), northern harrier (*Circus cyaneus*), sandhill crane (*Grus canadensis*), northern rough-winged swallow, northern shoveler, red-winged blackbird (*Agelaius phoeniceus*), ring-billed gull, ruddy duck, savannah sparrow (*Passerculus sandwichensis*), snowy egret, song sparrow (*Melospiza melodia*), sora, spotted sandpiper (*Actitis macularius*), Virginia rail (*Rallus limicola*), white-faced ibis, and yellow-headed blackbird (*Xanthocephalus xanthocephalus*).

Fish Species

Fathead minnow, green sunfish, longnose dace, mosquitofish (*Gambusia affinis*), redside shiner, and speckled dace.

Reptile and Amphibian Species

American bullfrog, common slider, desert night snake, desert striped whipsnake, Great Basin gopher snake, Great Basin rattlesnake, Great Basin skink, Great Basin whiptail, Great Plains toad, green frog, leopard frog, long-nosed leopard lizard, northern desert horned lizard, northern sagebrush lizard, regal ring-necked snake, rubber boa, short horned lizard, side-blotched lizard, spadefoot toads (*Scaphiopus* spp. and *Spea* spp.), tiger salamander, valley gartersnake, wandering gartersnake, western (boreal) toad, western chorus frog, western yellow-bellied racer, and Woodhouse's toad,

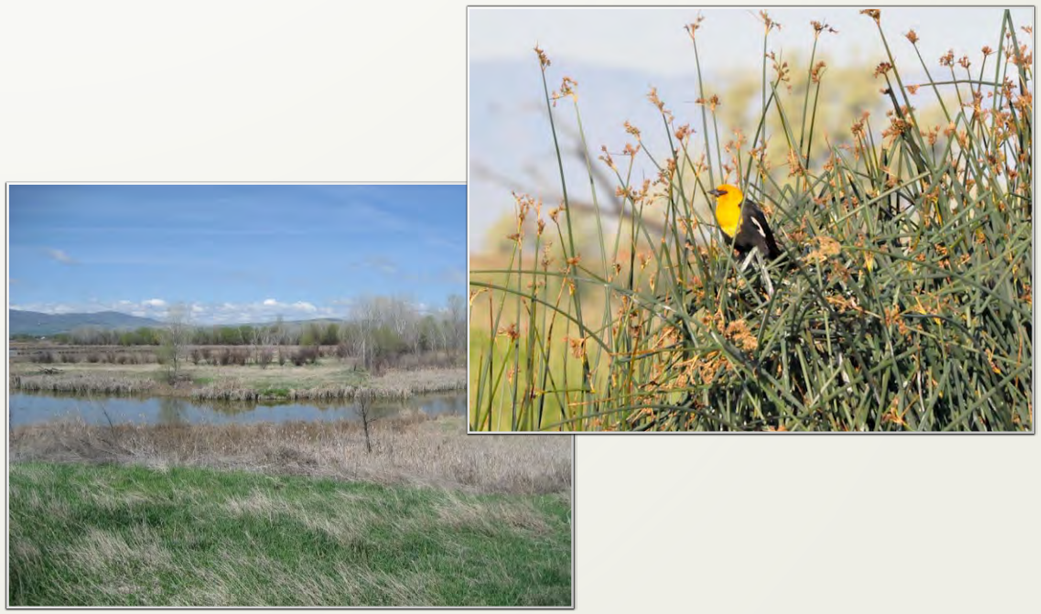


Figure 2.10. Physical features and characteristic species of wetland habitat in the planning area.

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

Coyote (*Canis latrans*), little brown bat, long-legged myotis, montane vole (*Microtus montanus*), mule deer (*Odocoileus hemionus*), northern pocket gopher (*Thomomys talpoides*), red fox (*Vulpes vulpes*), rock squirrel (*Otospermophilus variegatus*), vagrant shrew (*Sorex vagrans*), and western spotted skunk (*Spilogale gracilis*).

Bird Species

American kestrel (*Falco sparverius*), American robin (*Turdus migratorius*), barn owl, brewer's blackbird (*Euphagus cyanocephalus*), California quail (*Callipepla californica*), common raven (*Corvus corax*), European starling (*Sturnus vulgaris*), green-tailed towhee (*Pipilo chlorurus*), horned lark (*Eremophila alpestris*), house finch (*Haemorhous mexicanus*), killdeer, northern harrier, ring-necked pheasant (*Phasianus colchicus*), short-eared owl (*Asio flammeus*), spotted towhee (*Pipilo maculatus*), vesper sparrow (*Pooecetes gramineus*), western kingbird (*Tyrannus verticalis*), and western meadowlark (*Sturnella neglecta*).

Reptile and Amphibian Species

American bullfrog, common slider, desert night snake, desert striped whipsnake, Great Basin gopher snake, Great Basin rattlesnake, Great Basin skink, Great Basin whiptail, Great Plains toad, green frog, leopard frog, Long-nosed leopard lizard, northern desert horned lizard, northern sagebrush lizard, regal ring-necked snake, rubber boa, short horned lizard, side-blotched lizard, spadefoot toads, tiger salamander, valley gartersnake, wandering gartersnake, western (boreal) toad, western chorus frog, western yellow-bellied racer, and Woodhouse's toad.

Figure 2.11. Physical features and characteristic species of annual grassland habitat in the planning area.

AGRICULTURE

Physical Features

Covers approximately 11% 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

Black rat (*Rattus rattus*), brown (Norway) rat (*Rattus norvegicus*), coyote, deer mouse (*Peromyscus maniculatus*), house mouse (*Mus musculus*), little brown bat, long-legged myotis, montane vole, mountain cottontail (*Sylvilagus nuttallii*), mule deer, northern pocket gopher, red fox, rock squirrel, striped skunk (*Mephitis mephitis*), vagrant shrew, western harvest mouse (*Reithrodontomys megalotis*), and western spotted skunk.

Bird Species

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

Reptile and Amphibian Species

American bullfrog, common slider, desert night snake, desert striped whipsnake, Great Basin gopher snake, Great Basin rattlesnake, Great Basin skink, Great Basin whiptail, Great Plains toad, spadefoot toads, green frog, leopard frog, long-nosed leopard lizard, northern desert horned lizard, northern sagebrush lizard, regal ring-necked snake, rubber boa, short horned lizard, side-blotched lizard, tiger salamander, valley gartersnake, wandering gartersnake, western (boreal) toad, western chorus frog, western yellow-bellied racer, and Woodhouse's toad.

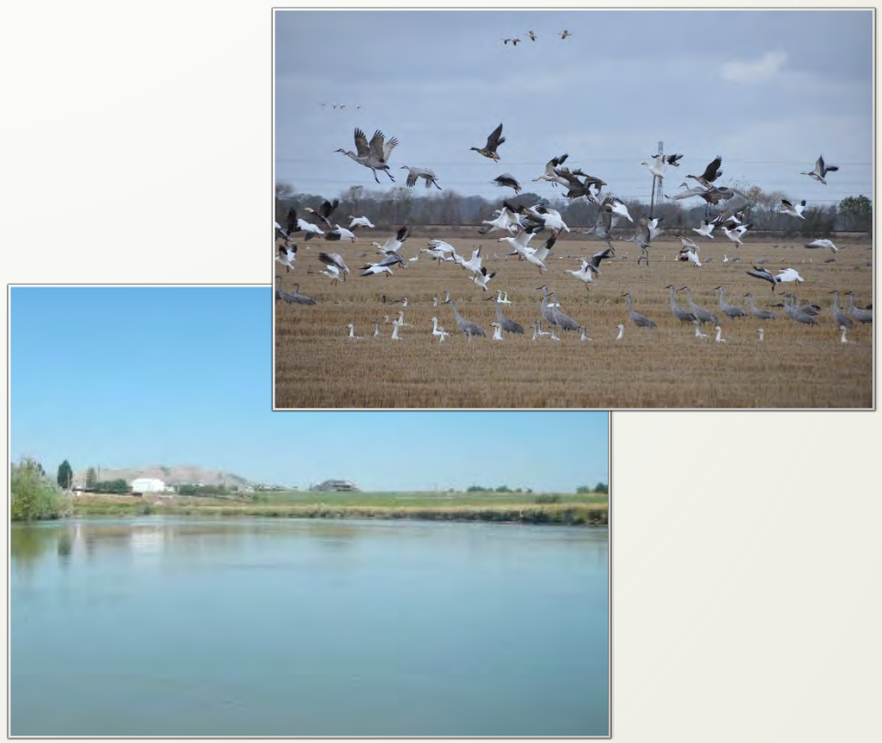


Figure 2.12. Physical features and characteristic species of agriculture habitat in the planning area.

DEVELOPED

Physical Features

Covers approximately 1% 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 black medic (*Medicago lupulina*), cheatgrass, common mallow (*Malva neglecta*), field bindweed (*Convolvulus arvensis*), lambsquarter (*Chenopodium album*), and puncturevine (*Tribulus terrestris*).

Mammal Species

Black rat, brown (Norway) rat, common raccoon, deer mouse, house mouse, little brown bat, long-legged myotis, mule deer, northern pocket gopher, rock squirrel, and striped skunk.

Bird Species

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

Reptile and Amphibian Species

American bullfrog, common slider, desert night snake, desert striped whipsnake, Great Basin gopher snake, Great Basin rattlesnake, Great Basin skink, Great Basin whiptail, Great Plains toad, green frog, leopard frog, long-nosed leopard lizard, northern desert horned lizard, northern sagebrush lizard, regal ring-necked snake, rubber boa, short horned lizard, side-blotched lizard, spadefoot toads, tiger salamander, valley gartersnake, wandering gartersnake, western (boreal) toad, western chorus frog, western yellow-bellied racer, and Woodhouse's toad.

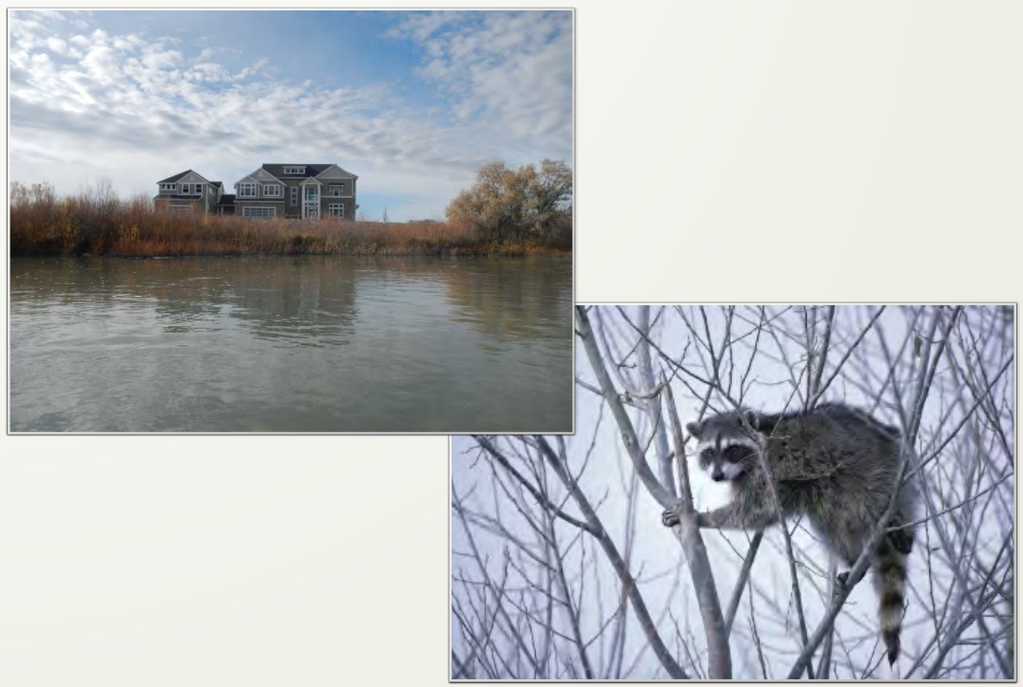


Figure 2.13. Physical features and characteristic species of developed habitat in the planning area.

SHRUBLAND

Physical Features

Covers approximately 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 greasewood, shadscale saltbush (*Atriplex confertifolia*), and spiny hopsage. 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, deer mouse, little brown bat, long-legged myotis, montane vole, mule deer, northern pocket gopher, pronghorn (*Antilocapra americana*), rock squirrel, Rocky Mountain elk (*Cervus elaphus nelsoni*), sagebrush vole (*Lemmiscus curtatus*), striped skunk, and vagrant shrew.

Bird Species

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

Reptile and Amphibian Species

American bullfrog, common slider, desert night snake, desert striped whipsnake, Great Basin gopher snake, Great Basin rattlesnake, Great Basin skink, Great Basin whiptail, Great Plains toad, green frog, leopard frog, long-nosed leopard lizard, northern desert horned lizard, northern sagebrush lizard, regal ring-necked snake, rubber boa, short horned lizard, side-blotched lizard, spadefoot toads, tiger salamander, valley gartersnake, wandering gartersnake, western (boreal) toad, western chorus frog, western yellow-bellied racer, and Woodhouse's toad.

Figure 2.14. Physical features and characteristic species of shrubland habitat in the planning area.

RIPARIAN

Physical Features

Covers approximately 12% 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 cottonwoods (e.g., *Populus fremontii*), boxelder (*Acer negundo*), and peachleaf willow (*Salix amygdaloides*). Introduced tree species such as Russian olive (*Elaeagnus angustifolia*), saltcedar (*Tamarix ramosissima*), and Siberian elm (*Ulmus pumila*) are also common.

Shrubs include native and introduced willows (*Salix exigua* and *Salix fragilis*, respectively), skunkbush sumac (*Rhus trilobata*), and Woods' rose (*Rosa woodsii*). 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

American mink (*Mustela vison*), little brown bat, long-eared myotis, long-legged myotis, long-tailed vole (*Microtus longicaudus*), long-tailed weasel (*Mustela frenata*), montane shrew, mule deer, North American beaver, Rocky Mountain elk, Townsend's big-eared bat, and vagrant shrew.

Bird Species

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

Reptile and Amphibian Species

American bullfrog, common slider, desert night snake, desert striped whipsnake, Great Basin gopher snake, Great Basin rattlesnake, Great Basin skink, Great Basin whiptail, Great Plains toad, green frog, leopard frog, long-nosed leopard lizard, northern desert horned lizard, northern sagebrush lizard, regal ring-necked snake, rubber boa, short horned lizard, side-blotched lizard, spadefoot toads, tiger salamander, valley gartersnake, wandering gartersnake, western (boreal) toad, western chorus frog, western yellow-bellied racer, and Woodhouse's toad.

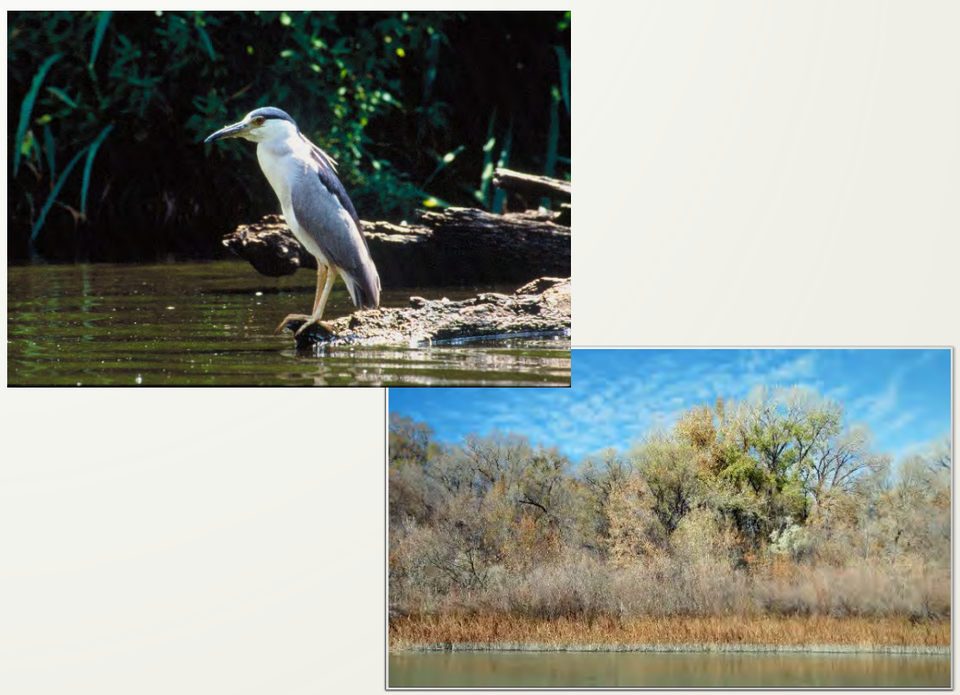


Figure 2.15. Physical features, and characteristic species of riparian habitat in the planning area.

Habitat Location and Condition

Figure 2.16 lists and describes the habitats in the planning area by river segment. This figure also provides the DWQ aquatic habitat beneficial uses by river segment (e.g., warm water aquatic) and important bird areas (IBAs). IBAs are areas identified for conservation and management that are vital to birds and other biodiversity. IBAs may provide important migratory stop-over, foraging, nesting, or wintering habitat. The IBA program—administered by BirdLife International and its United States partner, the National Audubon Society—is an international effort to identify, monitor, and protect areas that provide essential habitat for bird populations (Wells et al. 2005).

Using a cross section of the river, Figure 2.17 shows specific aquatic and riverbank habitats and characteristics along the Bear 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, fertilizer runoff, and sedimentation). Hence, habitat in the planning area has been altered from its pre-settlement condition. In general, agriculture (although providing some wildlife habitat itself) and other human disturbances have in many places fragmented contiguous grasslands, shrublands, and woodlands and have decreased the riparian corridor width along the river. In addition, invasive species have been introduced to river habitats. Over time, habitats in the planning area were altered through the draining and filling of wetlands, construction of dams, diversions for irrigation, and the degradation of water quality. More recently, a concerted effort has been taken to protect and restore wildlife habitat associated with the Bear River, including conservation action planning, PacifiCorp mitigation measures, improving irrigation water management and efficiency, and stream restoration projects to benefit native fishes and other aquatic and riparian-dependent species. The Nature Conservancy has facilitated and, with the involvement of 12 participating organizations (including FFSL), has developed a conservation action plan (CAP) for the entire Bear River (The Nature Conservancy 2010). The process of developing the CAP includes a viability assessment intended to determine the existing and target health of key ecological attributes of the river. The Nature Conservancy has identified riparian vegetation presence and vegetation composition as key ecological attributes associated with the Bear River and determined that these attributes are in fair and poor condition, respectively, with a desired condition of good[1].

[1] *Very Good* = Functioning at its ecologically desired status. Requires little human intervention. *Good* = Functioning within its range of acceptable variation. May require human intervention to maintain this status. *Fair* = Outside its range of acceptable variation. Requires human intervention. Vulnerable to serious degradation if left unchecked. *Poor* = If condition remains for extended period, restoration or prevention of extirpation will be practically impossible (The Nature Conservancy 2010).

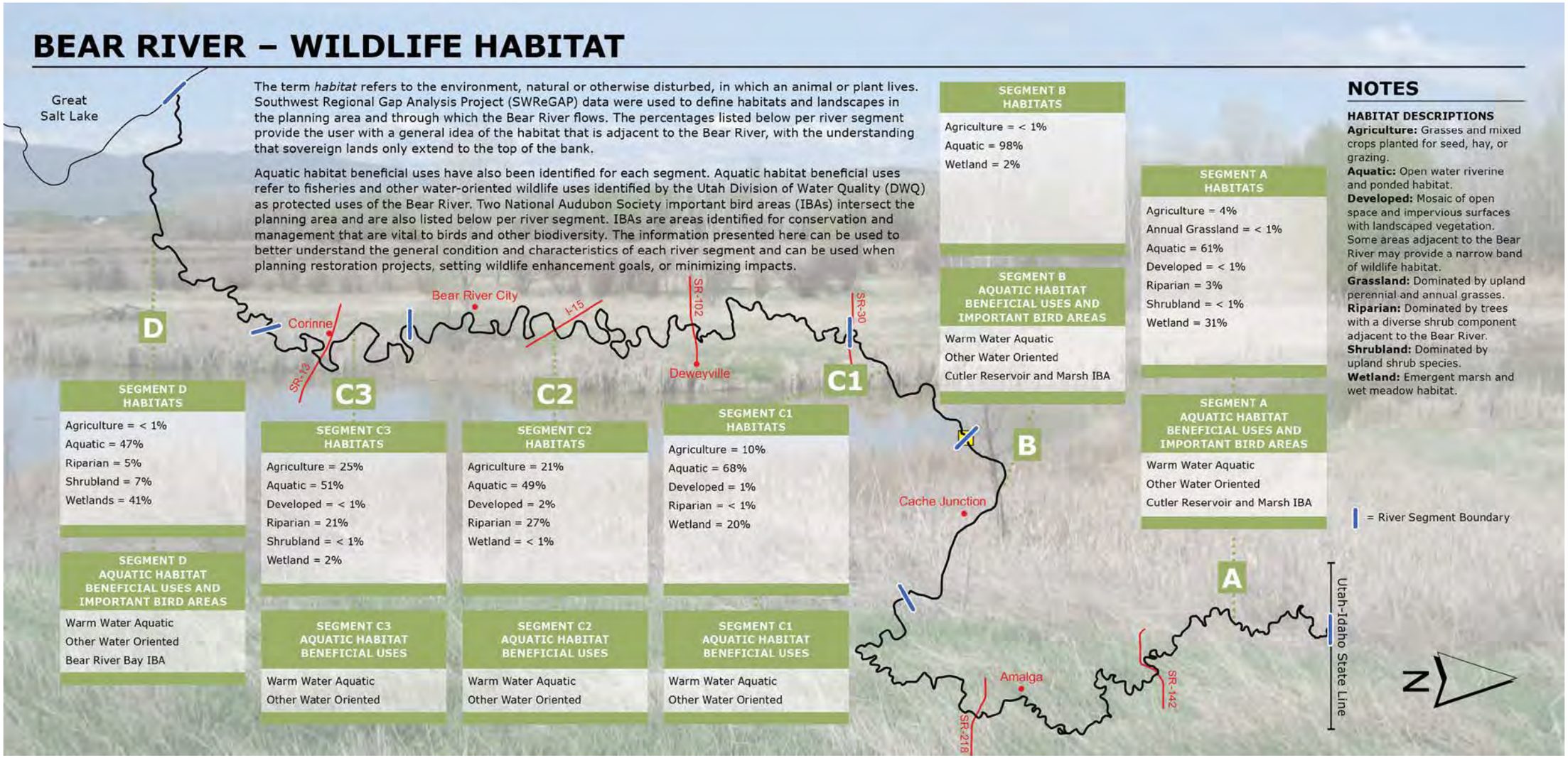


Figure 2.16. Habitats in the planning area by river segment.

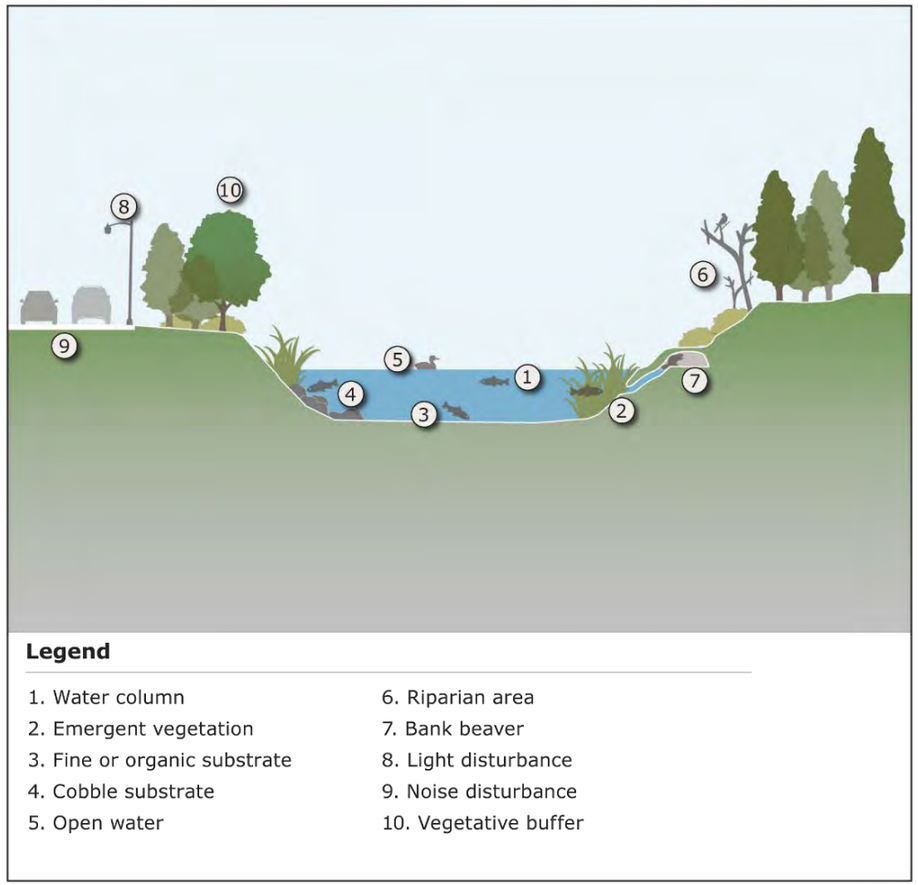


Figure 2.17. Cross section showing aquatic and riverbank habitats and characteristics in the planning area.

VEGETATION

A major structural component of habitat is vegetation. Vegetation is often classified by layers such as grasses, forbs, shrubs, and trees. A mosaic of these vegetation types 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 weed species. These categories are not mutually exclusive but are helpful when making management decisions such as restoration, regulations, and weed management, respectively. The coverage 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 native plant species in the planning area (along with their wetland indicator status) that are recommended for restoration or revegetation projects. The wetland indicator status of a plant reflects the likelihood of its presence in a wetland and influences where a particular plant species is planted during restoration and revegetation projects. For example, a plant with an upland wetland indicator status almost never occurs in wetlands and would therefore be planted in an upland area rather than a wetland area. This plant list should serve as a guide for planning restoration or revegetation projects, but it is not meant to be exhaustive and does not reflect current seed or plant stock availability.

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

Common Name	Scientific Name	Wetland Indicator Status*
AQUATIC AND WETLAND SPECIES		
Bulrush species	*Schoenoplectus* spp.	OBL
Duckweed species	*Lemna* spp.	OBL
Fineleaf pondweed	*Stuckenia filiformis*	OBL
Longleaf pondweed	*Potamogeton nodosus*	OBL
Sago pondweed	*Stuckenia pectinata*	OBL
Spiral ditchgrass	*Ruppia cirrhosa*	OBL
RIPARIAN TREE SPECIES		
Black cottonwood	*Populus trichocarpa*	FACW
Box elder	*Acer negundo*	FACW
Fremont cottonwood	*Populus fremontii*	FACW
Narrowleaf cottonwood	*Populus angustifolia*	FACW
Peachleaf willow	*Salix amygdaloides*	FACW
Whiplash willow	*Salix lasiandra*	FACW
SHRUB SPECIES		
Big sagebrush	*Artemisia tridentata*	FACU
Black hawthorn	*Crataegus douglasii*	FAC
Broom snakeweed	*Gutierrezia sarothrae*	NI
Chokecherry	*Prunus virginiana*	FAC
Fourwing saltbush	*Atriplex canescens*	UPL
Golden currant	*Ribes aureum*	FAC
Greasewood	*Sarcobatus vermiculatus*	FAC
Narrowleaf willow	*Salix exigua*	FACW
Rubber rabbitbrush	*Ericameria nauseosa*	UPL
Silver buffaloberry	*Shepherdia argentea*	FACU
Skunkbush sumac	*Rhus trilobata*	FACU
Woods' rose	*Rosa woodsii*	FACU
FORB SPECIES		
Blanket flower species	*Gaillardia* spp.	FACU
Hairy false goldenaster	*Chrysopsis villosa*	NI
Lewis flax	*Linum lewisii*	NI
Milkweed species	*Asclepias* spp.	Varies by species
Rocky Mountain beeplant	*Cleome serrulata*	NI
White sagebrush	*Artemisia ludoviciana*	FACU
GRASS SPECIES		
Alkali sacaton	*Sporobolus airoides*	FAC
Arctic rush	*Juncus arcticus*	FACW
Common spikerush	*Eleocharis palustris*	OBL
Inland saltgrass	*Distichlis spicata*	FAC
Nuttall's alkaligrass	*Puccinellia nuttalliana*	FACW
Sand dropseed	*Sporobolus cryptandrus*	FACU
Sandberg bluegrass	*Poa secunda*	FACU
Western wheatgrass	*Pascopyrum smithii*	FAC

* 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 (Lichvar et al. 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.

Cache County has two federally listed threatened plant species, and Box Elder County has one federally listed candidate plant species (DWR 2015a). Table 2.4 provides a list of these three species and indicates whether potential habitat for them 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
Goose Creek milkvetch *Astragalus anserinus*	Candidate	On soils derived from the Salt Lake Formation in semi-barren areas in sagebrush, rabbitbrush, and juniper communities.	Box Elder	None; suitable habitat not present in the planning area.
Maguire primrose *Primula maguirei*	Threatened	In crevices on north-facing or well-shaded south-facing damp ledges and on overhanging rocks along canyon walls.	Cache	None; suitable habitat not present in the planning area. Plant is only known to occur in Logan Canyon.
Ute ladies'-tresses *Spiranthes diluvialis*	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.	Cache	Low to moderate in Cache County. No records in Box Elder 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.

Figure 2.18. Weedy plant species terminology and definitions.

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 displace native vegetation, resulting in a reduction of plant diversity and a decrease in overall habitat structure and function.

Five noxious weed species of particular concern in the planning area are common reed (*Phragmites australis*), goatsrue (*Galega officinalis*), purple loosestrife (*Lythrum salicaria*), Russian olive (*Elaeagnus angustifolia*), and saltcedar (*Tamarix ramosissima*). Brief descriptions of these five species are provided in Figure 2.19. Most weed management along the river is being done by the Cache County Weed Division and the Box Elder County Weed Department in cooperation with FFSL. Many private landowners along the river also provide weed management. USU is currently managing *Phragmites* along the Bear River northeast of Trenton, Utah. Concerns about these specific species include the high potential for spreading, impeded access to the river, degradation to wildlife habitat, impairment of the viewshed, and fire safety.

Common Reed (*Phragmites australis*)

Common reed is a 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). This species is a Class 3 declared noxious weed in Utah. Class 3 weeds are found extensively throughout Utah, and statewide efforts are aimed at containing smaller infestations (UDAF 2017).

Goatsrue (*Galega officinalis*)

Goatsrue is a perennial, shrubby plant that can grow up to 6 feet tall. It is known to invade wet, disturbed areas such as streambanks, low pastures, and ditches, forming dense thickets. It is toxic to livestock. This species is a Class 1B declared noxious weed in Utah. Class 1B weeds are known to exist in the state in very limited populations, pose a serious threat to the state, and should be considered as a very high priority (UDAF 2017).

Purple Loosestrife (*Lythrum salicaria*)

Purple loosestrife is a noxious weed that can create a monoculture in wet meadows, ditches, and along the banks of rivers and lakes. It reproduces by prolific seed production and a creeping rootstock. It can rapidly outcompete native vegetation and is difficult to remove once established. This species is a Class 2 declared noxious weed in Utah. Class 2 weeds pose a threat to the state, should be considered a high priority for control, and are known to exist in varying populations throughout the state. Class 2 weed populations are at levels where control or eradication may be possible (UDAF 2017). Photograph credit: Steve Dewey, Utah State University, Bugwood.org.

Russian Olive (*Elaeagnus angustifolia*)

Russian olive originated in Europe and 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. 2009). 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 tree throughout Utah, Salt Lake, and Davis Counties. This species is a Class 4 declared noxious weed in Utah. Class 4 prohibited noxious weeds are annual, biennial, or perennial designated plants that pose a threat to the state through the propagation and retail sale in the greenhouse and plant nursery industry (UDAF 2017).

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 3 declared noxious weed in Utah. Class 3 weeds are found extensively throughout Utah, and statewide efforts are aimed at containment of smaller infestations (UDAF 2017).

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

Other introduced, aggressive, invasive, and/or noxious weed species that are common in the planning area and in adjacent agricultural land and open space that should be considered as part of integrated weed management are listed in Table 2.5. One species in particular—reed canarygrass—forms dense stands of grass from large root stocks that outcompete other species. Reed canarygrass is an aggressive plant adapted to wet conditions and can be problematic when growing in canals and irrigation ditches.

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

Common Name	Scientific Name
Bull thistle	*Cirsium vulgare*
Burdock	*Arctium minus*
Canada thistle	*Cirsium arvense*
Cheatgrass	*Bromus tectorum*
Cocklebur	*Xanthium strumarium*
Common ragweed	*Ambrosia artemisiifolia*
Common teasel	*Dipsacus fullonum*
Field bindweed	*Convolvulus arvensis*
Hoary cress (whitetop)	*Cardaria draba*
Houndstongue	*Cynoglossum officinale*
Mullein	*Verbascum thapsus*
Pepperweed	*Lepidium* sp.
Poison hemlock	*Conium maculatum*
Puncturevine (goathead)	*Tribulus terrestris*
Quackgrass	*Elymus repens*
Reed canarygrass	*Phalaris arundinacea*
Russian knapweed	*Acroptilon repens*
Scotch thistle	*Onopordum acanthium*
Spotted knapweed	*Centaurea stoebe*
Yellow sweetclover	*Melilotus officinalis*

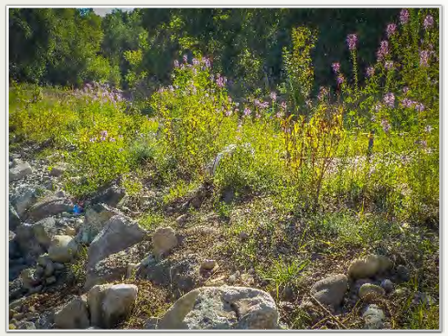
RESTORATION

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 Bear River specifically include increased water and air pollution, habitat fragmentation, 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 effects and provide important ecosystem services to the surrounding areas and the waterway itself. Restoring native plant diversity and improving habitats throughout the Bear River corridor can reduce erosion and flooding hazards, increase pollination for urban and agricultural environments, reduce water pollution, benefit wildlife, improve visual aesthetics, 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 Bear 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 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 along the Bear River are native vegetation enhancement, streambank stability, and water quality improvement (Figure 2.20). Restoration of more "free-flowing" or naturalized flows in the Bear River system—although supported by FFSL—is outside their management directive. In addition, because of human encroachment, water rights, and the highly regulated nature of the Bear River for flood control, irrigation, hydroelectric power, and municipal and industrial uses, a return to a hydrograph with high spring runoff driven by melting snow is unlikely without changes to Utah water law and associated contracts or permits. Figure 2.21 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. In some cases, rock may be required to mitigate for erosional forces.



Native Vegetation Enhancement

Noxious 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 cause habitat degradation, 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 comprise a major goal of restoration efforts along the Bear River.

Streambank Stability

Some areas of the Bear River experience significant bank erosion from flowing water, wave action, or adjacent land uses. In many locations, vertical cut banks are present that cannot support vegetation, making them more likely to erode. The lowering of the channel bottom can also cause major undercutting in places and significantly decreased bank stability. Physically restoring banks and channels while maintaining connections to floodplains and riparian areas is crucial to restoring a variety of habitats along the river.

Water Quality Improvement

Land development, agricultural practices, and grazing activities along the river can contribute to water quality degradation such as nutrient loading and low DO. Increased phosphorous and nitrogen can lead to algal blooms and other effects. Improving agriculture practices, grazing practices, and other land uses, and implementing natural pretreatment methods are important in reducing source pollutants entering the river. Examples of such improvements include off-channel watering, riparian exclosures, bioswales, and other best management practices.

Figure 2.20. Restoration focus areas in the planning area.

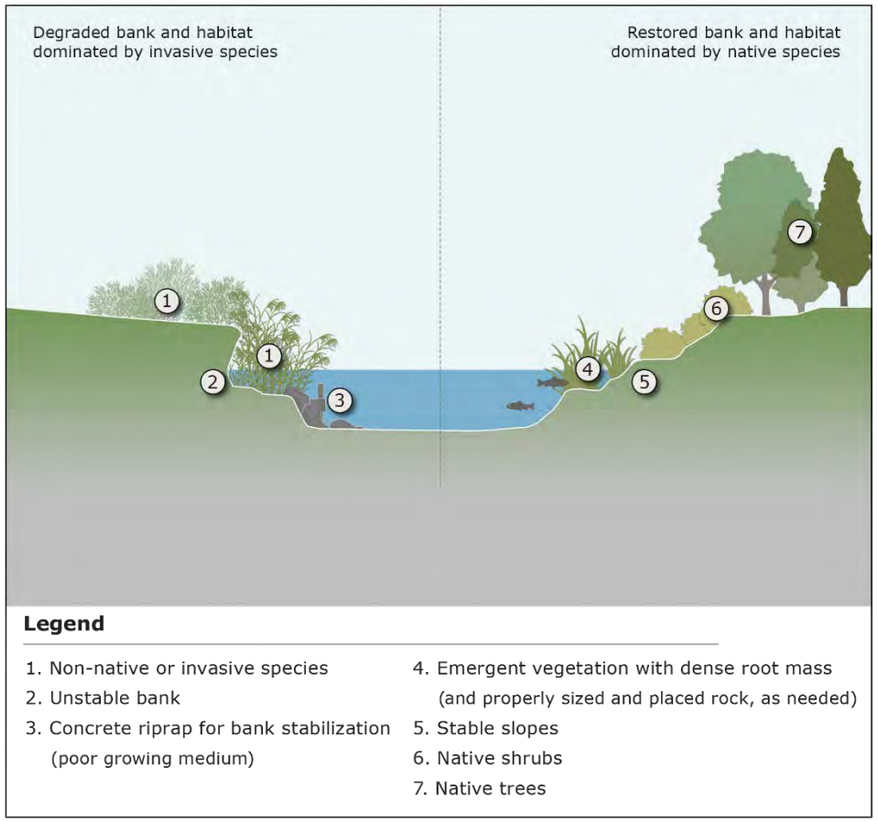


Figure 2.21. River restoration cross section showing degraded banks versus restored riverbank with diverse habitats.

Further Reading

Applied River Morphology (Rosgen 1996)

Bear River Baseline. Human and Biophysical Attributes of the Bear River Corridor in Cache and Box Elder Counties (Utah Division of Forestry, Fire & State Lands 2015)

Bear River Migratory Bird Refuge Habitat Management Plan (Olsen et al. 2004)

Bear River Migratory Bird Refuge Phragmites Control Plan (Olsen 2007)

Bear River Watershed: Its Role in Maintaining the Bear River Migratory Bird Refuge (Toth et al. 2010)

Box Elder County, Utah Resource Assessment (Natural Resources Conservation Service et al. 2005a)

Cache County, Utah Resource Assessment (Natural Resources Conservation Service et al. 2005b)

Conservation Buffers: Design Guidelines for Buffers, Corridors, and Greenways (Bentrup 2008)

Final Great Salt Lake Comprehensive Management Plan and Record of Decision (SWCA 2013)

Land Protection Plan – Bear River Watershed (U.S. Fish and Wildlife Service 2013)

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

Riparian Buffer Design Guidelines For Water Quality and Wildlife Habitat Functions on Agricultural Landscapes in the Intermountain West (Johnson and Buffler 2008)

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

The Bear River A Conservation Priority (The Nature Conservancy 2010)

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

Geographic Information System Data Layers

Conservation Easements, Habitat Types, Important Bird Areas, LANDFIRE Existing Vegetation Types, National Wetlands Inventory, Noxious Weeds, Soil Types, SWReGAP Land Cover Types

Wildlife Species

INTRODUCTION

This section provides information on populations of wildlife species known to occur in or adjacent to the Bear River in the planning area. 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 Bear River corridor provides habitat for many native wildlife species and provides important stop-over areas and foraging opportunities for migratory birds. Given anthropogenic 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 in Figures 2.9–2.15.

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 Bear River ecosystem, such as beavers and common carp. Planning area stakeholders may also be interested in wildlife species that have recreational value, such as birds. Not only does the presence of a variety of wildlife provide recreational opportunities, it is also an indicator of a healthy ecosystem.

Figure 2.22 illustrates natural areas and wildlife watching areas along the Bear River that are likely to contain bird and fish species known to occur in each segment as well as fish species common to all segments. Riparian areas and agriculture fields generally support a range of wildlife species.

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

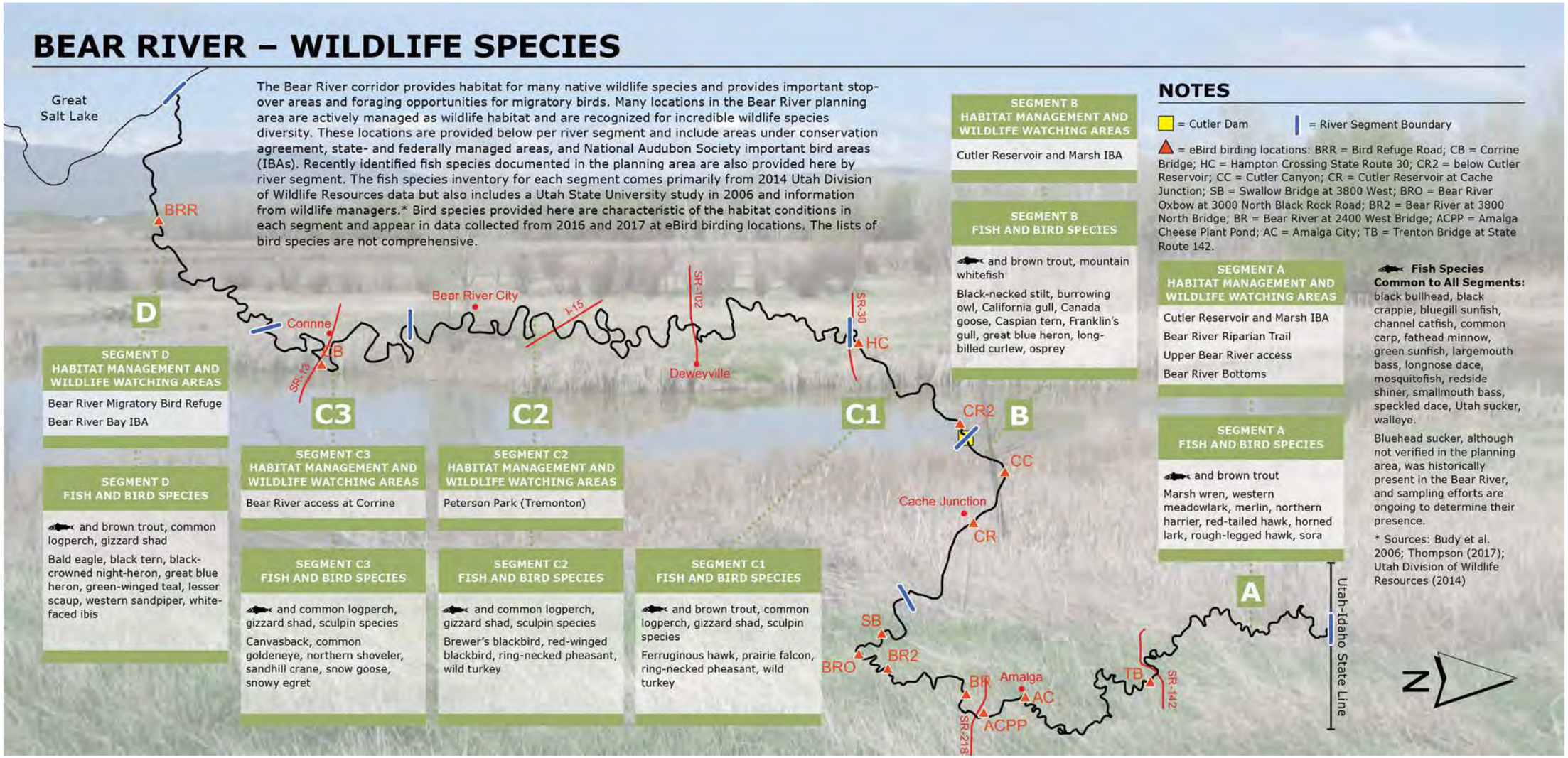


Figure 2.22. Wildlife watching areas, bird species, and Utah Division of Wildlife Resources fish occurrence data in the planning area by river segment.

SPECIAL-STATUS SPECIES

Special-status wildlife species include federally listed species that are protected under the Endangered Species Act (threatened and endangered species), species considered candidates for such listing (candidate species), Utah wildlife species of concern (SPC), and species receiving special management under a conservation agreement to preclude the need for federal listing. Cache County has two federally listed wildlife species (brown [grizzly] bear [*Ursus arctos*] and Canada lynx [*Lynx canadensis*]), and Box Elder County has two federally listed wildlife species (gray wolf [*Canis lupus*] and Lahontan cutthroat trout [*Oncorhynchus clarkii henshawi*]) (DWR 2015a). Suitable habitat for these four species is not present in the planning area; however, gray wolves and Canada lynx could pass through the planning area. These lists of special-status wildlife species are compiled using known species occurrences and observations from the Utah Natural Heritage Program's Biodiversity Tracking and Conservation System. Other federally listed species managed by the Endangered Species Program, e.g., yellow-billed cuckoo (*Coccyzus americanus*), could occur in the planning area. In the Arid West, the yellow-billed cuckoo is usually restricted to cottonwood-dominated riparian areas along larger rivers, which may be present in places along the Bear River.

The *Utah Wildlife Action Plan* identifies 141 SGCN in Utah and provides a summary of the distribution and abundance information on these species and a threat-assessment for some species and their habitats. Many SGCN, such as the white-faced ibis (*Plegadis chihi*), are found along the Bear River and adjacent habitats.

Nineteen Utah wildlife SPC may occur in or directly adjacent to the Bear River. These comprise nine bird species, six mammal species, two amphibian species, and two invertebrate species. In addition, two fish species receiving special management under a conservation agreement have the potential to occur in the Bear River. Table 2.6 provides a summary of these species, including their status, general habitat association, and potential for occurrence in the planning area or adjacent habitat.

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 or adjacent to the Planning Area
BIRDS			
American white pelican *Pelecanus erythrorhynchos*	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 Bear River foraging or flying over, and is a regular visitor to Cutler Reservoir.
Bald eagle *Haliaeetus leucocephalus*	SPC	This species tends to nest within 200 meters of water. They eat mainly fish and carrion.	Bald eagles have been documented along the Bear River and at Cutler Reservoir.
Bobolink *Dolichonyx oryzivorus*	SPC	This species nests in marshes, grasslands, and in hayfields.	This species has been documented at Cutler Marsh. It may use riparian and wetland areas along the Bear River during the summer months.
Ferruginous hawk *Buteo regalis*	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 may nest along the Bear River and can be observed in the spring and fall migrating along the river. Sightings of this species in the Cutler Reservoir area are common in the winter.
Grasshopper sparrow *Ammodramus savannarum*	SPC	This ground-nesting species forages and nests in grasslands.	This species has been documented at the Bear River Migratory Bird Refuge and also occurs in Cutler Canyon at the north end of Cutler Reservoir.
Lewis's woodpecker *Melanerpes lewis*	SPC	This species generally occurs in open woodland. It is a cavity nester.	This species may use riparian areas along the Bear River for nesting and foraging.

Common Name and Scientific Name	Status*	General Habitat Association	Potential to Occur in or adjacent to the Planning Area
Long-billed curlew *Numenius americanus*	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 Bear River in the spring, summer, and fall. They prefer short grass habitats, including shortgrass and mixed-grass prairies as well as agricultural fields. This species can also be observed on the west side of Cutler Marsh and in the Cutler Reservoir management units.
Sharp-tailed grouse *Tympanuchus phasianellus*	SPC	This ground-nesting species uses bunchgrass habitats interspersed with deciduous shrubs.	This species is limited to a remnant population in eastern Box Elder, Cache, and Morgan Counties and may occur where suitable habitat is present along the Bear River. It also occurs in Cutler Canyon at the north end of Cutler Reservoir.
Short-eared owl *Asio flammeus*	SPC	This species nests and forages in open grasslands, shrublands, and other open habitats.	This species does not nest along the Bear River but can be observed foraging or migrating along the river in the spring, summer, and fall. It can also be observed at Cutler Marsh.
MAMMALS			
Canada lynx *Lynx canadensis*	T-ESA	This species prefers montane coniferous forests.	This species, if present, may pass through the planning area but would not be a resident.
Fringed myotis *Myotis thysanodes*	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 Bear River.
Gray wolf *Canis lupus*	E-ESA	This species can live in many habitat types but prefers areas with little human activity.	This species, if present, may pass through the planning area but would not be a resident.
Preble's shrew *Sorex preblei*	SPC	This species occurs in a range of habitats, but is thought to have an affinity for wetland areas.	This species may occur in wetland areas along the Bear River.
Townsend's big-eared bat *Corynorhinus townsendii*	SPC	This species is often found near forested and riparian areas and uses caves, mines, and buildings for day roosting and winter hibernation.	This species is likely to occur at least sporadically along the Bear River.
Western red bat *Lasiurus blossevillii*	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 Bear River.
AMPHIBIANS			
Great Plains toad *Bufo cognatus*	SPC	This species prefers grassland, desert, and agricultural habitats. This species burrows underground and becomes inactive during the cold winter months.	This species may occur in agricultural areas adjacent to the Bear River.
Western (boreal) toad *Anaxyrus* (syn. *Bufo*) *boreas*	SPC	This species is generally a high elevation species that occurs in wetlands surrounded by a variety of habitats.	This species occurs in Box Elder and Cache Counties but has not been documented along the Bear River though suitable habitat is present (DWR 2005)
FISH			
Bluehead sucker *Catostomus discobolus*	CS	This species is a bottom dweller that feeds primarily on algae that it scrapes from the surface of rocks. It occurs in the upper Colorado River system, the Snake River system, and the Lake Bonneville basin.	This species is known to occur in the Bear River historically; however, bluehead suckers were not detected in the upper reaches of the lower Bear River (below Cutler Reservoir) during an inventory survey (DWR 2014).

Common Name and Scientific Name	Status*	General Habitat Association	Potential to Occur in or adjacent to the Planning Area
Bonneville cutthroat trout *Oncorhynchus clarkia utah*	CS	Like other salmonids, this species generally requires clean, well-oxygenated water and a complexity of habitat and overhanging banks for cover.	This species is generally found in and near tributary creeks to the Bear River. Historically, this species was abundant in the main stem of the Bear River, but it is unclear if the species occurred downstream of Tremonton, Utah. It is presently rare in the main stem, although it is occasionally collected in the Bear River and in the Cutler Reservoir (Davies 2017).
INVERTEBRATES			
California floater *Anodonta californiensis*	SPC	This species is found in lakes and lake-like stream environments.	This species may still be extant in portions of the Bear River drainage.
Western pearlshell *Margaritifera falcata*	SPC	This species is found in small streams.	This species was collected in 2010 from the upper Bear River near the Utah-Wyoming border (Wyoming Game and Fish Department 2010).

* 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

DWR has periodically conducted fish surveys of the Bear River at the Utah-Idaho state line, immediately below Cutler Dam, and in the Bear River near the town of Tremonton, Utah. These surveys have been specifically conducted to locate populations of bluehead sucker (*Catostomus discobolus*), which have occurred historically in the Bear River in Utah and have been found as recently as 1994 (DWR 2014).

Two surveys were conducted in 2006 on the Bear River at the Utah-Idaho state line and near the town of Tremonton, Utah (Budy et al. 2006). These surveys yielded 12 fish species of varying abundances, five of which were found at both sites. Common carp (*Cyprinus carpio*) were found in high abundance at both sites. Channel catfish (*Ictalurus punctatus*) were found at both sites but were significantly more abundant at the Tremonton site. Black crappie (*Pomoxis nigromaculatus*) were found in medium abundances at both sites. Green sunfish (*Lepomis cyanellus*) were found at low and medium abundances at the Utah-Idaho state line and Tremonton sites respectively. Smallmouth bass (*Micropterus dolomieu*) were found at medium and low abundances at the Utah-Idaho state line and Tremonton sites respectively. Fathead minnow (*Pimephales promelas*) were found only at the Utah-Idaho state line site and were found in high abundance. Six fish species were found only at the Tremonton site during the 2006 surveys. Of these six species, gizzard shad (*Dorosoma cepedianum*) were found in high abundances. Bluegill sunfish (*Lepomis macrochirus*) and walleye (*Sander vitreus*) were found at medium densities. Fish found in low abundances included black bullhead (*Ameiurus melas*), common logperch (*Percina caprodes*), and redside shiner (*Richardsonius balteatus*).

Several sites in Cutler Reservoir and two sites in the Bear River above Cutler Reservoir were surveyed in 2005 and 2006 (Budy et al. 2006). These surveys focused primarily on the Cutler Reservoir, but also included one site upstream of the reservoir and one site at the Utah-Idaho border. Fourteen species were recorded in varying abundances. Common carp, fathead minnow, green sunfish, black bullhead, channel catfish, bluegill sunfish, and black crappie were all found in abundance at all sites. Largemouth bass (*Micropterus salmoides*) and walleye were found at each site but not necessarily at high abundance. Utah Sucker (*Catostomus ardens*) were found at each site at low abundances. Smallmouth bass were found at low abundances in three of five sites within the reservoir. Mountain whitefish (*Prosopium williamsoni*) and brown trout (*Salmo trutta*) were found at one site each at low abundances.

A 5-mile stretch of the Bear River immediately below Cutler Dam was surveyed in 2014 and yielded seven fish species (DWR 2014). Common carp were the most abundant species during this survey. Brown trout, channel catfish, fathead minnow, common logperch, Utah sucker, and walleye were all present at low abundances.

Overall, 16 fish species have been found during surveys in the planning area within the last decade, most of which are introduced species (Table 2.7). Of the 16 species found, three are native to the Bear River: Utah sucker, redside shiner, and mountain whitefish. The other 13 have been introduced to reservoirs on the Bear River and within the Bear River as sportfish or as forage for said sportfish. Other native fish species known to occur in the Bear River are sculpin species (*Cottus* spp.), longnose dace (*Rhinichthys cataractae*), and speckled dace (*Rhinichthys osculus*) (Thompson 2017).

Table 2.7. Fish Species in the Planning Area

Common Name	Scientific Name	Notes and Location in Planning Area
NATIVE FISH		
Bluehead sucker	*Catostomus discobolus*	Occurred historically in all segments
Longnose dace	*Rhinichthys cataractae*	Found in all segments
Mountain whitefish	*Prosopium williamsoni*	Found in Segment B
Redside shiner	*Richardsonius balteatus*	Found in all segments
Sculpin species	*Cottus* spp.	Found in Segments C1, C2, and C3
Speckled dace	*Rhinichthys osculus*	Found in all segments
Utah sucker	*Catostomus ardens*	Found in all segments
NON-NATIVE FISH		
Black bullhead	*Ameiurus melas*	Found in all segments
Black crappie	*Pomoxis nigromaculatus*	Found in all segments
Bluegill sunfish	*Lepomis macrochirus*	Found in all segments
Brown trout	*Salmo trutta*	Found in all segments
Channel catfish	*Ictalurus punctatus*	Found in all segments
Common carp	*Cyprinus carpio*	Found in all segments
Common logperch	*Percina caprodes*	Found in Segments C1, C2, C3, and D
Fathead minnow	*Pimephales promelas*	Found in all segments
Gizzard shad	*Dorosoma cepedianum*	Found in Segments C1, C2, C3, and D
Green sunfish	*Lepomis cyanellus*	Found in all segments
Largemouth bass	*Micropterus salmoides*	Found in all segments
Mosquito fish	*Gambusia affinis*	Found in all segments
Smallmouth bass	*Micropterus dolomieu*	Found in all segments
Walleye	*Stizostedion vitreum*	Found in all segments

Sources: Budy et al. (2006); DWR (2014); Thompson (2017).

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 Bear River food web 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 Bear River at two locations between 1998 and 2005: 1) Bear River above Cutler Reservoir and 2) Bear River south of Bear River City (DWQ 2017).

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 2.23. Examples of common taxa collected include beetles (Coleoptera [Elimidae]), flies (Diptera [Chironomidae and Simuliidae]), mayflies (Ephemeroptera [Baetidae]), damselflies (Odonata [Coenagrionidae]), worms (Oligochaeta [Physidae]), caddisflies (Trichoptera [Hydropsychidae and Hydroptilidae]), mites (Trombidiformes), flatworms (Turbellaria), and mollusks (Veneroida [Cyrenidae]) (DWQ 2017).

Table 2.8. Number of Invertebrate Taxa Identified in Bear River Samples Collected Between 1998 and 2005

Bear River Sampling Location	Year (number of taxa)
Bear River City	1998 (19), 2000 (19), 2001 (26), 2002 (12)
Upstream Cutler Reservoir	1998 (26), 1999 (35), 2003 (3), 2004 (9), 2005 (7)

Source: DWQ (2017).

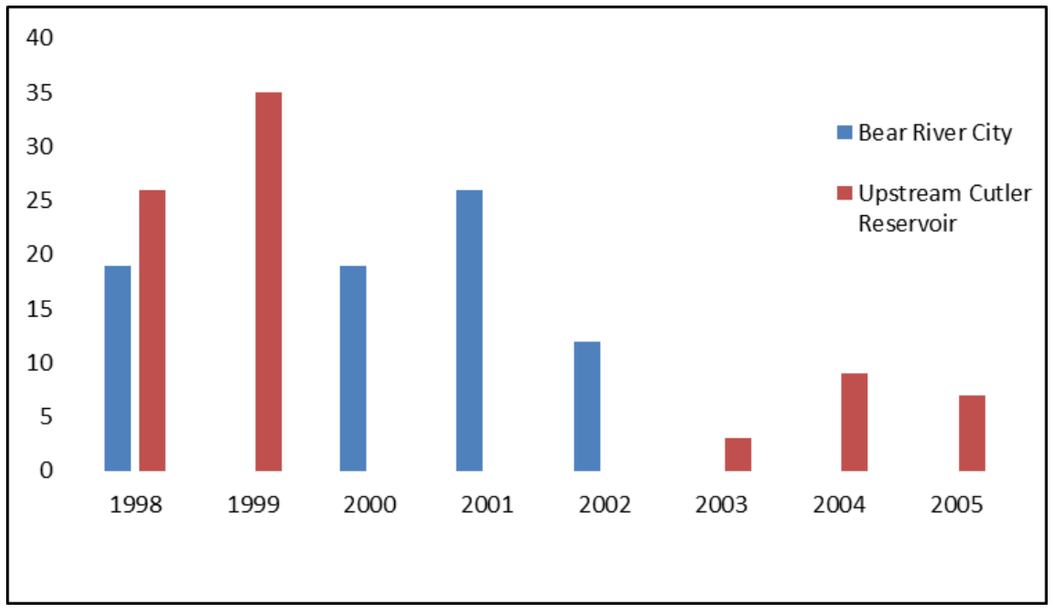


Figure 2.23. Number of invertebrate taxa identified at Bear River sample locations collected between 1998 and 2005.

Findings from the sampling efforts listed above were reported using the observed/expected (O/E) index (Western Center for Monitoring and Assessment of Freshwater Ecosystems and the National Aquatic Monitoring Center 2017) (Table 2.9). The O/E index calculates a numerical value representing the number of observed macroinvertebrate taxa compared to the number of expected taxa for the location based on other reference sites. This value is intended to provide an indication of the integrity of the macroinvertebrate community. Scores that are < or = 0.69 indicate poor conditions. Scores between 0.70 and 0.75 indicate fair conditions. Scores that are > or = 0.76 to approximately 1.4 indicate good conditions. 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 2.9. Aquatic Macroinvertebrate Community Condition in the Planning Area

Location	Dates and Condition				
Bear River Above Cutler Reservoir	11/18/1998	05/10/1999	12/03/2003	11/30/2004	11/22/2005
	1.18 (condition rating good)	0.95 (condition rating good)	0.35 (condition rating poor)	0.59 (condition rating poor)	0.59 (condition rating poor)
Bear River South of Bear River City	11/17/1998	10/31/2000	05/23/2001	11/20/2001	04/07/2002
	0.71 (condition rating fair)	0.71 (condition rating fair)	0.47 (condition rating poor)	0.59 (condition rating poor)	0.83 (condition rating good)

BIRD SPECIES

The Bear River flows into the Bear River Bay of Great Salt Lake where it supports marshes, wet meadows, and open water systems, many of which are found within the Bear River Migratory Bird Refuge. The refuge is critical habitat for more than 250 species of migratory birds (USFWS 2017), and for this reason, the refuge is designated as a Western Hemisphere Shorebird Reserve Network Site of global importance. Other portions of the BRCMP planning area are well-known for bird species diversity and are recognized as IBAs. The BRCMP planning area intersects two IBAs: 1) the Cutler Reservoir and Marsh IBA and 2) the Bear River Bay IBA. Bird species data are available for specific locations in the planning area. Many groups, including the National Audubon Society, conduct bird monitoring along and near the river. Two of the National Audubon Society's 15-mile-diameter count circles for their annual Christmas Bird Count (CBC) overlap the Bear River (one at the bird refuge, and one near Logan, Utah). Data from these circles were not used because the Logan circle only intersects a small portion of the Bear River and the habitat at the Bear River Migratory Bird Refuge circle is drastically different from the rest of the Bear River corridor. Species counts from over 20 locations along the Bear River and at Cutler Reservoir are available on ebird.org. 2016 and 2017 eBird data from 13 locations in the planning area documented more than 150 bird species along the Bear River (Table 2.10). eBird is a citizen-based global bird observation network that provides data sources for basic information on bird distribution and abundance at a variety of temporal and spatial scales. The presence or absence of species in

addition to bird abundance are documented through checklist data. A birder fills out a checklist of all the birds seen or heard during a particular outing. Submissions are reviewed by automated data quality filters developed by regional birding experts before they are entered into the database, and unusual records are flagged by filters and reviewed by local experts.

Table 2.10. Bird Species Recorded along or near the Bear River Planning Area in 2016 and 2017

Common Name	Scientific Name	Location*
DUCKS, GEESE, AND SWANS		
American wigeon	*Anas americana*	TB, BR, BRO, BRR
Barrow's goldeneye	*Bucephala islandica*	BRR
Bufflehead	*Bucephala albeola*	BRR
Canada goose	*Branta canadensis*	TB, BR, BRO, SB, CC, CR2, HC, CB, BRR
Canvasback	*Aythya valisineria*	CB, BRR
Cinnamon teal	*Anas cyanoptera*	TB, ACPP, BRO, BRR
Common goldeneye	*Bucephala clangula*	TB, BRO, CB, BRR
Common merganser	*Mergus merganser*	BRO, BRR
Gadwall	*Anas strepera*	TB, BR, BRO, SB, BRR
Green-winged teal	*Anas crecca*	ACPP, BRO, BRR
Hooded merganser	*Lophodytes cucullatus*	BRR
Lesser scaup	*Aythya affinis*	BRR
Mallard	*Anas platyrhynchos*	TB, ACPP, BR, BRO, SB, CR2, BRR
Northern pintail	*Anas acuta*	BRO, BRR
Northern shoveler	*Anas clypeata*	TB, BRO, CB, BRR
Red-breasted merganser	*Mergus serrator*	BRR
Redhead	*Aythya Americana*	BRO, BRR
Ring-necked duck	*Aythya collaris*	BRR
Ruddy duck	*Oxyura jamaicensis*	CR, BRR
Snow goose	*Chen caerulescens*	CB, BRR
Trumpeter swan	*Cygnus buccinator*	BRR
Tundra swan	*Cygnus columbianus*	TB, BRO, BRR
Wood duck	*Aix sponsa*	TB
PHEASANTS, GROUSE, AND QUAIL		
California quail	*Callipepla californica*	TB, CR2, BRR
Ring-necked pheasant	*Phasianus colchicus*	TB, BR, BRO, CC, CR2, HC, BRR
Ruffed grouse	*Bonasa umbellus*	BRR
Wild turkey	*Meleagris gallopavo*	CR2, HC, BRR
LOONS AND GREBES		
Clark's grebe	*Aechmophorus clarkii*	BRO, CR, BRR
Common loon	*Gavia immer*	BRR
Eared grebe	*Podiceps nigricollis*	BRR
Horned grebe	*Podiceps auritus*	BRR
Pied-billed grebe	*Podilymbus podiceps*	TB, BR, BRO, CR, BRR
Western grebe	*Aechmophorus occidentalis*	BRO, CR, BRR
PELICANS AND CORMORANTS		
American white pelican	*Pelecanus erythrorhynchos*	TB, BR, BR2, BRO, SB, CR2, HC, CB
Double-crested cormorant	*Phalacrocorax auritus*	TB, CR2, BRR

Common Name	Scientific Name	Location*
EGRETS AND IBIS		
Black-crowned night-heron	*Nycticorax*	TB, BRR
Cattle egret	*Bubulcus ibis*	BRO
Great blue heron	*Ardea Herodias*	TB, BR, BRO, SB, CR2, BRR
Great egret	*Ardea alba*	BR, BRR
Snowy egret	*Egretta thula*	TB, ACPP, BRO, BRR
White-faced ibis	*Plegadis chihi*	TB, BR, BRO, CR2, BRR
VULTURES, HAWKS, AND EAGLES		
Bald eagle	*Haliaeetus leucocephalus*	TB, HC, BRR
Ferruginous hawk	*Buteo regalis*	CR, HC, BRR
Golden eagle	*Aquila chrysaetos*	TB, BRO, CR2, BRR
Northern harrier	*Circus cyaneus*	TB, AC, BR, BRO, SB, CR, CR2, BRR
Osprey	*Pandion haliaetus*	CR2, BRR
Red-tailed hawk	*Buteo jamaicensis*	TB, AC, BR, BR2, BRO, CR, CC, CR2, HC, CB, BRR
Rough-legged hawk	*Buteo lagopus*	TB, AC, BRR
Sharp-shinned hawk	*Accipiter striatus*	BRR
Swainson's hawk	*Buteo swainsoni*	TB, BRO, CR, CR2, BRR
Turkey vulture	*Cathartes aura*	CR2, BRR
RAILS AND CRANES		
American coot	*Fulica americana*	TB, BR, BRO, SB, BRR
Sandhill crane	*Grus canadensis*	TB, BRO, SB, CC, CB, BRR
Sora	*Porzana carolina*	TB, ACPP, BR, BRR
Virginia rail	*Rallus limicola*	BRR

Common Name	Scientific Name	Location*
PLOVERS, SANDPIPERS, AND GULLS		
American avocet	*Recurvirostra americana*	ACPP, BR, BRR
Baird's sandpiper	*Calidris bairdii*	ACPP, BRR
Black tern	*Chlidonias niger*	BRR
Black-necked stilt	*Himantopus mexicanus*	BR, BRR
California gull	*Larus californicus*	TB, BRO, SB, CR2, BRR
Caspian tern	*Hydroprogne caspia*	BRR
Forster's tern	*Sterna forsteri*	TB, BRO, BRR
Franklin's gull	*Leucophaeus pipixcan*	TB, BR, BR2, BRO, SB, CR2, BRR
Greater yellowlegs	*Tringa melanoleuca*	ACPP, CB, BRR
Herring gull	*Larus argentatus*	BRR
Killdeer	*Charadrius vociferus*	TB, ACPP, BR, CC, CR2, CB, BRR
Least sandpiper	*Calidris minutilla*	BR, BRR
Lesser yellowlegs	*Tringa flavipes*	ACPP, BRR
Long-billed curlew	*Numenius americanus*	BRR
Long-billed dowitcher	*Limnodromus scolopaceus*	BRR
Marbled godwit	*Limosa fedoa*	BRR
Pectoral sandpiper	*Calidris melanotos*	ACPP
Red-necked phalarope	*Phalaropus lobatus*	BRR
Ring-billed gull	*Larus delawarensis*	CR, CB, BRR
Sanderling	*Calidris alba*	BRR
Snowy plover	*Charadrius nivosus*	BRR
Solitary sandpiper	*Tringa solitaria*	ACPP, BRR
Spotted sandpiper	*Actitis macularius*	TB, ACPP, CR2, BRR
Western sandpiper	*Calidris mauri*	BRR

Common Name	Scientific Name	Location*
Whimbrel	*Numenius phaeopus*	BRR
Willet	*Tringa semipalmata*	BR, BRR
Wilson's phalarope	*Phalaropus tricolor*	BR, BRR
Wilson's snipe	*Gallinago delicata*	ACPP, BRR
PIGEONS AND DOVES		
Eurasian collared-dove	*Streptopelia decaocto*	TB, AC, ACPP, BR, BR2, BRO, SB, CR, CR2, CB, BRR
Mourning dove	*Zenaida macroura*	TB, BR, BR2, BRO, CC, CR2, BRR
Rock pigeon	*Columba livia*	TB, AC, BR, BR2, CR, CC, CR2, BRR
OWLS		
Barn owl	*Tyto alba*	BR, CB, BRR
Burrowing owl	*Athene cunicularia*	BRR
Great horned owl	*Bubo virginianus*	TB, AC, BR, SB, BRR
Short-eared owl	*Asio flammeus*	BRR
NIGHTJARS		
Common nighthawk	*Chordeiles minor*	ACPP
HUMMINGBIRDS		
Black-chinned hummingbird	*Archilochus alexandri*	CR2
Broad-tailed hummingbird	*Selasphorus platycercus*	TB
KINGFISHERS		
Belted kingfisher	*Megaceryle alcyon*	TB, BR, BR2, BRO, CR, BRR
WOODPECKERS		
Downy woodpecker	*Picoides pubescens*	TB, BR, CR2
Northern flicker	*Colaptes auratus*	TB, AC, BR, BR2, BRO, CR, CC, CR2, CB, BRR
FALCONS		
American kestrel	*Falco sparverius*	TB, AC, BR, BRO, CR, CC, CR2, HC, CB, BRR
Merlin	*Falco columbarius*	TB, BRR
Peregrine falcon	*Falco peregrinus*	BRR
Prairie falcon	*Falco mexicanus*	TB, BR, HC, BRR
FLYCATCHERS		
Eastern kingbird	*Tyrannus tyrannus*	CR2
Say's phoebe	*Sayornis saya*	BRR
Western kingbird	*Tyrannus verticalis*	TB, CR, CR2, BRR
Western wood-pewee	*Contopus sordidulus*	CR2
VIREOS		
Warbling vireo	*Vireo gilvus*	CR2
SHRIKES		
Loggerhead shrike	*Lanius ludovicianus*	BRR
Northern shrike	*Lanius excubitor*	BRR
JAYS AND CROWS		
American crow	*Corvus brachyrhynchos*	TB, BRO, SB, CR, BRR
Black-billed magpie	*Pica hudsonia*	TB, AC, BR, BRO, SB, CC, CR2, HC, CB, BRR
Common raven	*Corvus corax*	TB, BR, CC, CR2, BRR
LARKS		
Horned lark	*Eremophila alpestris*	TB, AC, BR, CC, BRR

Common Name	Scientific Name	Location*
SWALLOWS		
Bank swallow	*Riparia riparia*	TB, BR, CR, CR2, BRR
Barn swallow	*Hirundo rustica*	TB, ACPP, BR, BRO, CR, CR2, BRR
Cliff swallow	*Petrochelidon pyrrhonota*	TB, BR, SB, CR, CR2, BRR
Northern rough-winged swallow	*Stelgidopteryx serripennis*	TB, BR, CR2, BRR
Tree swallow	*Tachycineta bicolor*	TB, BR, BR2, BRO, SB, CR2, BRR
Violet-green swallow	*Tachycineta thalassina*	TB, BRR
CHICKADEES		
Black-capped chickadee	*Poecile atricapillus*	TB, BR, BRO, CR, CC, CR2, BRR
WRENS		
Marsh wren	*Cistothorus palustris*	ACPP, BR, BRO, SB, BRR
THRUSHES		
American robin	*Turdus migratorius*	TB, BR, BR2, BRO, SB, CC, CR2, CB, BRR
Mountain bluebird	*Sialia currucoides*	BRR
Townsend's solitaire	*Myadestes townsendi*	CC
THRASHERS		
Gray catbird	*Dumetella carolinensis*	CR2
STARLINGS		
European starling	*Sturnus vulgaris*	TB, AC, ACPP, BR, BR2, BRO, SB, CR, CR2, CB, BRR
PIPITS		
American pipit	*Anthus rubescens*	BRR

Common Name	Scientific Name	Location*
WAXWINGS		
Cedar waxwing	*Bombycilla cedrorum*	CR2, BRR
WARBLERS		
Common yellowthroat	*Geothlypis trichas*	BRR
Orange-crowned warbler	*Oreothlypis celata*	TB
Wilson's warbler	*Cardellina pusilla*	CR2
Yellow warbler	*Setophaga petechia*	TB, BRO, CR2, BRR
Yellow-breasted chat	*Icteria virens*	CR2
Yellow-rumped warbler	*Setophaga coronata*	TB, BR2
SPARROWS		
American tree sparrow	*Spizelloides arborea*	TB, BRR
Brewer's sparrow	*Spizella breweri*	BRR
Dark-eyed junco	*Junco hyemalis*	TB, BRO, SB, CC, CB, BRR
Grasshopper sparrow	*Ammodramus savannarum*	BRR
Lark sparrow	*Chondestes grammacus*	CR2, BRR
Lincoln's sparrow	*Melospiza lincolnii*	BRR
Sagebrush sparrow	*Artemisiospiza nevadensis*	BRR
Savannah sparrow	*Passerculus sandwichensis*	BRR
Song sparrow	*Melospiza melodia*	TB, AC, BR, BR2, BRO, SB, CR, CC, CR2, BRR
Spotted towhee	*Pipilo maculatus*	CC
Vesper sparrow	*Pooecetes gramineus*	BRR
White-crowned sparrow	*Zonotrichia leucophrys*	TB, AC, BRO, SB, CC, CB, BRR

Common Name	Scientific Name	Location*
TANAGERS, GROSBEAKS, AND BUNTINGS		
Black-headed grosbeak	*Pheucticus melanocephalus*	TB, CR2
Western tanager	*Piranga ludoviciana*	CR2
BLACKBIRDS AND ORIOLES		
Brewer's blackbird	*Euphagus cyanocephalus*	TB, AC, ACPP, BR, CR2
Brown-headed cowbird	*Molothrus ater*	TB, BRR
Bullock's oriole	*Icterus bullockii*	TB, CR2, BRR
Great-tailed grackle	*Quiscalus mexicanus*	BRR
Red-winged blackbird	*Agelaius phoeniceus*	TB, AC, ACPP, BR, BR2, BRO, SB, CC, CR2, BRR
Western meadowlark	*Sturnella neglecta*	TB, AC, BR, BRO, SB, CC, CR2, BRR
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	TB, BR, BRO, SB, CR2, BRR
FINCHES		
American goldfinch	*Spinus tristis*	TB, BRO, CR, CR2, BRR
Common redpoll	*Acanthis flammea*	TB
House finch	*Haemorhous mexicanus*	TB, BR, BRO, SB, BRR
Pine siskin	*Spinus pinus*	TB, BRO, BRR
OLD WORLD SPARROWS		
House sparrow	*Passer domesticus*	TB, AC, BR, BR2, BRO, SB, CR, CR2, BRR

Source: eBird (2017).

* TB = State Route 142 Trenton Bridge; AC = Amalga City; ACPP = Amalga cheese plant pond; BR = Bear River 2400 W Bridge; BR2 = Bear River 3800 N Bridge; BRO = Bear River Oxbow 3000 N Black Rock Road; SB = Swallow Bridge; CR = Cutler Reservoir Cache Junction; CC = Cutler Canyon; CR2 = below Cutler Reservoir; HC = Hampton Crossing State Route 30; CB = Corinne Bridge; and BRR = Bird Refuge Road.

SPECIES OF MANAGEMENT CONCERN

Bird Species

As illustrated in Table 2.10, the list of bird guilds and bird species (> 150) observed along the Bear River is extensive. Using DWR's list of priority or key habitats (Utah Wildlife Action Plan Joint Team 2015) and specifically those found in the planning area, i.e., lowland riparian, wetland, and open water (flowing/standing), the BRCMP recommends considering individual bird species, bird SPC, and *Utah Wildlife Action Plan* SGCN 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 Bear River, are generally more productive and biologically diverse than surrounding upland habitats. Bird communities, in particular, 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 Bear 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 (Utah SPC), great blue heron, black crowned night-heron, and broad-tailed hummingbird (Utah Partners in Flight priority species) all nest in lowland riparian habitats and can be the focus of habitat restoration efforts. A large great blue heron rookery containing approximately 75 nests in riparian trees is located adjacent to the planning area in the Audubon's Cutler Reservoir and Cutler Marsh IBA.

Wetland Species

The American avocet (Utah Partners in Flight priority species), which is found in northern Utah and has been observed along the Bear 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 (Utah Partners in Flight Priority Species), white-faced ibis (SGCN), snowy plover (SGCN), marsh wren, heron species, and common yellowthroat.

Open Water (Flowing and Standing)

Open water combines both flowing and standing aquatic habitats. It comprises approximately 2.6% of the total area of Utah (Utah Wildlife Action Plan Joint Team 2015) and includes lakes, reservoirs, streams, and rivers. Aquatic habitats on the Bear 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 family can be observed on the Bear 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 Bear River are western grebe, Clark's grebe, 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 Bear River.

Carp

Because carp make up such a large percentage of the fish biomass in the Bear River (Budy et al. 2006), 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).
- Effects to invertebrates (as carp increase in size, they begin eating native invertebrates).
- Effects 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).
- Effects 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 Bear 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

A Handbook of Riparian Restoration and Revegetation for the Conservation of Land Birds in Utah With Emphasis on Habitat Types in Middle and Lower Elevations (Gardner et al. 1999)

An Evaluation of the Fish Community of Cutler Reservoir and the Bear River Above the Reservoir (Budy et al. 2006)

Bear River Baseline. Human and Biophysical Attributes of the Bear River Corridor in Cache and Box Elder Counties (Utah Division of Forestry, Fire & State Lands 2015)

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

eBird Explore Hotspots (eBird 2017)

Land Protection Plan – Bear River Watershed (U.S. Fish and Wildlife Service 2013)

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

*Three Species Monitoring Summary: Roundtail Chub (*Gila robusta*), Bluehead Sucker (*Catostomus discobolus*), and Flannelmouth Sucker (*Catostomus latipinnis) (Utah Division of Wildlife Resources 2014)

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

Aquatic Macroinvertebrate Monitoring, eBird Birding Locations, Important Bird Areas, Natural and Wildlife Viewing Areas, Wildlife Habitat

2.3 Water Resources

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

Hydrology

The Bear River is the longest river in North America that does not eventually drain to the ocean (U.S. Geological Survey [USGS] 2006), and it is the largest source of water flowing into Great Salt Lake (FFSL 2015). The river is born high in the Uinta Mountains and flows north through Utah, Wyoming, and Idaho along a circuitous route, turning west and then south back into Utah before emptying into Great Salt Lake. The hydrology of the Bear River is heavily influenced by impoundments (hydroelectric and agricultural) and irrigation diversions, which have drastically altered the flow regime and character of the river. Within the larger Bear River Basin there are five hydroelectric plants (Alexander, Last Chance, Grace, Oneida, and Cutler) on the main stem of the Bear River and over 450 irrigation companies that own and operate water delivery systems (SWCA 2010). Although this description of the Bear River provides some background context, the focus of the BRCMP is on the planning area, which includes the Bear River from the Idaho-Utah border downstream to Great Salt Lake. Within the planning area, Cutler Dam is the main impoundment regulating flows, although numerous agricultural and wildlife (Bear River Migratory Bird Refuge) diversions exist. Because of the river's hydrologic complexity, the river system is best described through an in-depth look at several of its primary elements, including 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 valley bottom of the planning area consists mostly of younger alluvium as well as unconsolidated basin-fill deposits of Quaternary age from former Lake Bonneville and older lakes (Kariya et al. 1994). Over geologic time following the disappearance of Lake Bonneville, the Bear River within the BRCMP planning area has created a complex river channel with many oxbow lakes, backwaters, and side channels in the middle and lower reaches of the watershed (SWCA 2010). The complex nature of the river and associated floodplain is depicted in a cross section and in a plan view in Figures 2.24 and 2.25, respectively. The low gradient and erodible soils have allowed the river to meander and develop new channels. More recent construction of impoundments along the river has resulted in hydrologic modifications, reducing the dynamic nature of the river.

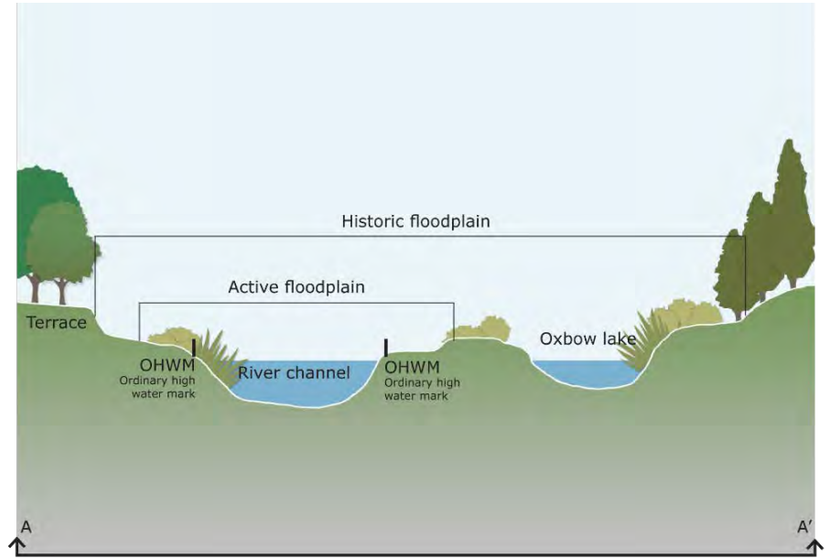


Figure 2.24. Bear River cross section showing an ordinary high water mark and physical features such as an oxbow lake (abandoned river channel), historical floodplain, active floodplain, and river channel. Note: This cross section is a representation of the transect A to A' shown on the river plan view in Figure 2.25.

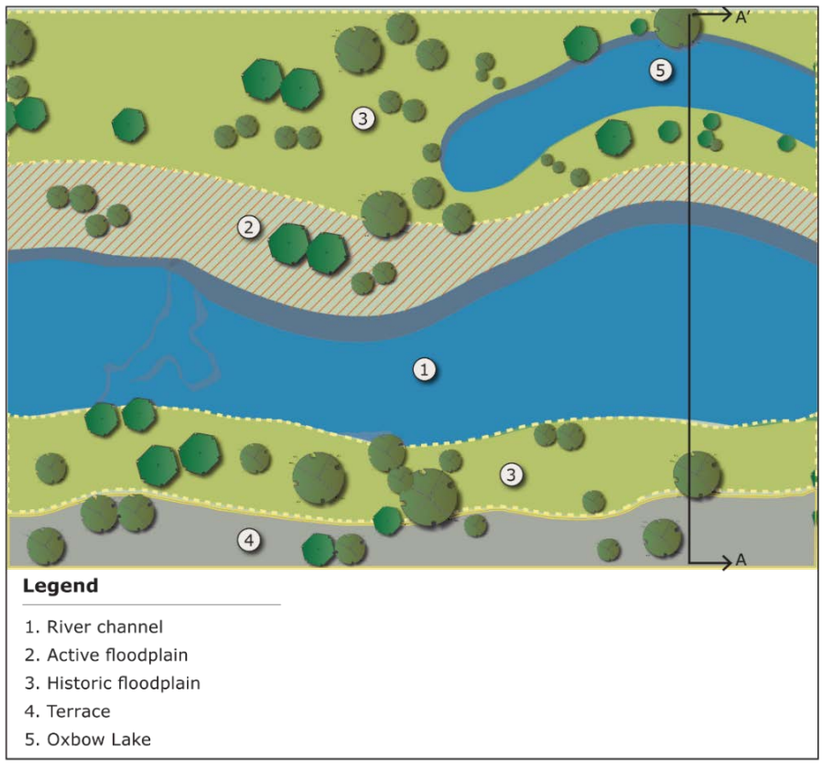


Figure 2.25. Bear River plan view showing physical features such as an oxbow lake (abandoned river channel), historical floodplain, active floodplain, and river channel. Note: the transect A to A' shown on this figure is depicted as a cross section of the river channel in Figure 2.24.

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. An understanding of the relative volumes of water sources and uses helps to explain land use activities within the watershed and potential water conservation opportunities. Table 2.11 provides the water budget for the Bear River at Tremonton, Utah (Miller 2017). By combining climatological and streamflow data, an estimate of available water supply was created. Average annual precipitation was multiplied by the watershed area to generate an estimate of 3,726,571 acre-feet of water from precipitation. For the purposes of this estimate, DWRe defined the Utah portion of the Bear River as the contributing watershed area from the Idaho-Utah border downstream to Tremonton, Utah.

Table 2.11. Water Budget for the Utah Portion of the Bear River Basin based on Data from 1989 to 2014

Category	Water Supply (acre-feet/year)
Total precipitation	3,726,571
Used by vegetation and natural systems	**2,152,715**
Basin yield	1,573,856
Agricultural depletions	430,793
Municipal and industrial depletions	25,323
Wetland and riparian depletion and reservoir evaporation	271,878
Total Losses	**727,994**
Flow to Great Salt Lake *(total available supply - total losses)*	845,863

Source: Miller (2017).

More than half of the total water supply of the Bear River Basin is taken up by vegetation and natural systems (2,152,715 acre-feet or 58%), whereas approximately 430,793 acre-feet (11.6%) are used in agriculture, 25,323 acre-feet (0.7%) are used in municipal and industrial depletions, and 271,878 acre-feet (7.3%) are estimated to be lost in the basin's wet and open-water areas (including evaporation in the Bear River Migratory Bird Refuge). This water budget estimates a total of 845,863-acre-feet (approximately 23% of precipitation) flow to Great Salt Lake annually.

SURFACE WATER FLOW

The Bear River enters the planning area approximately 31 river miles downstream of the Oneida Narrows Reservoir, which is the last of several impoundments on the river in Idaho. The river is representative of Intermountain West streams with high water yields associated with spring melting of winter snow packs (DWQ 2002). River flows are fed by precipitation and from runoff from the greater watershed, which extends from high in the Uinta Mountains through the high plateaus of Wyoming and Idaho into the Bear River Basin of Utah. Several lakes and reservoirs regulate river flows through impoundments, including Bear Lake, Alexander Reservoir, and Oneida Narrows Reservoir in Idaho, before they are regulated by Cutler Reservoir within the planning area.

Figure 2.26 depicts the variable nature of water supply within the Bear River watershed, as demonstrated by the Corinne gage (10126000), where flows differ dramatically from one year to the next. Annual yield (total flow) values were downloaded from USGS flow gages (USGS 2017a) for the entire period of record and were grouped into bins based on their magnitude relative to the average total yield. Each bin was given a unique color to distinguish it from the others. Although the period of record at the Corinne gage (10126000) does not go back to 1890, it does at the Collinston, Utah gage (10118000), and flow estimates were generated from a Collinston-Corinne regression developed from the overlapping period of record between the two gages. Annual yield values from 1890 to 1949 and from 1958 to 1963 were generated from this Collinston-Corinne correlation, whereas values from 1950 to 1957 and 1964 to 2014 were available from the Corinne gage. Annual yield values are extremely variable and rarely approximate the average value (horizontal green line) from the entire period of record.

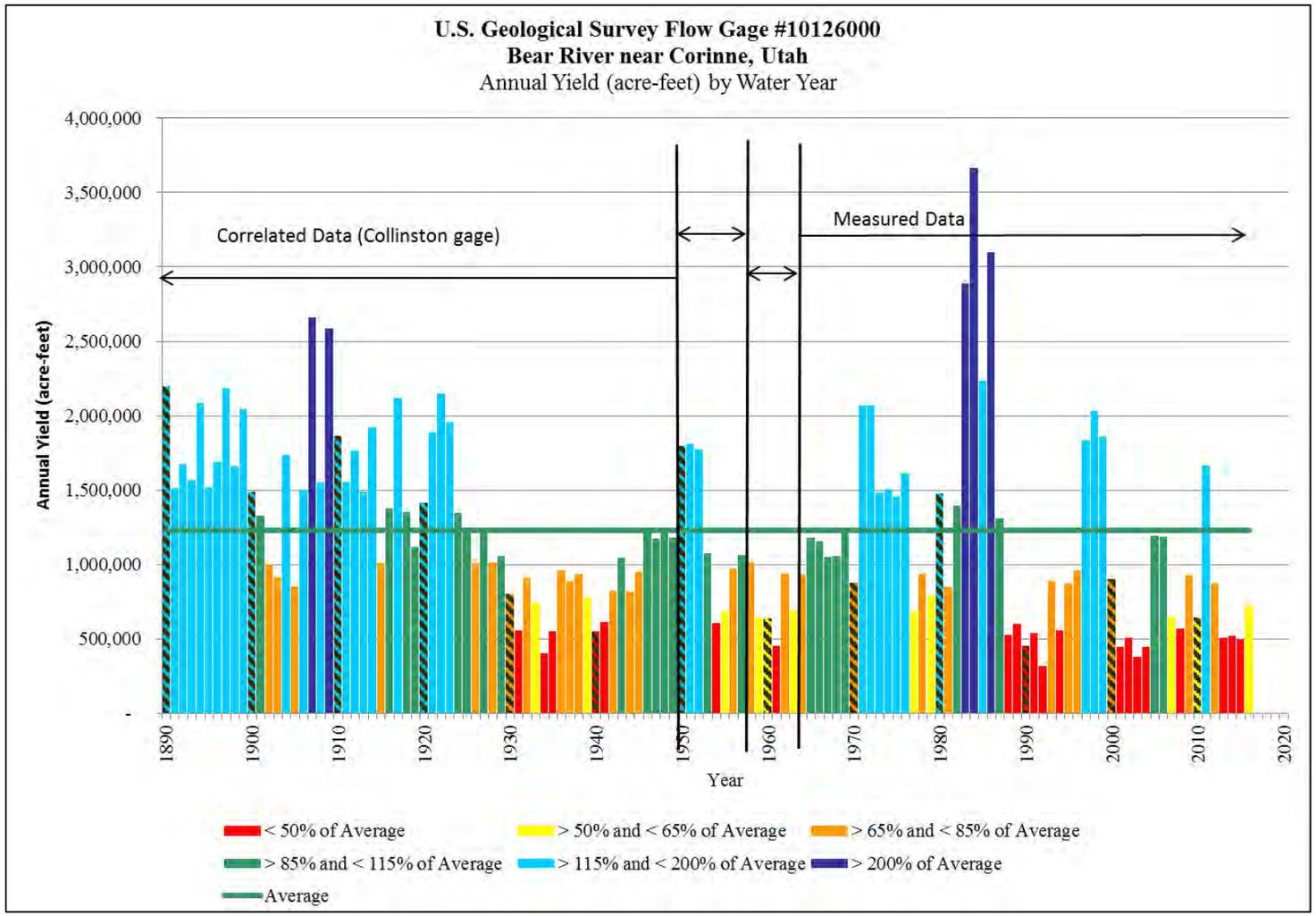


Figure 2.26. Annual water yield (acre-feet) for the Bear River at the U.S. Geological Survey Corinne flow gage grouped into categories of wet and dry water year classifications. Annual yield values from 1950 to 1957 and from 1964 to 2014 were downloaded directly from the Corinne gage, whereas data from 1890 to 1949 and from 1958 to 1963 were estimated using a regression correlation between the Corinne and Collinston gages.

In addition to the main river flows (and tributaries) from the greater watershed, the Bear River within the planning area is fed by several perennial tributaries, including the Cub River, the Logan River, the Blacksmith Fork River, the Little Bear River, and the Malad River (Figure 2.27). Annual flow volumes measured by USGS flow gages along these tributaries were downloaded from the USGS's National Water Information System application (USGS 2017b) (Table 2.12), averaged over the period of record, and converted to acre-feet. Ninety percent flows (that is, the annual runoff volumes that are equaled or exceeded in 90% of years) were calculated from flow-duration curves generated from the annual flows for the available period of record (USGS 2017b). Similar data are available in the 2010 TMDL (SWCA 2010); however, the calculations presented here are more up-to-date because one gage includes data up to 2016 (Table 2.13). Flows in the Bear River at the Idaho-Utah state line on average are approximately 700,000 acre-feet (see Table 2.12) annually, and the main tributaries of the Bear River deliver approximately 440,000 acre-feet of water into the Bear River annually (see Table 2.12). Flow data are generated and maintained by USGS at gages along the aforementioned tributaries of the Bear River, although the period of record available for each gage is variable, as shown in Table 2.13.

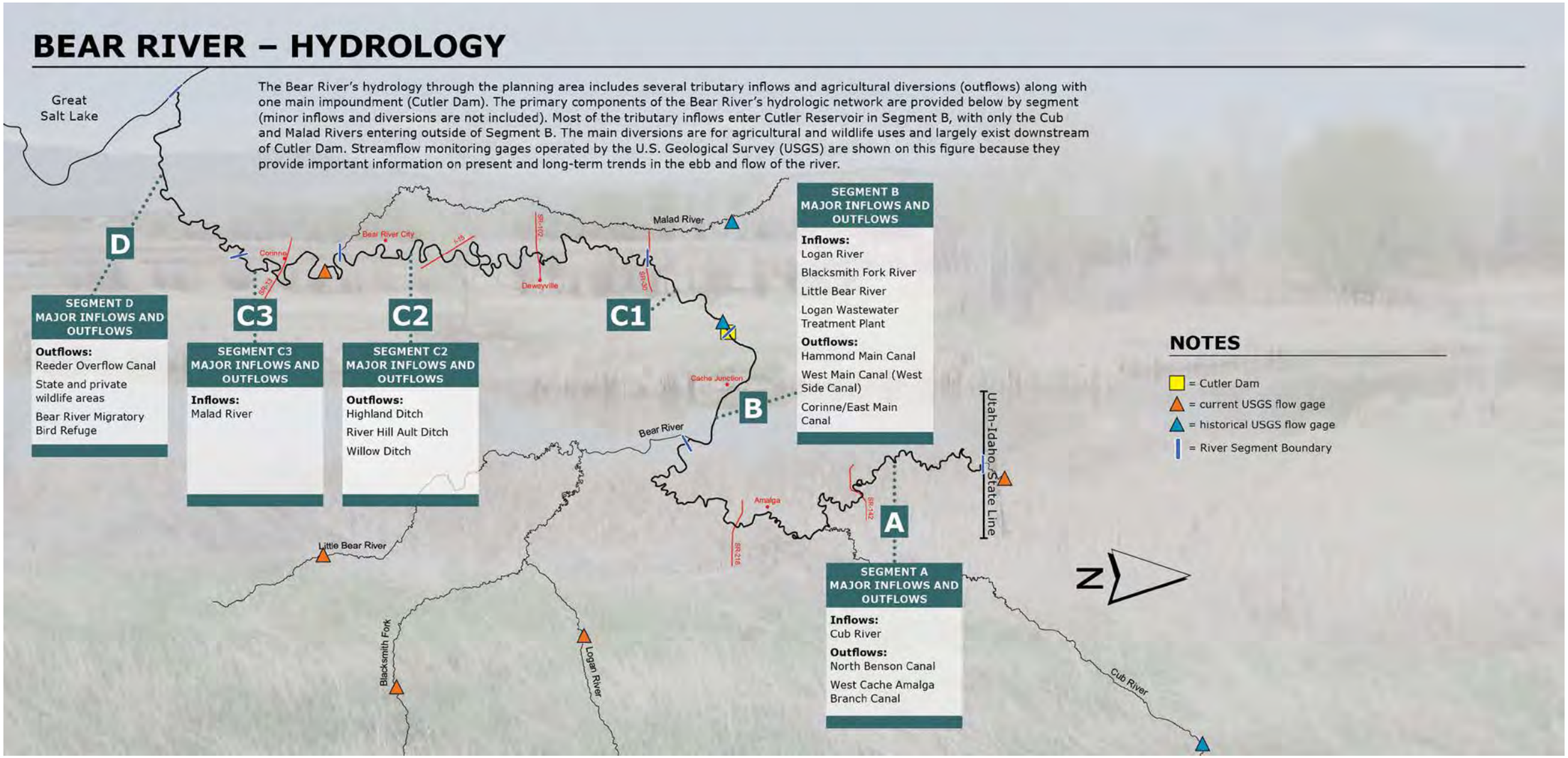


Figure 2.27. Existing hydrologic condition in the planning area by river segment.

Table 2.12. Annual Flow for Major Tributaries of the Bear River

Tributary Name	Flow	
	Average (acre-feet)	90% Reliability
Bear River at Idaho-Utah state line	3	359,060
Cub River	63,119	43,034
Logan River	166,588	93,410
Blacksmith Fork River	89,423	43,900
Little Bear River	61,641	27,469
Malad River	59,549	35,635
Total	**1,148,346**	**604,149**

Note: 90% reliability indicates that the annual runoff volumes have a 90% chance of being equaled or exceeded in any given year.
Source: USGS (2017b).

Table 2.13. Select U.S. Geological Survey Flow Gages on the Bear River and Tributaries within the Planning Area

Flow Gage Number	Gage Name	Time Period Used in the Analysis	Average Annual Flow (cubic feet per second)
10092700	Bear River at Idaho-Utah state line	1971–2015	978
10093000	Cub River near Preston, Idaho	1940–2010	87
10109000	Logan River above state dam, near Logan, Utah	1953–2015	230
10113500	Blacksmith For River AB UP and L C0.'s Dam NR Hyrum, Utah	1913–2016	123
10105900	Little Bear River at Paradise, Utah	1993–2015	85
10125600	Malad River near Plymouth, Utah	1964–1980	82
10118000*	Bear River near Collinston, Utah	1903–2006	1,479
10126000	Bear River near Corinne, Utah	1950–2016	1,605

Source: USGS (2017b)
* This gage is currently maintained and operated by PacifiCorp.

Figure 2.28 depicts the changing hydrograph from the top to the bottom of the planning area. Impoundments upstream of the Idaho-Utah state line buffer the spring runoff, resulting in muted annual variation in Bear River flows. Downstream of Cutler Reservoir (near Corinne, Utah), there is much greater variation in annual flows with a pronounced spring runoff, likely due to the high number of snowmelt-driven tributaries entering Cutler Reservoir and the low volume, flow-through nature of the reservoir. At the Corinne gage, there is approximately 2,000 cubic feet per second (cfs) in variation from low to high flows, whereas the variation at the Idaho-Utah state line is only approximately 500 cfs.

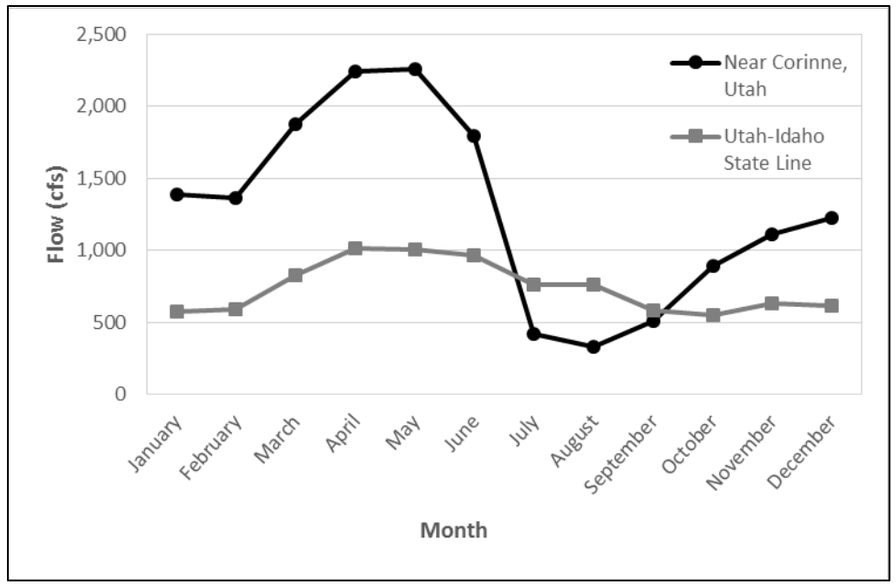


Figure 2.28. Monthly mean hydrograph for flow gages on the Bear River at the Utah-Idaho state line (gage 10092700) and near the town of Corinne, Utah (gage 10126000) from 1995 to 2015.

FLOODING

Flooding and the potential for flooding in the planning area have been influenced by the construction of impoundments and diversions along the Bear River, although limited storage in reservoirs such as Cutler and Oneida does not allow for significant moderation of flood flows. The floodplain areas surrounding the active river channel are classified as Zone A by FEMA, meaning that they are subject to inundation by the 1%-annual-chance flood event, and are generally determined using approximate methodologies (FEMA 2017). Detailed hydraulic analyses have not been performed for these Zone A areas, and therefore no base flood elevations or flood depths are shown on the flood insurance rate maps for the Bear River. The potential for flooding in and along the Bear River is greatest in the spring and in the early summer, but it is reduced by the annual operations of the various impoundments and diversions within the watershed.

HYDROLOGIC CONDITION BY RIVER SEGMENT

The BRCMP planning area has been broken down into six different hydrologic segments, from upstream to downstream (Segments A, B, C1–C3, and D). These hydrological segments correspond to river units defined by DWQ for beneficial use designation and water quality assessment (DWQ 2017) and are included in Table 2.14. The various segments are illustrated in Figure 2.27 and described in more detail below.

Table 2.14. Bear River Segments and Descriptions

Bear River Unit	River Segment	Segment Description
DWQ 1	D	Great Salt Lake to Reeder Overflow diversion
DWQ 2	C3	Malad River to Reeder Overflow Canal
	C2	State Route 30 to just above Malad River
	C1	Cutler Dam to State Route 30
DWQ Unit Cutler Reservoir	B	Cutler Reservoir
DWQ 3	A	Cutler Reservoir upstream to the Idaho-Utah state line

- *Segment D:* From Great Salt Lake to the Reeder Overflow diversion. This reach is influenced dramatically (both in length and hydrology) by the surface elevation of Great Salt Lake. The hydrology of this reach is largely influenced by controlled releases out of Cutler Reservoir, agricultural diversions and return flows, and the diversion and control of flows into the Bear River Migratory Bird Refuge.
- *Segment C3*: From the Reeder Overflow diversion upstream to the Malad River confluence. The hydrology of this reach is largely controlled by Cutler Dam and the Malad River, which delivers most of its flow in the late winter and early spring.
- *Segment C2*: From State Route 30 downstream to just above the Malad River confluence. The hydrology of this reach is largely influenced by the operation of Cutler Dam, agricultural diversions, and agricultural return flow.
- *Segment C1*: From Cutler Dam downstream to State Route 30. The hydrology of this reach is largely controlled by Cutler Dam, agricultural diversions, and agricultural return flows.
- *Segment B*: Cutler Reservoir. Cutler Dam was built in 1927, increasing the height and extent of the impoundment previously formed by the Wheelon Dam. Cutler Dam was built to impound the Bear River and all tributaries within the Cache Valley, creating a shallow, marshy reservoir in the middle of Cache Valley. The reservoir has a large surface area (10,000 acres) but a short residence time (1.47–3.97 days), which varies depending on the geographic portion of the reservoir. The shortest residence time is within the northern portion where most of the Bear River's flow passes right through without mixing with the isolated portions of the reservoir (SWCA 2010).
- *Segment A*: From the mouth of the Bear River at Cutler Reservoir upstream to the Idaho-Utah state line. The hydrology of the Bear River between the Idaho border and Cutler Reservoir has been altered dramatically by agricultural diversions via a network of canals and ditches that transect the watershed. The altered hydrology of this reach is depicted by the hydrograph in Figure 2.28. At times, over half of the natural flow of the Bear River is diverted for agricultural uses in Cache Valley, a portion of which returns to the river via return flow and/or subsurface recharge throughout the year.

Further Reading

A Hydrologic Model of the Bear River Basin (Hill et al. 1970)

A Millennium-Length Reconstruction of Bear River Stream Flow, Utah (DeRose et al. 2015)

Bear River Baseline: Human and Biophysical Attributes of the Bear River Corridor in Cache and Box Elder Counties (Utah Division of Forestry, Fire & State Lands 2015)

Eighteenth Biennial Report 2013-2014 (Bear River Commission 2015)

Hydrology of Cache Valley, Cache County, Utah and Adjacent Part of Idaho, With Emphasis on Simulation of Ground-Water Flow (Kariya et al. 1994).

Bear River Basin Planning for the Future (Utah Division of Water Resources 2004)

Bear River Flow Chart (Utah Division of Water Resources 1990 [n.d.])

Cache County Water Master Plan (J-U-B Engineers, Inc. 2013)

"Hydrology of the Bear Lake Basin, Utah" in Natural Resources and Environmental Issues (Palacios et al. 2007)

Lower Bear River Watershed Restoration Action Strategy (Ecosystems Research Institute, Inc. 2002)

Middle Bear River and Cutler Reservoir Total Maximum Daily Load (TMDL) (SWCA Environmental Consultants 2010)

Geographic Information System Data Layers

Canals, Dams, Depth to Groundwater, Field Drains, Flooding, National Hydrography Dataset, National Wetlands Inventory, Points of Diversion, Stream Alteration Permits, USGS Flow Gages, Watershed

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 2.15 lists Utah's four major beneficial use classifications and sub-classifications.

Table 2.15. 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.

Impairment status is bestowed upon a given waterbody by DWQ when the concentration of a specific pollutant is above the numeric criteria associated with the beneficial use designated for the waterbody. The Bear River within the planning area has been divided into a series of assessment units by DWQ, which do not correspond exactly to the six river segments in the plan (see Table 2.14). Beneficial use designations and water quality impairments are detailed on the interactive DWQ Beneficial Uses and Water Quality Assessment Map (DWQ 2016a) and are depicted on Figure 2.29. Data from UDEQ water quality monitoring locations along the Bear River (shown in Figure 2.29) help to inform beneficial use designations and impairments; however, monitoring locations are not found in all assessment units. Descriptions of water quality impairments that occur in the BRCMP planning area are provided in Table 2.16.

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

Parameter	Impairment Description
Total dissolved solids (TDS)	The greatest concentrations of TDS in the planning area are found in in Segment C3. Some of the larger known sources of TDS pollution that enter the Bear River include groundwater, wastewater discharge, irrigation return flow, and tributary inflow mainly from the Malad River. High levels of TDS can negatively influence both livestock health and crop production.
Temperature	Temperature levels that exceed the Class 3B warm water aquatic life criterion (27 degrees Celsius) have been measured in Segments C1 and C2. Temperature exceedances are a concern for aquatic species that have a limited temperature range within which they can survive and reproduce.
Dissolved oxygen (DO)	Low levels of DO are currently a concern in Segments B and D. DO levels in the Bear 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.
OE bioassessment	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 C and D.
Total phosphorus	Total phosphorus is a concern in all segments, and TMDLs have been completed for phosphorus all the way to the Utah-Idaho state line. Phosphorus occurs naturally and is important for supporting aquatic food webs; however, high levels promote excess algae growth that can degrade lakes and streams.
Sedimentation	Sedimentation is a concern in all segments. Sedimentation can increase bank erosion; cause stream meandering and flooding; and degrade the water quality for agricultural, municipal, industrial, and recreational uses because nutrients bind to sediment particles in the river.

Source: DWQ (2016b).

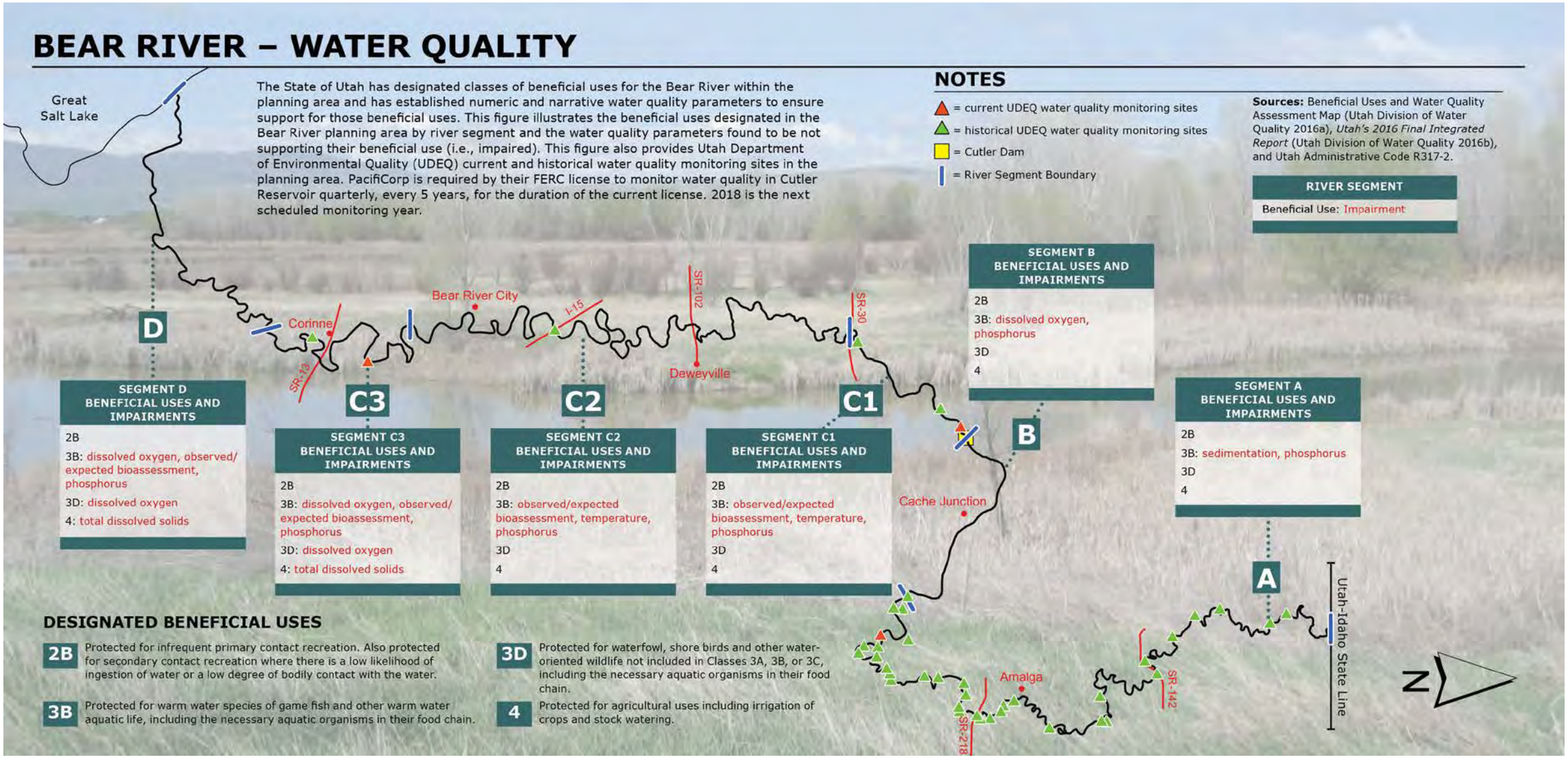


Figure 2.29. Beneficial uses and impairments in the planning area by river segment.

When levels of a pollutant such as TDS exceed state water quality criteria, the waterbody is considered impaired, and the state is required by the Clean Water Act to develop a TMDL for that waterbody. A TMDL document justifies the amount of a given pollutant that a waterbody can receive and still meet water quality standards. In addition to defining the maximum pollutant load, the TMDL also identifies necessary reductions in current loading within the watershed. 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 2002, UDEQ prepared the lower Bear River TMDL, which was published as the *Lower Bear River Watershed Restoration Action Strategy* (DWQ 2002). The strategy identifies the maximum phosphorus load the TMDL study area could transport while still meeting the water quality criteria defined for the reach's beneficial use (3B warm water aquatic life). In 2010, UDEQ published the Middle Bear River and Cutler Reservoir TMDL (SWCA 2010). This report documents the minimum dissolved oxygen (DO) and maximum total phosphorus loads that section of the river is able to transport while meeting the criteria associated with the beneficial uses (2B Infrequent Contact Recreation, 3B Warm Water Aquatic Life, 3D Waterfowl/Shorebirds, and 4 Agricultural). Several other TMDLs have been developed for tributaries of the Bear River, such as the Cub River, Little Bear River, Hyrum Reservoir, Spring Creek, and the Bear River-Malad Subbasin. Other tributaries are also listed as not supporting their beneficial uses (Blacksmith Fork River: DO, *Escherichia coli*; Little Bear River: total phosphorus) and may require TMDLs moving forward. The main sources of pollutants to the Bear River are erosion, wastewater, and agriculture.

Further Reading

A Utah Strategy to Address Water Pollution from Animal Feeding Operations (The Utah CAFO Advisory Committee 2001)

Assessing the Potential for Water Quality Trading in the Bear River Watershed (Whitehead 2006)

Bear River Tri-State Water Quality Monitoring 2006-2011 Data Summary (Idaho Department of Environmental Quality 2001)

Bear River Watershed Management Unit Water Quality Assessment Report (Utah Division of Water Quality 2000)

Cutler Hydroelectric Project. FERC Project No. 2420. Resource Management Plan. Five-Year Monitoring Report 2008-2012: Final (PacifiCorp 2013)

Improving Utah's Water Quality Lower Bear River Watershed. USU Water Quality Extension (Utah State University 2014)

Improving Utah's Water Quality Middle Bear Watershed (Utah State University 2011b)

Lower Bear River Watershed Restoration Action Strategy (Ecosystems Research Institute, Inc. 2002)

Middle Bear River and Cutler Reservoir Total Maximum Daily Load (TMDL) (SWCA Environmental Consultants 2010)

Synthesis of Design Guidelines and Experimental Data for Water Quality Function in Agricultural Landscapes in the Intermountain West (Buffler et al. 2005)

Upper Bear TMDL Water Quality Study (Cirrus Ecological Solutions, LC. 2006)

Utah Nonpoint Source Pollution Management Plan (Utah Department of Environmental Quality 2000)

Utah's Final 2016 Integrated Report (Utah Division of Water Resources 2016b)

Water Quality in the Bear River Basin of Utah, Idaho and Wyoming Prior to and Following Snowmelt Runoff in 2001. National Water Quality Assessment Program (U.S. Geological Survey 2006).

Geographic Information System Data Layers

Beneficial Uses Assessment Units, Water Quality Monitoring Sites

2.4 Community Resources

Community resources are those resources associated with the Bear 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 A). Community resources in the BRCMP planning area are discussed in seven sections: Agriculture, Infrastructure, Cultural Resources, Recreation, Access, Public Safety, and Education.

Agriculture

AGRICULTURE AND WATER RESOURCES

Agriculture has played in important role in the economies of Box Elder and Cache Counties. Permanent European settlements in both counties began in the 1850s and centered on farming and ranching. Water from the Bear River, specifically, has been integral to the development of these counties' economic sectors.

The NRCS is responsible for preparing statewide lists of soil mapping units that meet the criteria for 1) prime farmland, 2) unique farmland, 3) farmland of statewide importance, or 4) farmland of local importance (7 CFR 658). Table 2.17, as inventoried by NRCS and using 2014 and 2015 soil series data, provides the total acreage of each of these four farmland types in the planning area relative to the total acreage of each county. Prime farmland has the best combination of physical and chemical characteristics for producing crops. Unique farmland is land other than prime farmland for production of specific high-value crops. Farmland of state and local importance considers parameters such as location, high yields for specific crops, and growing season, among others.

Table 2.17. Acres of Farmland Classes in Box Elder and Cache Counties

Farmland Classes	Box Elder County (acres)	Cache County (acres)
Acres of prime farmland if irrigated (percentage of county acres)	277,749 (6%)	78,845 (11%)
Acres of unique farmland (percentage of county acres)	8,818 (< 1%)	0 (0%)
Acres of farmland of statewide importance (percentage of county acres)	209,432 (5%)	59,775 (8%)
Acres of farmland of local importance (percentage of county acres)	239,821 (6%)	49,507 (7%)
Not mapped or not available*	5,992 (< 1%)	245,135 (33%)
Total county acres	**4,306,702**	**750,053**

* The *not mapped or not available* acreage for Cache County is relatively high because it includes Wasatch-Cache National Forest; NRCS does not map farmland on national forest lands.

Sources: NRCS (2014a, 2014b, 2015a, 2015b).

Hay, grain, and alfalfa are and have historically been cultivated in Box Elder County. The county also historically produced sugar beets, which supported sugar factories in Garland and Brigham City. Abundant fruit orchards and garden crops continue to contribute to the local economy (Utah State Historical Society 1988). 2012 agricultural census data, including area of farmland, type of agriculture use, and dominant agricultural product per county, are summarized in Table 2.18. USU Extension reports that major crops in Box Elder County consist of alfalfa hay, other hay, corn for silage, corn for grain, barley, winter wheat, and oats (Holmgren and Pace 2012). In 2012, Box Elder County had 86,635 cattle and calves and 9,238 milk cows (U.S. Department of Agriculture [USDA] 2014). In Cache County, advances in dry-farming techniques and canal and reservoir construction increased farm production and allowed for the development of cash crops (Utah State Historical Society 1988). The county's sheep herds grew from 10,000 in 1880 to 300,000 in 1900, and dairy cows numbered 16,000 in 1910 (Utah State Historical Society 1988). In 2012, Cache County had 52,367 cattle and

calves and 15,646 milk cows (USDA 2014). Cache County continues as the state's leader in dairy products and as a major producer of hay, alfalfa, and grain (Utah State Historical Society 1988). 2012 agricultural census data for Cache County are summarized in Table 2.18.

Table 2.18. Agriculture Census Data for Box Elder and Cache Counties

Agriculture Parameters	Box Elder County*	Cache County†
Farmland	1,170,736 acres	268,511 acres
Percentage of total county area	32%	36%
Percentage use	Pastureland: 68.8% Cropland: 28.1% Other: 3.1%	Pastureland: 51.1% Cropland: 40.9% Other: 8.0%
State rankings	**Value of sales:** Grains, oilseeds, dried bean, dried peas (1) Cattle and calves (1) **Top crop items (acres):** Forage land (2) Wheat for grain (1) Winter wheat for grain (1) Barley for grain (1) Safflower (1) Corn for grain (1) **Top livestock inventory:** Cattle and calves (1) Sheep and lambs (2)	**Value of sales:** Grains, oilseeds, dried bean, dried peas (3) **Top crop items (acres):** Forage land (3) Wheat for grain (3) Winter wheat for grain (3) Barley for grain (1) Safflower (2) **Top livestock inventory:** Cattle and calves (4) Hogs and pigs (4)

Note: The numbers in parentheses reflect state rankings.

* Data from USDA (2012a).

† Data from USDA (2012b).

Manufacturing, service, retail, transportation, and utilities constitute most of the Bear River Basin's economy (DWRe 2004). However, the agricultural sector in the basin continues to be the major user of water. Recently, urban areas in Utah have experienced decreases in agricultural use and increases in municipal and industrial use. However, this general trend in conversion has not occurred to the same extent in the Bear River Basin and consequently has not had a measurable impact to agricultural water use. In some cases, conversion of agricultural land to urban land has resulted in a net loss of dry-farmland but not a net loss of irrigated acreage. It is unlikely this trend will be reversed any time soon (DWRe 2004).

Increases and decreases in depletion (authorized withdrawals of Bear River water) of water for industrial, municipal, and agricultural uses have been estimated in Box Elder and Cache Counties. These increases and decreases in depletions from 1976 to 2010 for both counties are shown in Table 2.19.

Table 2.19. Change in Water Depletions in Box Elder and Cache Counties from 1976 to 2010

County	Industrial (acre-feet)	Municipal (acre-feet)	Agricultural (acre-feet)
Cache County	83	2,939	- 4,689
Box Elder County	205	2,655	- 646

Source: Bear River Commission (2014).

Increases in depletions have occurred in both counties for industrial and municipal uses. Decreases in agricultural depletions are the result of conversion of fully supplied irrigated acres to partially supplied irrigated acres with the latter requiring less water (Bear River Commission 2014).

Approximately 60% of the irrigation water available in Box Elder County is from the Bear River Canal System (major canals in the planning area are listed in Table 2.22). The Bear River Canal Company owns priority water rights and a portion of Bear Lake storage. Pineview Reservoir, in the Weber River watershed, contributes another 15% of irrigation water, whereas deep wells provide the remaining 25% (USU 2005a). Efficient flood irrigation is the primary mechanism for watering crops in Box Elder County because of the relative abundance of water available. Agriculture land use in Box Elder County based on 2009 field surveys by the Utah Division of Water Resources is presented in Table 2.20.

Approximately 75% of the irrigation water available in Cache County is from river water and runoff, primarily from the Cub, Logan, and Blacksmith Fork watersheds. Reservoirs and deep wells in the area contribute another 15% and 10%, respectively (USU 2005b). In Cache County, most irrigation occurs using sprinkler systems. Agricultural land use in Cache County based on 2009 field surveys by the DWRe is presented in Table 2.20. Note that the data for Tables 2.18–2.20 are not comparable across tables because they are taken from different sources.

Table 2.20. Agricultural Land Use in Box Elder and Cache Counties

Agricultural Land Use	Box Elder County (acres)	Cache County (acres)	Total (acres)
Irrigated	**126,395**	**94,716**	**221,110**
Alfalfa	48,930	38,063	86,993
Beans	2	–	2
Berries	6	52	58
Corn	15,815	8,114	23,929
Grain	28,421	18,491	46,912
Grass hay	11,122	9,151	20,273
Melon/pumpkin/squash	69	–	69
Oats	759	699	1,458
Onions	817	12	830
Orchard	798	51	849
Other horticulture	31	225	255
Other vegetables	188	47	235
Pastureland	18,055	18,500	36,556
Potatoes	325	235	560
Safflower	322	845	1,166
Sorghum	3	197	200
Tomatoes	12	–	12
Turf farms	719	26	745
Vineyard	1	6	6
Not Irrigated	**712,381**	**73,536**	**785,917**
Dry alfalfa	4,589	13,376	17,965
Dry grain	42,641	20,477	63,118
Dry land	601,977	25,861	627,837
Dry oats	1,812	112	1,923
Dry safflower	7,068	5,325	12,393
Fallow-irrigated agriculture	6,520	1,491	8,011
Idle-irrigated agriculture	26,615	5,783	32,398
Idle-irrigated pastureland	21,159	1,113	22,272
Sub-Irrigated	**19,345**	**8,865**	**28,211**
Grass hay, sub-irrigated	862	1,258	2,120
Pastureland, sub-irrigated	18,483	7,607	26,091
Total	858,121	177,117	1,035,238

Source: DWRe (2014).

AGRICULTURE AND WATER RIGHTS

A *water right* is a right to the use of water based on 1) quantity, 2) source, 3) priority date, 4) nature of use, 5) point of diversion, and 6) physically putting water to beneficial use (DWRi 2011). Three basic beneficial uses of water are domestic, stock watering, and irrigation, and these are allocated based on an annual requirement or "duty" as described in Table 2.21; other beneficial uses include municipal and industrial and instream flows (USU 2008).

Table 2.21. Beneficial Uses of Water and their Associated Requirements

Beneficial Use	Requirements (acre-feet)
Domestic use is any use of water inside the home.	0.45
Stock watering is quantified based on equivalent livestock unit. An equivalent livestock unit is one horse and foal or cow and calf, or equivalent number of sheep, goats, pigs, chickens, etc. The beneficial use period for these uses is generally year-round, but can vary with specific needs.	0.028
Irrigation is the act of applying water to any plant to obtain optimal growth and maintenance of that plant. Although not always harvested as crops, lawns, gardens, shrubs, pasturelands, and non-native trees and plants are all considered plants that require irrigation.	Range: 3.0 to 6.0 per irrigated acre Mean: 4.0 per irrigated acre. This "duty" is based on the highest water consuming crop, which is alfalfa, during the growing season of the region and surface irrigation practices.

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 Bear River, and has the authority to regulate dams to protect public safety. Because FFSL does not regulate water rights, the BRCMP does not outline management strategies for water rights.

Irrigation Companies

Irrigation companies can own the right to use water from a surface and/or groundwater source, which is delivered to users by a canal, ditch, or pipeline. Individual shareholders in an irrigation company do not, however, legally own the water right. This right is allocated based on the number of shares in an irrigation company owned by an individual shareholder. The value or quantity of water allocated to a share of water is not constant throughout the state and varies considerably from one irrigation company to another. In some canal companies, a share of water is allocated per acre, whereas in others, three or four shares may be needed to provide sufficient irrigation water for 1 acre of alfalfa (USU 2008).

AGRICULTURE USES BY RIVER SEGMENT

Agricultural activities and related infrastructure are permitted uses of sovereign lands, including the bed and bank of the Bear River. Figure 2.30 presents the location of agricultural uses in the planning area by river segment. Figure 2.31 provides a river plan view of typical agricultural infrastructure seen along the Bear River.

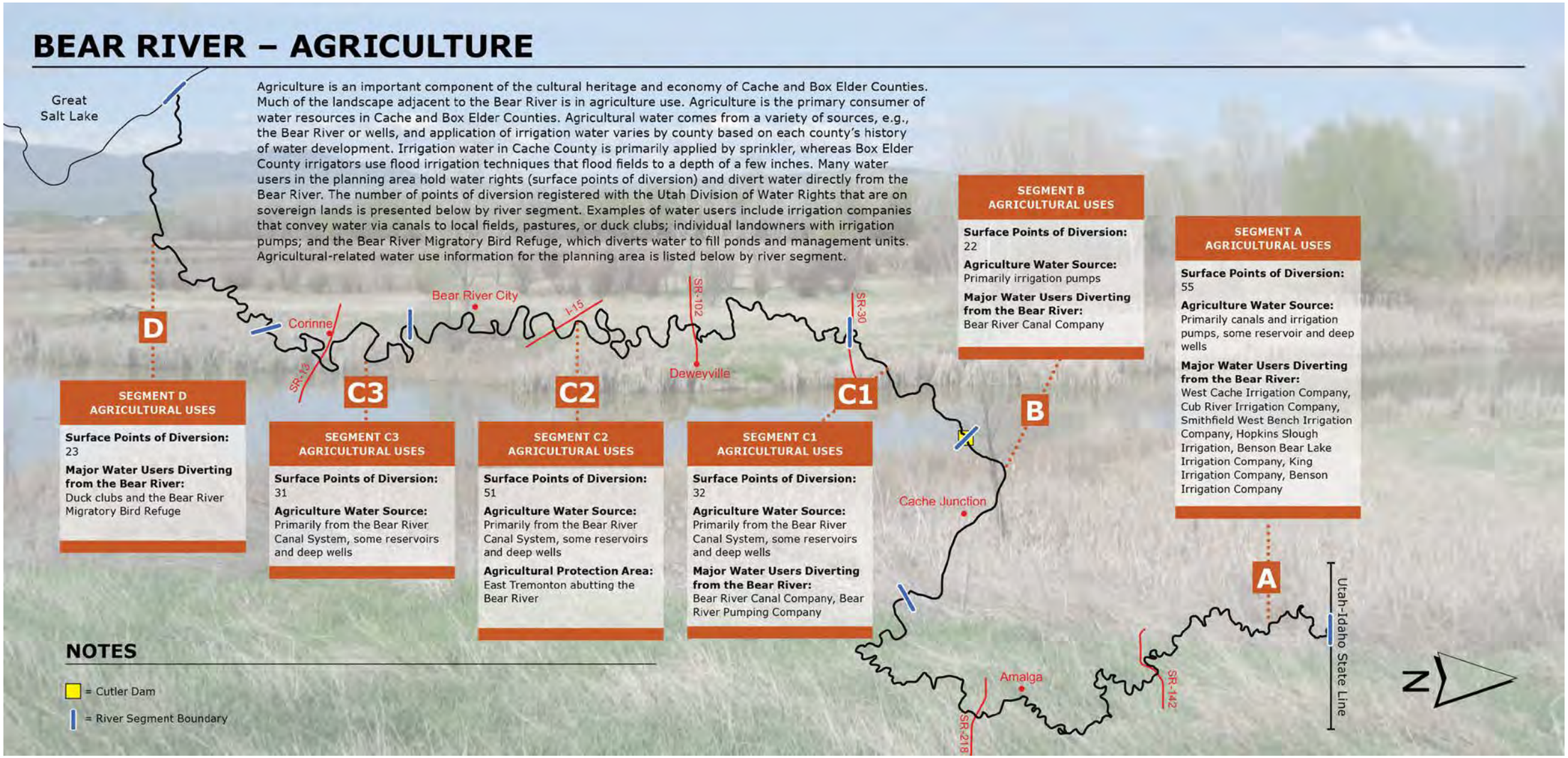
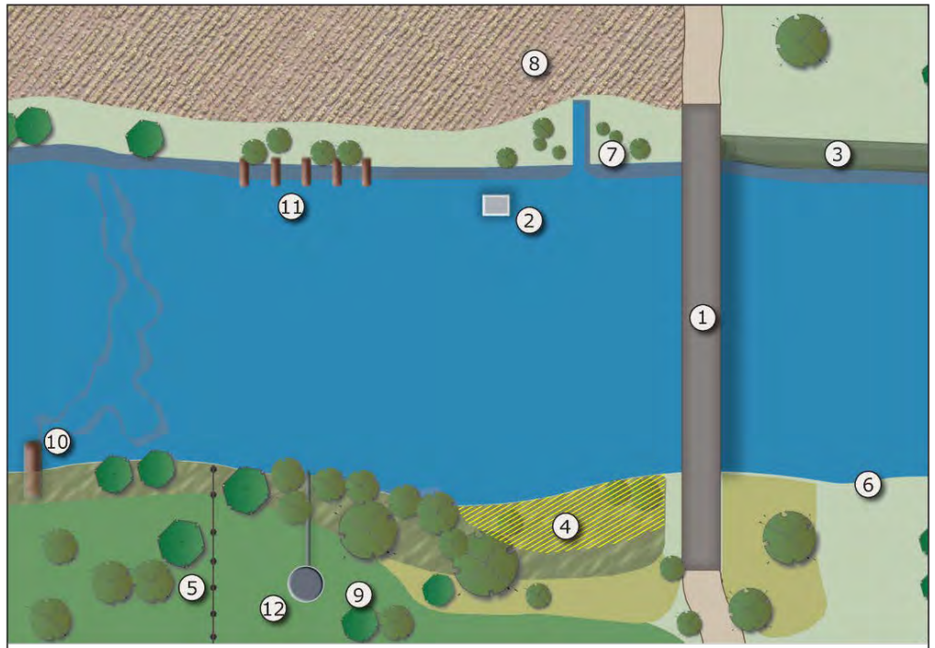


Figure 2.30. Agricultural uses in the planning area by river segment.



Legend

1. Access bridge
2. Pump
3. Levee
4. Weed treatment
5. Fence
6. Flood-control access point
7. Intake canal
8. Cropland
9. Grazing land
10. Outfall/land drain
11. Tile drains
12. Off-channel watering

Figure 2.31. Plan view of typical agricultural infrastructure in the planning area.

Irrigation Pumps

Many small irrigators in the Bear River watershed use irrigation pumps to withdraw water directly from the Bear River and apply it to crops or rangeland. Methods for withdrawing water include securing hoses in the river, installing floating pumps, and constructing pump vaults (as shown in Figure 2.32). The primary concerns for protection of the Public Trust are impediments to navigation and degradation of water quality from bank erosion.

Figure 2.32. Pump in the Bear River.

Irrigation Distribution Systems

Other agricultural infrastructure often built on sovereign lands includes irrigation distribution systems that can include diversions, canals, and return flow structures. Figure 2.33 shows a photograph of an intake channel along the Bear River (the intake channel feeds a pump station, which lifts water from the river to a canal located outside the planning area). When properly designed and sited, structures such as intake channels pose no problem to navigation, nor do they degrade bank condition. However, poorly designed and sited structures can result in increased erosion of the bed and bank. In addition, irrigation water distribution systems are efficient weed vectors, either from or to the Bear River. FFSL recognizes the importance of weed control on and adjacent to sovereign lands.

Figure 2.33. Intake channel along the Bear River.

Stock Watering

Stock watering, when associated with a water right and associated point-to-point diversion, is a recognized use of sovereign lands. However, stock watering directly in the Bear River can have negative impacts on bank stability and water quality, as shown in Figure 2.34. FFSL currently works with, and will continue to work with, landowners on strategies to bring water to livestock at locations away from the river. FFSL will partner with agencies such as UDAF and NRCS during this process.

Figure 2.34. Bear River riverbank showing impacts from stock watering.

Fences

Fences are a necessary and practical component of livestock management. So that navigation and recreation in the river are not compromised, fences may extend riverward only to the water's edge or reasonably beyond to restrain livestock, as shown in Figure 2.35. Although very few known fences extend across the entire width of the Bear River, this has been an identified problem in the past. FFSL will work with owners of existing fences to bring them into compliance. All fences on sovereign lands require authorization from FFSL.

Figure 2.35. Fence in the Bear River.

Tile Drains (Field Drains)

Tile drains are installed to allow water in wet or saturated ground to rapidly drain away from an area, to lower the groundwater table, or to relieve hydrostatic pressure. They are typically underground linear structures oriented to land contours and are often used in agriculture because saturated soils do not provide enough aeration for crop root development. In the planning area, tile drains conduct surplus water into the Bear River.

FFLS recognizes that tile drains—historically buried clay pipes or tiles, but more recently plastic conduit—have been in place in fields adjacent to the Bear River for many decades. Exact locations of each tile drain are not always available or known, and it is important to note that these drains may not have been installed by the current landowner. Tile drains in some portions of Box Elder County have been mapped and are available in the GIS data viewer on the FFSL website. Landowners installing new tile drain systems that extend on or over sovereign land must apply for authorization from FFSL. FFSL will work with landowners to improve bed and bank conditions if existing tile drain systems are actively degrading bed and bank conditions. It is unusual for a tile drain to cause ongoing or new degradation of the bed and banks of the Bear River because of their historical presence. Similar in function to tile drains but more often associated with commercial or residential development and construction are modern land drains. An example of a poorly designed and cited land drain on sovereign lands that is responsible for bank erosion and undercutting a bridge footing is shown in Figure 2.36.

Figure 2.36. Poorly designed and cited land drain on sovereign lands.

Further Reading

A History of Box Elder County (Huchel 1999)

A History of Cache County (Peterson 1997)

An Early History of Cache County (Hovey 1936)

Bear River Development Act (2006)

Bear River Resource Conservation and Development Council Area Plan (Natural Resources Conservation Service and Bear River Resource Conservation and Development Council 2006)

Box Elder County, Utah Resource Assessment (Natural Resources Conservation Service et al. 2005a)

Cache County, Utah Resource Assessment (Natural Resources Conservation Service et al. 2005b)

*Canal Maps & Information (*Cache County 2017a*)*

Envision Cache Valley Final Report and Toolkit (Envision Cache Valley 2010)

History of Box Elder County (Forsgren and Daughters of Utah Pioneers n.d. [1938])

History of the Bear River Compact (Utah Division of Water Rights 2016)

Improving Utah's Water Quality Lower Bear River Watershed (Utah State University 2014)

Improving Utah's Water Quality Middle Bear Watershed (Utah State University 2011b)

Manure Best Management Practices: A Practical Guide for Dairies in Colorado, Utah and New Mexico (Davis et al. 2010)

The Logan Northern and Logan, Hyde Park, and Smithfield Canals: A Historical Narrative (HDR 2013)

Water Quality. Best Management Practices (Utah State University 2017)

Geographic Information System Data Layers

Canals, Field Drains, Irrigation, Landownership, Points of Diversion, Prime Farmland, Soil Types, Water-Related Land Use

Infrastructure

Infrastructure in the planning area either treats the river as an obstacle to be crossed (e.g., bridges and utility crossings) or as a resource to be used (e.g., outfall structures and dams). Infrastructure in the planning area includes bridges, utility crossings, outfall structures, land or tile drains, dams, and canals and ditches. Each of these infrastructure elements is described in more detail below. There are no known FEMA-permitted levees for flood control in the planning area. Some levees may have been constructed along the Bear River by farmers to protect agricultural fields; however, these would be very small and are not expected to provide significant protection during a major flood.

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. Some of the existing infrastructure on Bear River sovereign land is sanctioned with an associated FFSL authorization; however, some infrastructure, especially older infrastructure, is not. Some bridges and other infrastructure improvements are deemed eligible for the NRHP because of their age and local significance (see the Cultural Resources section of Chapter 2). Chapter 1 of the BRCMP describes the FFSL authorization 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 data layers are also available in the GIS data viewer.

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

Infrastructure, if not designed and maintained appropriately, can negatively affect navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality. For example, 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 and safety hazards. Careful placement of infrastructure, such as bridges along the Bear 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 Bear 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 hydraulics, and can cause large woody debris to accumulate behind them.

UTILITY CROSSINGS

Utility crossings include water pipelines, sewer pipelines, gas pipelines, fiber optic lines, and powerlines. Crossing types are 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 2.37 and 2.38). Some older utility crossings that rest on the bed of the channel are considered above grade.

Figure 2.37. Stand-alone above-grade crossing on the Bear River.

Figure 2.38. Above-grade crossing attached to a bridge on the Bear River.

OUTFALL STRUCTURES

Outfall structures include storm drain outlets, irrigation return flows, and cooling water outlets. Figure 2.39 shows a typical outfall structure on the Bear River.

Figure 2.39. Typical outfall structure on the Bear River.

TILE DRAINS AND LAND DRAINS

Tile drains and land drains are discussed in the Agriculture section of Community Resources.

DAMS

In 1889, construction began on Wheelon Dam, which was built at Bear River Canyon primarily to divert water into the Hammond Main Canal and West Main Canal (Figure 2.40). In 1927, Utah Power and Light (now known as PacifiCorp) constructed Cutler Dam in Bear River Canyon near the Box Elder-Cache County line to provide agricultural water and power generation. The 110-foot-tall Cutler Dam impounds water from the main stem of the Bear River (as well from the Logan River, Little Bear River, and Spring Creek) into Cutler Reservoir, which covers approximately 10,000 acres at its average storage capacity (SWCA 2010). Figure 2.41 shows Cutler Dam from downstream. The FERC license for Cutler Dam (FERC No. 2420) as a hydropower facility was last renewed in 1994. It included the establishment of an operational elevation range at which Cutler Reservoir would be maintained to protect fish and wildlife in the reservoir (SWCA 2010). As part of its FERC licensing requirements, PacifiCorp developed a resource management plan with goals such as improving water quality, wildlife habitat, and scenic resources; retaining and improving traditional agricultural uses; and improving recreational access to the Cutler Reservoir project area (PacifiCorp 2013). PacifiCorp plans to initiate the FERC relicensing process for Cutler Dam in late 2017 or early 2018. Bear River sovereign lands consist of the river channel through Cutler Reservoir but do not include the remainder of the reservoir or the reservoir banks.

Other dams and hydroelectric plants are present on the Bear River outside of the planning area.

Figure 2.40. Wheelon Dam.

Figure 2.41. Cutler Dam.

CANALS AND IRRIGATION DITCHES

Multiple canals and irrigation ditches have altered the flow regime of the Bear River in the planning area. In some cases, intake canals divert water out of the Bear River and into the irrigation system. Table 2.22 lists some of the major canals and ditches in the river, as identified by DWRi. Figure 2.42 shows the West Cache Amalga Branch intake canal in Cache County.

Table 2.22. Major Canals in the Planning Area

Canal or Ditch Name	Location	Purpose	Owner
West Cache Amalga Branch Canal	Near Trenton and Amalga, Cache County	Irrigation	West Cache Irrigation Company
North Benson Canal	East of Cutler Reservoir, Cache County	Irrigation	Benson Irrigation Company
West Main Canal (West Side Canal)	From Cutler Reservoir to Fielding, Box Elder County	Irrigation (outlet for Cutler Reservoir)	Bear River Canal Company
Hammond Main Canal	From Cutler Reservoir to north of Deweyville, Box Elder County	Irrigation (outlet for Cutler Reservoir)	Bear River Canal Company
Hammond West Branch Canal (connects with Hammond Main Canal)	From north of Deweyville to Great Salt Lake, Box Elder County	Irrigation	Bear River Canal Company
Corinne/East Main Canal (connects with West Main Canal)	From Fielding to Great Salt Lake, Box Elder County	Irrigation	Bear River Canal Company
River Hill Ault Ditch	East of Elwood, Box Elder County	Irrigation	River Hill Ault Ditch Company
Highland Ditch	Southeast of Elwood, Box Elder County	Irrigation	Highland Ditch Company
Willow Ditch	North of Bear River City, Box Elder County	Irrigation	Willow Ditch Company
Reeder Overflow Canal	South border of the planning area, Box Elder County	Diversion to the Bear River Migratory Bird Refuge	USFWS Bear River Migratory Bird Refuge

Figure 2.42. West Cache Amalga Branch intake canal.

In addition to canals and irrigation ditches, a large number of culverts connect the river to meander ponds, which are mostly used for agriculture access.

FLOOD CONTROL

Box Elder County has an emergency management process that includes mitigation, preparedness, response, and recovery elements for natural disasters (including floods) and terrorism. The county also provides links to public education materials for flooding. Cache County has an emergency management program (through the Cache County Sherriff's Office) that emphasizes emergency preparedness and operates an Emergency Operations Center to respond to natural and other disasters. Cache County provides guidance on flooding in their *Family Emergency Guide*, which includes advice for before, during, and after a

flood (Cache County Sherriff's Office 2006). In addition, the *Pre-Disaster Mitigation Plan* was completed by the Bear River Association of Governments for Box Elder, Cache, and Rich Counties (Bear River Association of Governments 2015). This plan includes risk assessments and mitigation strategies for flooding. The Bear River Health Department published the *Public Health Emergency Guide*, which contains information on flooding and other emergencies (Bear River Health Department 2013). PacifiCorp has a Dam Safety Program that includes a probable maximum flood analysis and emergency action plans, which require annual updates and periodic functional exercises.

Major tributaries convey sediment loads into the Bear River, especially during flood or storm events. Sediment accumulation from such events above Cutler Dam would eventually accumulate in the reservoir. Areas downstream of Cutler Dam have very little tributary inflow before reaching Great Salt Lake. However, there may be areas where access should be preserved for future flood control.

Further Reading

Bear River Baseline. Human and Biophysical Attributes of the Bear River Corridor in Cache and Box Elder Counties (Utah Division of Forestry, Fire & State Lands 2015)

Bear River Development Act (2006)

*Cache County Water Master Plan (*J-U-B Engineers, Inc. *2013)*

Canal Maps & Information (Cache County 2017a)

Cutler Hydroelectric Project. FERC Project No. 2420. Resource Management Plan. Five-Year Monitoring Report 2008-2012: Final (PacifiCorp 2013)

*Eighteenth Biennial Report 2013-2014 (*Bear River Commission *2015)*

Family Emergency Guide (Cache County Sherriff's Office 2006)

Pre-Disaster Mitigation Plan (Bear River Association of Governments 2015)

Public Health Emergency Guide (Bear River Health Department 2013)

The Logan Northern and Logan, Hyde Park, and Smithfield Canals: A Historical Narrative (HDR 2013)

Geographic Information System Data Layers

Canals, Dams, FFSL Authorizations, Field Drains, Points of Diversions

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 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 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 Bear River consist of open campsites and artifact scatters. Although very few prehistoric sites have been documented within the BRCMP planning area, several Fremont sites were noted near the planning area, and undocumented sites are likely to exist in many locations.

The Lower Bear River Archaeological Discontiguous District is listed on the NRHP and crosses portions of Segments D and E of the planning area. The archaeological sites within this district are not in the planning area proper, but they are nearby, indicating a high probability for additional archaeological sites along the Bear River. These sites are associated with Fremont occupations, which used the riverine and marsh environments along the southern end of the Bear River and Great Salt Lake, and site types range from "short-term resource utilization to semi-permanent habitation sites with pit structures, use areas, and storage pits" (Dobra 1986). Artifacts associated with these sites include a variety of ceramics, ground stone, lithic flakes, chipped stone tools, and projectile points. Finally, it is important to note that many of the sites in the Lower Bear River Archaeological Discontiguous District are inundated during high water years.

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. According to existing data, previously documented historic sites on or near the Bear River consist of canals, a railroad, bridges, a hydroelectric plant, transmission lines, buildings, structures, and artifact scatters.

The previously documented cultural resources in the planning area are either prehistoric or historic resources. In addition, two historic properties adjacent to the Bear River—the Hampton's Ford Stage Stop and Barn and the Cutler Hydroelectric Power Plant Historic District—are listed on the NRHP. Other sites in the planning area, such as the Whistler Canal and the Reeder Overflow Canal in Box Elder County, have been determined eligible for the NRHP but have not yet been listed. The types of cultural resources found along the Bear River are described in Figure 2.43. Based on the previously documented cultural resources in the planning area, the relatively small number of completed cultural resource surveys in the planning area, and local knowledge, there are likely additional cultural resources within the planning area that have not been identified.

Bridges

Bridge types along the Bear River may include pedestrian, vehicle, or railroad.

The Bear River has many historic crossings, e.g., Promontory Route Railroad Trestle. Many but not all historic bridges over the river have been removed and replaced with newer bridges. In some instances, bridges, such as the Hampton Ford Bridge, have been demolished, but not all of the original structural pieces may have been removed from the river bed.

River Campsites

Historic and prehistoric peoples often camped by waterbodies such as the Bear River.

Prehistoric and historic campsites, although dispersed, are likely to exist on the banks of the Bear River and may be exposed during bank or bed disturbance.

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., Hampton's Ford Stage Stop and Barn, built adjacent to the Bear River range from private homes to public spaces. In addition, sites, e.g., the Bear River Duck Club, provide a look at historic recreational activity sites along the river.

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. Utility lines can be placed above grade or can be bored under the Bear 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., Hammond Main Canal, Whistler Canal, and the Reeder Overflow Canal. Canals vary in size and shape.

Notes:

Photographs from left to right, top to bottom: Cutler Dam[*], Bear River Canyon with railroad bridge and footbridge[*], Cutler Dam Powerhouse[†], Bear River Duck Club[*], steel railroad bridge and support columns over part of Bear River Canyon[*], Bear River Narrows[†].

[*] Courtesy of the Antiquities Section of the Utah Division of State History.

[†] Used by permission, Special Collections & Archives, Merrill-Cazier Library, Utah State University.

Figure 2.43. Types of cultural resources along the Bear River.

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

Figure 2.44 provides a river plan view of cultural resources that could be encountered during development authorized with an FFSL authorization.

CULTURAL RESOURCES BY RIVER SEGMENT

Figure 2.45 presents historic properties, cultural sites, and NRHP-listed sites in the planning area by river segment identified during a cultural resources file search for the planning area

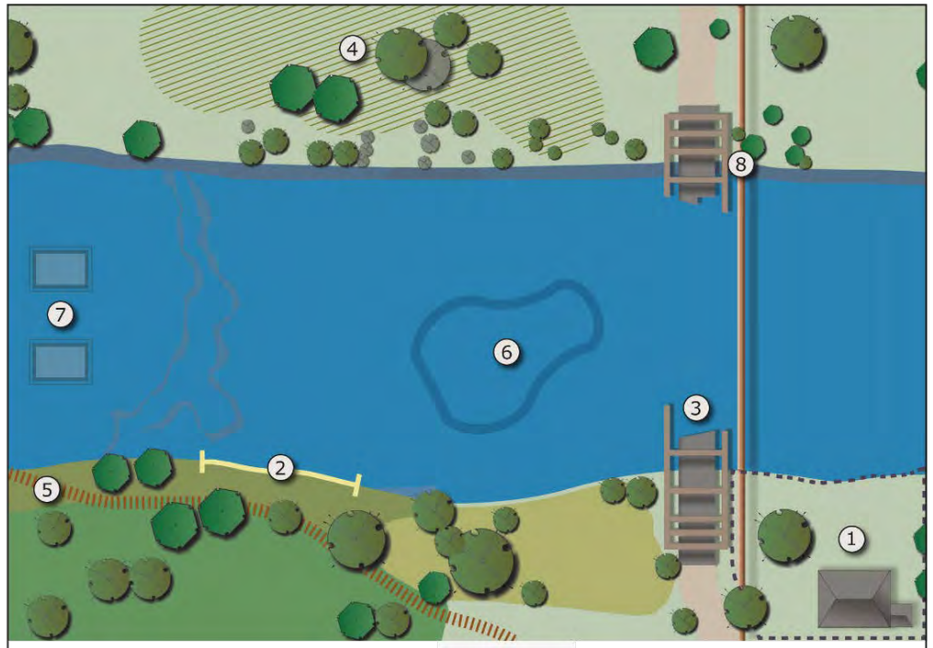


Figure 2.44. Plan view showing types of possible cultural resources in the planning area.

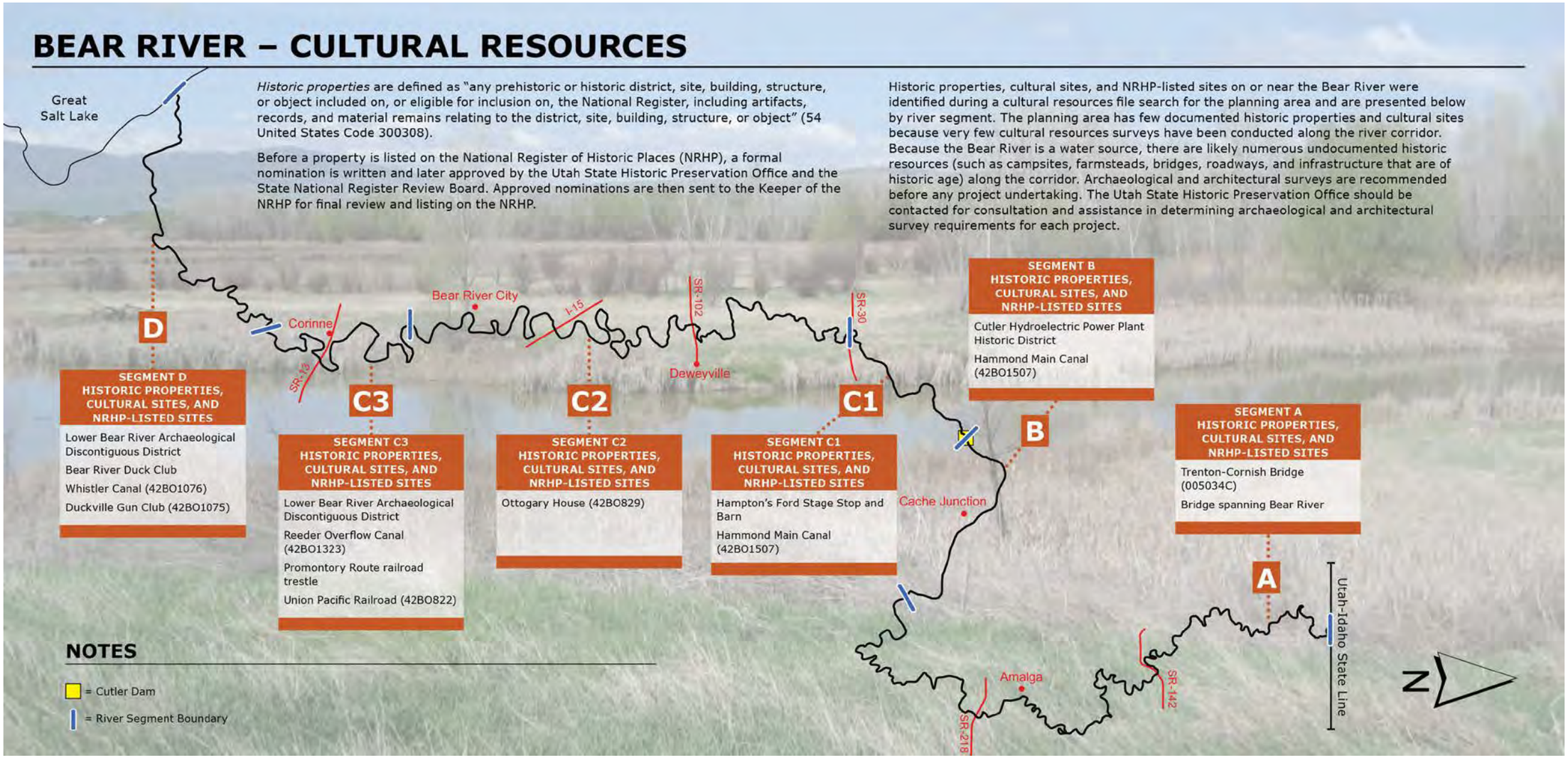


Figure 2.45. Historic properties, cultural sites, and National Register of Historic Places–listed sites in the planning area by river segment.

The following resources are in the planning area but are not include in Figure 2.45 because they are listed as "demolished" in Preservation Pro: Hampton Ford Bridge (associated with the NRHP-listed Hampton's Ford Stage Stop and Barn in Segment C), Bear River City Bridge (003055C) (Segment A), and Bear River Bridge (003054C) (Segment C3). They are mentioned here because portions of their old support systems or pylons may remain within the Bear River, and aerial imagery or on-site field visits can help determine if any portions of these resources still exist in the Bear River. If portions of these demolished properties are identified in the Bear River, SHPO should be contacted to determine if any consultation and documentation are required.

Further Reading

A History of Box Elder County (Huchel 1999)

A History of Cache County (Peterson 1997)

An Early History of Cache County (Hovey 1936)

An Expedition to the Valley of the Great Salt Lake of Utah (Stansbury 1855)

Ancient Peoples of the Great Basin and Colorado Plateau (Simms 2008)

Archaeological Reconnaissance in the Lower Bear River Marshes, Utah (Simms 1990)

Bear River Heritage Area (Bear River Heritage Area Council 2008)

History of Box Elder County (Forsgren and Daughters of Utah Pioneers n.d. [1938])

Land Protection Plan - Bear River Watershed Conservation Area (U.S. Fish and Wildlife Service 2013)

Geographic Information System Data Layers

Archaeological Sites, Archaeological Surveys, Historic Places

Recreation

The Bear River in the planning area is a meandering, valley bottom river with a complex channel system flowing predominantly through rural agricultural and riparian lands. Short portions of the river wind through residential and urban areas, and a section of the Bear River is impounded in Cutler Reservoir, which has flatwater conditions. Most lands adjacent to the river are privately owned. Agriculture is the dominant land use in both Box Elder and Cache Counties (FFSL 2015; The Nature Conservancy 2010).

Recreation in the planning area consists of boating, fishing, waterfowl and upland game hunting, wildlife watching, trapping, and hiking (FFSL 2015), as shown on Figure 2.46. Because of the area's rich diversity of bird species, wildlife watching is one of the most significant recreational opportunities along the Bear River through Cache and Box Elder Counties (FFSL 2015). Photography, paddle boarding, jet skiing, water skiing, and ice skating may also occur (Johnson 2017). The primary Bear River–based recreation sites are around Cutler Reservoir and include boat-launching facilities, picnic areas, canoe trails, and walking trails. These Cutler Reservoir recreation sites are typically outside the planning area, which consists only of the river channel through the reservoir.

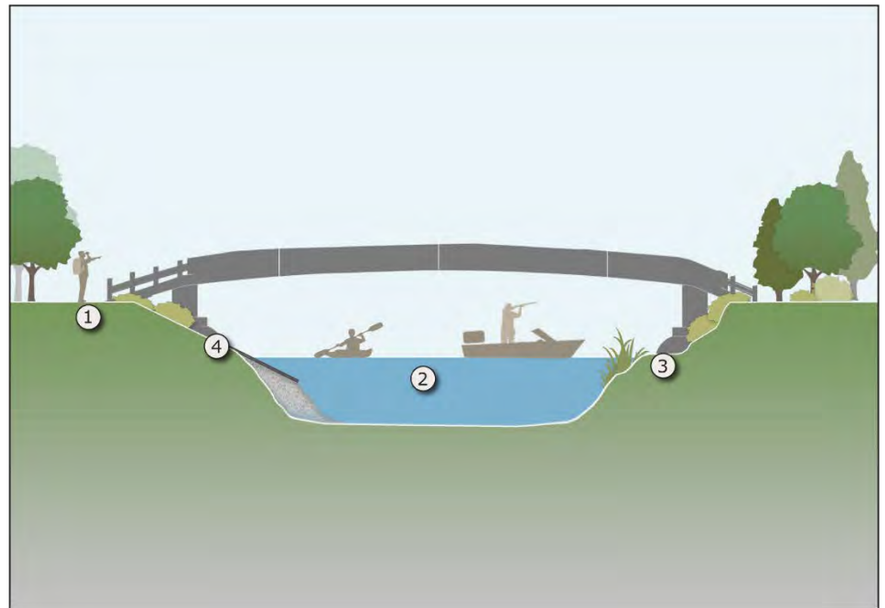


Figure 2.46. Cross section showing recreation types in the planning area.

BOATING

Boating on the Bear River consists of both motorized and non-motorized watercraft use. Non-motorized watercraft such as canoes and kayaks typically rely on one-way navigation in the downstream direction and require different access points to start and end a trip. At access points, non-motorized 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 the plan. The river distance between boater access points dictates the time spent boating for non-motorized users. For example, boater access points 10 miles apart on a slow-moving river like the Bear River would require a full-day time commitment for the average person. Therefore, the longitudinal distribution of boater access points can be a determinant for the type of river activity and amount of use for a given section of the river. Figure 2.47 shows a non-motorized boat on the Bear River.

Figure 2.47. Non-motorized boat use on the Bear River.

Motorized river recreation typically relies on two-way navigation, both upstream and downstream, and uses the same boater access point to start and end the trip. Boater access points for motorized river recreation need to accommodate trailered boats. In addition, motorized river recreation depends on sufficient flow to protect prop motors from damage, particularly during upstream travel when more power is required. Figure 2.48 shows a motorized boat on the Bear River.

Figure 2.48. Motorized boat on the Bear River.

A non-motorized watercraft usually has less draft on the boat waterline and can use the river channel at lower volumes. However, travel time for non-motorized watercraft is highly dependent on water velocity; during periods of lower flow, more travel time would be needed between boater access points.

Motorized boats must be properly registered with the Utah Division of Motor Vehicles and carry liability insurance while operating on Utah waters (motorboats with engines less than 50 horsepower are exempt from the insurance requirement). Utah law requires all boats to

have at least one wearable, approved life jacket for each person on board. The State Boating Act provides vessel navigation and steering laws for avoiding collisions, passing, overtaking another vessel, driving in narrow channels, sailboats, and persons riding on the bow of a boat (Utah Code 73-18-15.1). The following regulation on wakeless speed is also provided in the State Boating Act:

The operator of any vessel may not exceed a wakeless speed when within 150 feet of the following:

- Another vessel
- A person in or floating on the water
- A water skier being towed by another boat
- A water skier that had been towed behind the operator's vessel unless the skier is still surfing or riding in an upright stance on the wake created by the vessel
- A water skier that had been towed behind another vessel and the skier is still surfing
- A shore fisherman
- A launching ramp
- A dock
- A designated swimming area (Utah Code 73-18-15.1)

In addition, the operator of a motorboat is responsible for any damage or injury caused by the wake produced by the boat. Wakes from boat traffic can cause bank erosion (Bauer et al. 2002; Laderoute and Bauer 2013). Different boating rules apply at Cutler Reservoir than on the Bear River. In the Bear River east of the confluence with Cutler Reservoir, a vessel may not operate at greater than wakeless speed from the last Saturday in September through March 31 (Utah Administrative Code R651-205-17).

Boater access points in the planning area are listed from north to south in Table 2.23. Four of the access points listed in the table are not on the main stem of the Bear River; these are managed by PacifiCorp and are included here because they may be of interest to those using the river for one-way trips (PacifiCorp was required to establish recreation access sites as a condition of their FERC license). The distance between boater access points can prevent non-motorized watercraft from using sections of the river, unless they use informal boater access points. Informal boater access points are likely used at road crossings and on rural land between the Utah border and Cutler Reservoir. Informal boater access points are vulnerable to closure by private landowners or by UDOT and usually lack amenities such as parking lots and boat ramps. Because informal boater access points are not known to those without local knowledge, they make it difficult to plan river recreation activities.

Table 2.23. Bear River Boater Access Points in the Planning Area

Access Point	Location	Management Entity	Amenities
Bear River Bottoms Conservation Easement	11400 North, north of Trenton	Bear River Land Conservancy	Undeveloped
Bear River Bottoms access (DWR Wildlife Management Area)	State Route 142, west of Richmond	DWR	Undeveloped
Upper Bear River access	3800 North, Benson	PacifiCorp	Parking, restroom, ramp
Benson Marina*	4900 West 3000 North, Benson	PacifiCorp	Parking, restroom, ramp
Cutler Marsh Marina*	State Route 30/Cutler Reservoir	PacifiCorp	Parking, restroom, ramp
Clay Slough*	Sam Fellow Road/Cutler Reservoir	PacifiCorp	Parking, restroom
Cutler Canyon Marina*	Near 6200 North/Cutler Reservoir	PacifiCorp	Parking, restroom, ramp
Bear River access at Deweyville (DWR Wildlife Management Area)	State Route 102, Deweyville	DWR	Parking, ramp
Bear River access at Corinne (DWR Wildlife Management Area)	State Route 13, Corinne	DWR	Parking, ramp
Corinne City	3800 West, Corinne	City of Corinne	Parking, restroom, ramp
Bear River Migratory Bird Refuge	Bird Refuge Road, west of Brigham City	USFWS	Parking, ramp

*These access points are not on the main stem of the Bear River, but may be of interest to those using the river for one-way trips.

Boating on the Bear River is affected by the volume of water in the river. The diversion of water from the Bear River for agriculture, domestic, and industrial purposes is most pronounced downstream of Cutler Reservoir during the summer season. Irrigation withdrawals during the summer months can reduce the flow downstream of the reservoir to less than 40 cubic feet per second (Coombs 2017b). Such low flows, combined with the distance between boater access points, may limit both motorized and non-motorized boating downstream of the reservoir during the summer. Motorized boaters need deeper water for upstream travel; non-motorized travel time would be very slow. Other barriers to boating consist of limited public access to the river (discussed in more detail in the Access section), low bridges at high water, limited parking spots, and current and projected growth in Box Elder and Cache Counties. Growth in these counties is leading to new residential development of agricultural lands. This development places increased demands on recreation opportunities, causes potential aesthetic impacts along the river for recreationists, and may result in the closure of informal boater access points.

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 Bear River discussed in the Access section. In general, more boater access points are needed along the Bear River in the planning area to allow for full water trail use, especially for non-motorized users who generally prefer shorter distances between boater access points. During the public outreach process, several boater access point locations were suggested in the planning area, as follows:

- East of Cornish on State Route 61
- East of Amalga on State Route 218
- East of Fielding, near Hampton's Ford Stage Stop by The Old Barn Community Theatre
- Below the Cutler Dam power plant
- West of Honeyville on State Route 240

Unofficial Bear River boating data, using both designated and informal access points, show 26.6 miles of non-motorized boating on the river north of Cutler Reservoir (north of Benson Bridge) in two distinct navigable sections: 1) Cornish to Trenton and 2) Trenton to Benson Bridge (Mott 2017). Below Cutler Dam, there are 61.9 miles of water trail in seven distinct navigable sections: 1) Cutler Dam Bridge to Hampton's Ford, 2) Hampton's Ford to State Route 102 (Deweyville), 3) State Route 102 (Deweyville) to Raymond Hanson Park, 4) Raymond Hanson Park to State Route 240 (Honeyville), 5) State Route 240 (Honeyville) to Corinne, 6) Corinne to the Bear River Migratory Bird Refuge, and 7) the Bear River Migratory Bird Refuge to the site of the former Duckville Gun Club in the Bear River Migratory Bird Refuge. These data also indicate that there are very few, if any, human-made navigation blockages in the planning area at normal flow, other than Cutler Dam (Mott 2016a). Natural navigation hazards typical of most rivers are present, including rocky spots, shallow areas, overhanging tree branches, and deadfall. Whether such hazards affect navigation usually depends on the water level. In general, the width of the Bear River in Box Elder and Cache Counties makes it possible to avoid natural navigation hazards (Mott 2016b). The lack of human-made navigational blockages minimizes the need for portages. Portages are areas where boaters must carry their watercraft around an obstacle in the river, such as a 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. There are no known portages in the planning area. It was also noted during the public outreach process that finding parking at informal boater access points is a challenge.

HUNTING AND FISHING

Hunting and fishing on the Bear River are regulated by DWR, who also manages a limited number of hunting and fishing access areas along the river. DWR manages two types of access areas on the Bear River for hunting and fishing:

- Walk-in-access (WIA) areas are tracts of private land on which the agency has leased hunting, trapping, or fishing privileges for public recreation. Landowners enrolled in the WIA program receive monetary compensation and may also qualify for habitat restoration projects. In most cases, access to WIA properties is limited to foot traffic only.
- Wildlife management areas (WMAs) are single tracts of land owned by DWR, or two or more tracts of land owned by DWR, that are close to each other and managed as a single unit. WMAs are often managed to protect wildlife habitat and public access.

Boating access may also be available at some DWR-managed access areas (e.g., Bear River access at Deweyville [WMA] and Bear River access at Corinne [WMA]; see Table 2.23). DWR-managed access areas on the Bear River are shown in Figure 2.51.

PacifiCorp provides recreational infrastructure that supports hunting and fishing in areas near Cutler Reservoir and Marsh. Both waterfowl and upland bird hunting are popular in many areas along the river. Popular waterfowl hunting areas are north and south of Benson Marina in Cutler Reservoir, extending from south of the Cutler Marsh Marina and north up to the Cutler Canyon Marina area, as well as east along the Bear River (Johnson 2017 and Davies 2017). Pheasant and dove hunting is largely concentrated in the floodplain of the river, in grassy areas and along wetland edges (Johnson 2017). There are also opportunities for trapping muskrat and beaver in the planning area (FFSL 2015). Hunters, particularly waterfowl hunters, typically use the river as a travel corridor to arrive at a desired hunting destination. A number of duck clubs are present on the south end of the Bear River near the Bear River Migratory Bird Refuge. Representatives from waterfowl hunting groups at BRCMP public meetings during the public outreach process indicated that access is the most important issue for their groups. The popularity of specific hunting sites varies with different water levels and weather conditions.

Cutler Reservoir offers sport fishing, which is limited primarily to road access points. Fishing pressure is low to moderate with negligible boat angling. Primary sport fish targets in the reservoir are walleye, channel catfish, black bullhead, common carp, and black crappie (FFSL 2015). Night fishing for catfish is particularly popular around Benson Marina (Johnson 2017). There is no provision for fish passage at the reservoir; fish are unable to move downstream or upstream at this point. Fishing may also occur for brown trout, smallmouth bass, and walleye for approximately 5 miles below Cutler Dam. Fishing may also occur for brown trout, smallmouth bass, and walleye for approximately 5 miles below Cutler Dam. Fishing for large channel catfish is popular on the lower stretches of the Bear River from Corinne into the Bear River Migratory Bird Refuge. Fly-fishing or fishing by archery tackle for warm-water species, such as common carp, is becoming more popular in general and could become more prevalent throughout the lower Bear River (FFSL 2015). Most fishing is concentrated near public access locations, at DWR-managed access areas, or where roads cross the river. Anglers in motorized and non-motorized boats float the river and fish in more remote stretches (Johnson 2017). These fishermen travel longitudinally between two points, depending on the type of species being fished. The popularity of any one fishing location varies with the season, changing water, and weather conditions (Johnson 2017). Figure 2.49 shows a hunting blind on the Bear River. Figure 2.50 shows the Bear River access (Corinne) WMA.

Figure 2.49. Hunting blind on the Bear River.

Figure 2.50. Bear River access at Corinne.

RECREATION AREAS AND CONCERNS BY RIVER SEGMENT

Figure 2.51 illustrates DWR-managed access areas and their associated recreational uses, Cutler Reservoir recreation areas in the planning area, and other predominant recreation uses by river segment. The locations of existing boater access points and the approximate locations of proposed boater access points are also shown.

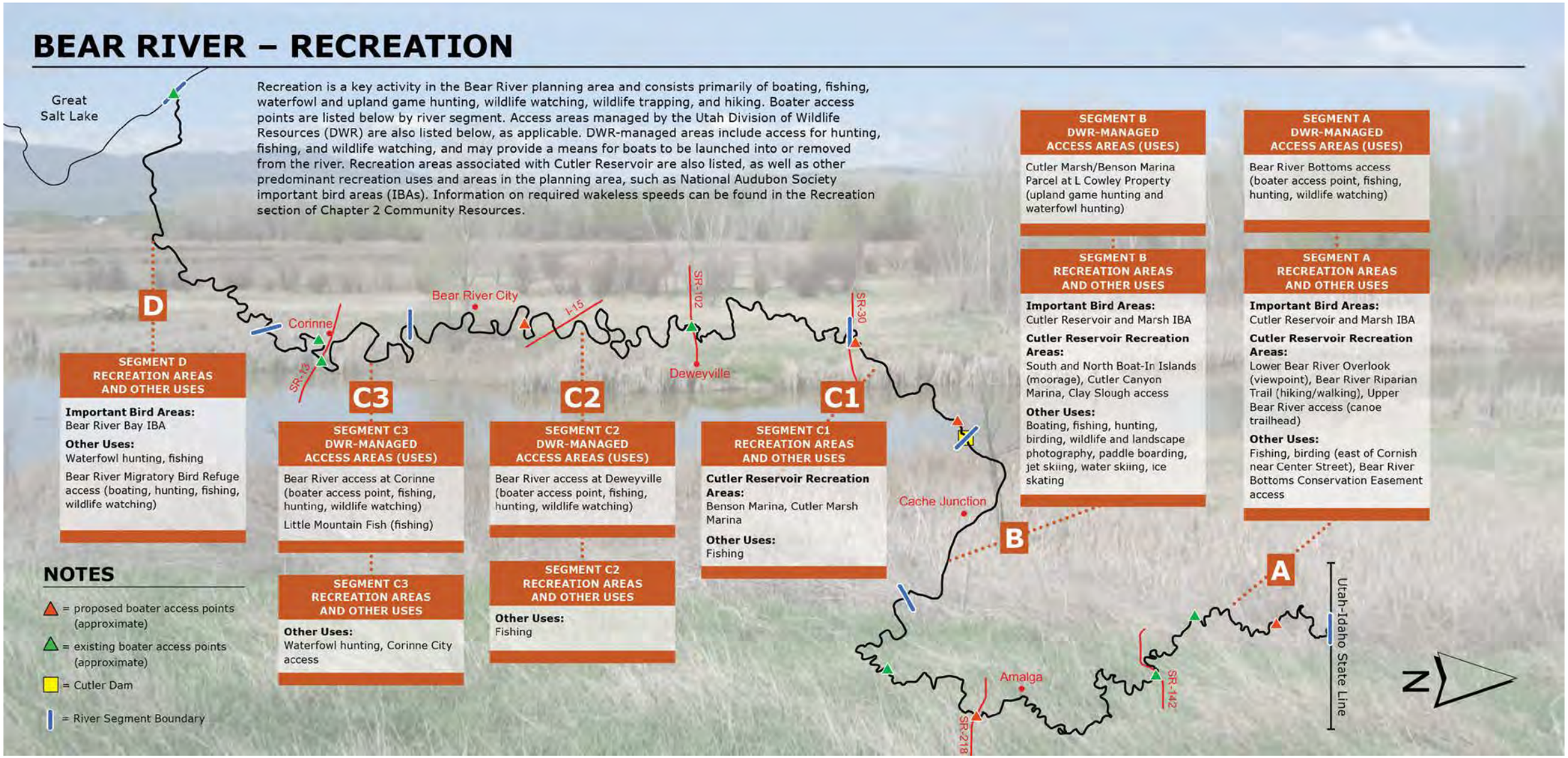


Figure 2.51. Utah Division of Wildlife Resources–managed access areas, Cutler Reservoir recreation areas, other recreation uses, and proposed and existing boater access points by river segment.

Further Reading

2007 Boater Use Zones (PacifiCorp 2007b)

Alternative Futures for the Bear River Watershed (Toth et al. 2005)

Bear River Baseline. Human and Biophysical Attributes of the Bear River Corridor in Cache and Box Elder Counties (Utah Division of Forestry, Fire & State Lands 2015)

Bear River Heritage Area (Bear River Heritage Area Council 2008)

Bear River Water Trail Section and Maps (Mott 2016a)

Envision Cache Valley Final Report and Toolkit (Envision Cache Valley 2010)

June 2007 Recreation Day-Use Rules (PacifiCorp 2007c)

The Navigational History of Bear River: Wyoming, Idaho, Utah (Crampton and Madsen 1975)

Geographic Information System Data Layers

Cutler Reservoir Recreation Areas, DWR-Managed Access Areas, Existing Boater Access Points, Proposed Boater Access Points, Trails

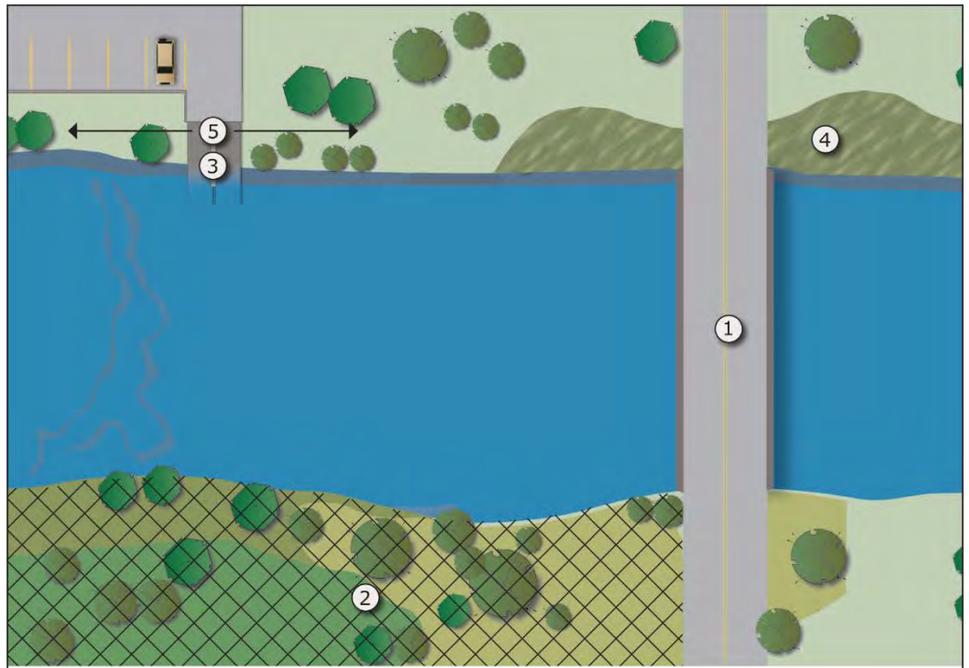
Access

Access is the ability to approach and use the Bear River for recreation, development, education, research, or other purposes such as flood control. Public access to Utah waters is currently under litigation. In 2008, the Utah Supreme Court ruled that the public has the right to float, hunt, fish, and participate in all lawful activities that use state waters. The court also ruled that the public has a right to touch the privately owned beds below state waters in ways incidental to recreational rights, so long as the public acts reasonably and do not cause unnecessary injury to the landowners (Utah Courts 2008). In 2010, Utah Legislature passed House Bill 141 (Recreational Use of Public Water on Private Property), which changed the recreational easement recognized in the Supreme Court ruling. House Bill 141 prohibits recreational users (anglers, kayakers, tubers, hunters, and others) from walking on the private bed of a public waterway without obtaining landowner permission. Floating on the surface of the water is allowed (Utah State Legislature 2010). A public interest group filed suit later that year to challenge the constitutionality of House Bill 141 (*Stream Access Coalition v. VR Acquisitions and the State of Utah*); in November 2015, the Utah Fourth District Court ruled in favor of the public interest group and found provisions of the bill unconstitutional (State of Utah 2015). An appeal of this ruling is ongoing, and House Bill 141 remains in effect while the appeal is heard and considered. Two additional cases currently before the Utah Supreme Court may also have some effect on the outcome. Because the bed and banks of the Bear River are considered sovereign land and therefore public land, the public can access the Bear River, riverbed, and banks as long as they do not trespass across private land.

Most of the land in the river corridor adjacent to sovereign lands is privately owned, presenting a significant barrier to river access. Privately owned areas adjacent to the Bear River can only be accessed with the consent of the landowner. In addition to landownership, access may be limited by the presence of non-native vegetation such as *Phragmites,* steep cut banks, lack of nearby roads or trails, or heavy native vegetation. Participants in the BRCMP public outreach process noted the presence of sloughs along the Bear River. When flooded, the sloughs can be accessed by recreation users; however, the sloughs are sometimes fenced off at low water levels by adjacent landowners, which prevents public access.

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 to infrastructure for recreation users in the planning area must also be protected so that recreation activities such as boating, fishing, and hunting can occur. Infrastructure should be safe for the public, protect natural resources, consider river fluctuations, and be Americans with Disabilities Act–accessible as required by law. Figure 2.52 shows a boater access point along the Bear River. Figure 2.53 further illustrates several types of access available along the river as well as access concerns.

Figure 2.52. Boater access point on the Bear River.



Legend

1. Bridge
2. Privately owned land (access prohibited)
3. Boat ramp (Utah Division of Wildlife Resources)
4. Obstructed access from *Phragmites*
5. Appropriate distance between facilities

Figure 2.53. Plan view showing types of access points and access concerns in the planning area.

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 river. Too many access points can damage the river 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. Because of the large amount of privately owned land in the planning area, opportunities to improve river access are limited without landowner collaboration. Careful planning would help preserve opportunities for access that have not yet been developed. 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 private land, roads, river use class, and other factors when deciding how close access points should be placed along the river.

Further Reading

Boating the Bear: An Introduction to the Bear River System for Users of Unpowered Watercraft (Boone 1992)

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

The Navigational History of Bear River: Wyoming, Idaho, Utah (Crampton and Madsen 1975)

Geographic Information System Data Layers

Cutler Reservoir Recreation Areas, DWR-Managed Access Areas, Existing Boater Access Points, Proposed Boater Access Points, Trails

Public Safety

Public safety refers to the welfare and protection of the general public. Public safety in the planning area primarily applies to recreational use of the Bear River by boaters and the associated boater access points, as well as by hunters and fishermen. Public safety could also apply to other recreation uses (e.g., wildlife watching) on the banks of the river or on bridges in the planning area. Natural hazards, such as wildfire and earthquakes, are also public safety issues.

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 administrated 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

Conflicts between motorized and non-motorized users are present in the planning area, primarily on Cutler Reservoir, as noted during the public outreach process. Motorized users do not always slow down to wakeless speed around kayakers and canoers. Sometimes kayakers and canoers paddle into the path of approaching motor boats. In addition, it was noted that current regulations on the reservoir are not well-enforced and do not allow for a quiet experience. Although important, this issue is beyond the jurisdiction of FFSL because it occurs on the water (and in Cutler Reservoir) and not on the bed or banks of the Bear River. FFSL would be willing to work with those agencies and entities having jurisdiction over this matter to ensure public safety. Public comments also requested that some Bear River boater access points (the northern road access points in both Box Elder and Cache Counties) be established and specified for non-motorized use, because motorized users are able to put-in downstream and navigate upstream easily.

Public safety issues identified in the planning area are presented in Figure 2.54.

Navigational Hazards	• Navigational hazards are both permanent (e.g., abandoned bridge pylons, low bridges, fences, railroad trestles) and temporary (e.g., garbage, downed tree limbs). These hazards are either human-made (e.g., dams) or are natural (e.g., tree limbs), and they can present direct safety risks to boaters. • Currently, there are few human-made navigational hazards in the planning area.
Fire	• Fire can be caused by river users (e.g., children), can threaten recreationists, and can reduce the quality of the recreation experience by eliminating natural elements such as trees. • Fire can negatively impact land adjacent to the planning area. • Fire can be associated with noxious weeds such as *Phragmites*.
Flooding	• Flooding can present safety risks by making the river trail impassable (e.g., boats will not fit under bridges) and by creating new navigational hazards. • Flooding can impact the safety of recreationists by inundating river crossings or other recreation spots. • Flooding can negatively impact land adjacent to the planning area.
General Safety	• Hunting involves guns, which can be dangerous for others on or near the river, if not used carefully. • Motorized boats can present risks to other users at higher speeds. • FFSL will collaborate with other management, permitting, and intersecting agencies to ensure safe access and use of the river.
Crime Prevention, Enforcement, and Patrolling	• FFSL currently has one law enforcement officer that can assist with crime prevention, enforcement, and patrolling. • Local law enforcement agencies often handle crime prevention and enforcement activities along the river. FFSL would consider partnering with such agencies to ensure public safety. • DWR access areas (WIA and WMAs) are regularly patrolled.

Figure 2.54. Public safety issues in the planning area.

In addition to the concerns illustrated in Figure 2.54, the lower Bear River is laterally unstable with high bank erosion potential (DWQ 2002). Bank erosion could be a safety concern for river users. Trash at boater access points was also identified during the public outreach process as a general issue.

The primary natural hazards in the Bear River region of Box Elder, Cache, and Rich Counties consist of dam failure, earthquakes, fire, flood, and landslides. Other regional hazards include drought, severe weather, agricultural hazards (e.g., insect infestation), radon, avalanches, and tornados (Bear River Association of Governments 2015). The following provides brief summaries of the primary natural hazards for each county in the planning area:

- Dam failure: Dam failure has a low probability of future occurrence in Box Elder County. Although Cutler Dam has a high hazard rating, the inundation area is primarily in the floodplain, and threats to population and homes appear to be minimal (Bear River Association of Governments 2015). PacifiCorp also employs a Dam Safety Program, which includes emergency action plans in the case of dam failure or other natural or human-caused risk to the dam, such as high flows.
- Earthquakes: Box Elder County has a moderate to high and high liquefaction potential along much of the Bear River. The county has a 35.9% chance every year of an earthquake of 4.0 magnitude or greater. Cache County has a high liquefaction potential along much of the Bear River. The county has a 20.5% chance every year of an earthquake of 3.0 magnitude or greater (Bear River Association of Governments 2015).
- Fire: Box Elder County has a very high probability of future wildfire occurrence dispersed throughout the whole county; however, most of the moderate to high fire risk areas are not near the Bear River. Cache County has a high probability of future wildfire occurrence mostly along the Bear River Mountains and the Wellsville Mountains. Most of the moderate to high fire risk areas are not near the Bear River.
- Flooding: Some flooding occurs nearly every year in Box Elder and Cache Counties (i.e., spring flooding as a result of snowmelt and mid- to late-summer cloudburst events). For delineated floodplains, there is a 1% chance of flooding in any given year in both counties.
- Landslides: Box Elder County has a very high probability of future landslide occurrences, dispersed throughout the whole county but mostly in the mountains in the east and northwest portions of the county. Cache County has a high probability of future landslide occurrences, generally in areas with steeper slopes (which are not typically along the Bear River).

Public safety concerns on the Bear River identified during the planning and public outreach process are shown in Figures 2.54 and 2.55.

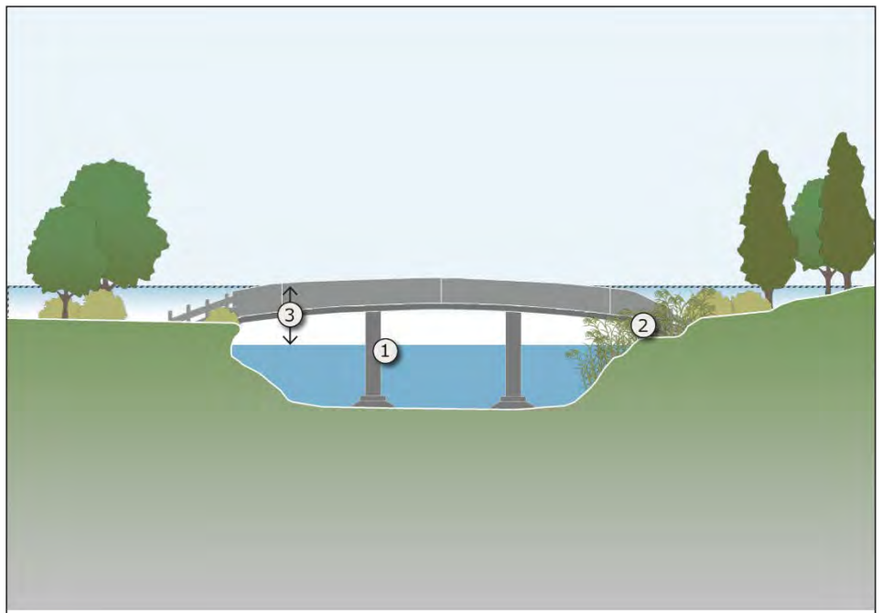


Figure 2.55. Cross section showing potential public safety hazards in the planning area.

FFSL prohibits camping on the beds of navigable rivers except in posted or designated areas (Utah Code 65A-3-1). FFSL, DWR, and DSPR all have responsibility for law enforcement on the Bear River.

Further Reading

Pre-Disaster Mitigation Plan 2015 (Bear River Association of Governments 2015)

What is Emergency Management, Box Elder Count (Box Elder County 2017)

Emergency Preparedness, Cache County (Cache County 2017b)

Geographic Information System Data Layers

Flooding, Navigational Hazards

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 Bear River, clarifies FFSL's jurisdiction and management authority on Bear River sovereign lands, and fosters public appreciation of the river and understanding of its value and the need to protect it. In addition, educating Bear 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.

User groups that benefit from educational efforts about the Bear River are listed in Figure 2.56.

General Public	• The general public should understand why the Bear River is valuable and why it should be protected. This creates support for and use of the river.
Recreationists	• Recreationists should understand what recreation opportunities are available (e.g., boating, fishing, hunting, wildlife watching) and how to take advantage of them.
Potential Permitees	• Permittees should understand FFSL jurisdiction and management authority, permit application requirements and processes, how to design a project to fit with FFSL management goals, and what best management practices to implement.
Adjacent Landowners	• Adjacent landowners should be aware that they may have negative impacts on the Bear River (e.g., pesticide runoff, animal waste), and they should have access to information about practices to reduce their impacts.
Students and Educators	• Students and educators should understand that the Bear River offers excellent educational opportunitites, and that an outdoor classroom such as the Bear River provides an effective learning setting.
Researchers	• Researchers should understand FFSL juridiction and management authority, permit application requirements and processes, what best management practices to implement during research activities, and how to share research results.
Government	• Elected and appointed officials, as well as local municipal, county, and other government agency staff, should understand why the Bear River is valuable and why it should be protected. In addition, they should understand FFSL jurisdiction and management authority.

Figure 2.56. User groups in the planning area.

EDUCATIONAL PROGRAMS

Several types of organizations provide educational programs for and on the Bear River. The following list describes a few:

- The Bear River Targeted Watersheds team provides presentations about water quality education, water quality issues, and other topics such as water quality trading in the Bear River watershed (USU 2011c).
- Bear River Migratory Bird Refuge staff and volunteer teams lead a variety of programs, including field trips and tours. The refuge also provides traveling kits and activities for teachers; a resource library of books, videos, and digital versatile discs; and teacher and group leader educational workshops (USFWS 2014).
- Bridgerland Audubon Society provides birding information for areas such as the Bear River and conducts public field trips (Bridgerland Audubon Society 2016).
- Wasatch Audubon Society provides birding information for areas such as the Bear River Migratory Bird Refuge, Cutler Marsh, and the Amalga Barrens (Wasatch Audubon Society 2016). They also conduct Christmas bird counts at the Bear River Migratory Bird Refuge and along parts of the Bear River and other birding outings.
- The Bear River Land Conservancy holds conservation easements on land along the Bear River and runs public outreach campaigns (Bear River Land Conservancy 2016). In addition, they host public outings to view migratory birds (FFSL 2015).
- Cache Anglers has offered a presentation on fishing the Bear River Narrows (Cache Anglers 2016).
- USU Water Quality Extension hosts an annual Bear River Celebration and Free Fishing Day with hands-on educational activities for youth and their families (USU 2016a). They also provide educator training and resources.

Figure 2.57 shows a picture of the Bear River Bird Migratory Refuge visitor center.

Figure 2.57. Bear River Migratory Bird Refuge visitor center.

Available Bear River curriculum for students and teachers includes the following:

- Stream Side Science from USU, which consists of 11 lesson plans based on water science originally designed for grades 9 through 11, but has been shown to be effectively used by grades 5 through 12 (USU 2011c).
- Journey through the Bear River Watershed, which is a Bear River–specific supplement to the Stream Side Science curriculum (USU 2011c).

- The Utah Stream Team Water Education and Water Quality Monitoring Program manual, which is linked to the grade 9 core curriculum and describes how to set up a volunteer stream monitoring program, including preparing for fieldwork, collecting data, and interpreting results (USU 2011c).
- Wetland Wonders Watershed Kit, from the Bear River Migratory Bird Refuge, which is designed to help teachers educate students about water, wetlands, and the Bear River watershed (USFWS 2014).

USU has developed the Bear River Watershed Information System for the Bear River in collaboration with the Bear River Commission; Utah, Idaho, and Wyoming Departments of Environmental Quality; and other interested stakeholders. The Bear River Watershed Information System is designed to be a central location for data and information on the Bear River Basin. It provides information on the watershed, outreach and education, water quality trading, watershed data, data tools, GIS and mapping, digital resources, associated organizations, and projects.

SIGNAGE

The Bear River in the planning area does not currently have a coordinated signage system. Interpretive and informational signing can help increase public awareness about the river and about access and recreational opportunities. A coordinated, standard system of signs would help provide safety and use information to river users, as well as highlight the natural and cultural features of the river corridor. For these reasons, FFSL would support the implementation of a coordinated signage system. Such a system would be especially useful to boaters, hunters, and fishermen using the water trail because it would provide information on safe navigation and boater access points.

In general, signs should be highly visible, easy to maintain, and consistent. Interpretive signs could be distributed at key locations to provide educational information about the history of the Bear River, wildlife and habitat, restoration and protection efforts, unique ecological features, and local culture. All trail signs should fulfill a need, command attention, convey a clear and simple meaning, command respect from river users, and give adequate time for proper response.

CURRENT RESEARCH

Research on the Bear River is often conducted in the planning area and may require FFSL authorization 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 Bear River and would support partnerships with organizations doing research.

Recent and ongoing research on the Bear River includes an investigation of the factors affecting native cutthroat trout population dynamics and health, creation of a revised bibliography of documents and Bear River–related information housed in the USU Special Collections and Archives, a study to contribute to drought management that examines factors that influence human conservation behavior, and the development of a database to analyze regional and local demographic and land use trends with important implications for water resources (USU 2011d). In addition, the USU Utah Water Research Laboratory is conducting research on the Bear River, including efforts to estimate and track phosphorus levels in the river and to measure nutrient loading, suspended sediments, and general water quality in Cutler Reservoir (USU 2010). PacifiCorp also conducts quarterly water quality monitoring every 5 years at Cutler Reservoir, as well as a variety of wildlife, habitat, and recreation monitoring efforts annually (Davies 2017).

The Bear River Migratory Bird Refuge regularly conducts research such as shorebird monitoring, waterfowl banding, mercury contamination monitoring, treatment method effectiveness for Phragmites, water quality monitoring, vegetation surveys, bird surveys, and grazing monitoring. Wasatch Audubon Society conducts Christmas bird counts at the Bear River Migratory Bird Refuge and along the portion of the Bear River ("citizen-science" research).

Further Reading

Bear River Watershed Data, Projects: Research (Utah State University 2011d)

Bear River Migratory Bird Refuge, About the Refuge (U.S. Fish and Wildlife Service 2016)

Birding Tools (Bridgerland Audubon Society 2016)

Great Salt Lake Birding Trails: Map and Key (Wasatch Audubon Society *2017)*

Utah State University, Water Quality (Utah State University 2016b)

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CHAPTER 3 – MANAGEMENT FRAMEWORK

3.1 Introduction

This chapter focuses on management strategies that FFSL will seek to implement in order to meet the needs of Bear River resources described in Chapter 2 of the plan. Management strategies are organized around each resource area and consist of management goals and objectives that focus on management actions and decisions within FFSL's jurisdiction. Identified management strategies allow numerous opportunities for coordination with respect to Bear River resources, a fundamental responsibility of FFSL according to Utah Code 65A-10-1. Collectively, management strategies discussed in this chapter are designed to facilitate FFSL's management of Bear River sovereign lands and resources in accordance with the Public Trust Doctrine and under multiple-use, sustained-yield principles, as stated in Utah Code 65A-2-1. In cases where FFSL does not have direct management authority over a particular aspect of the river, FFSL will coordinate with the agencies and other partners that do have such authority. The term *partners* as used in the Management Strategies chapter is defined as landowners, 501(c) and nonprofit organizations, special interest groups, and other Bear River stakeholder groups.

Managing for the Public Trust

As described in Chapter 1, managing for the Public Trust, FFSL "recognizes and declares that the beds 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 the beds of these waters. It is also recognized that the public health, interest, safety, and welfare require that all uses on, beneath or above the beds of navigable lakes and streams of the state be regulated, so that the protection of navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality will be given due consideration and balanced against the navigational or economic necessity or justification for, or benefit to be derived from, any proposed use" (Utah Administrative Code R652-2-200). The following management strategies reflect FFSL's commitment to the Public Trust on sovereign lands when considering specific projects, decisions, and applications for permits or authorizations:

- Navigation: FFSL will strive to maintain or improve navigation on the Bear River. Decisions concerning river management will consider mitigation and removal of existing navigational hazards as well as parameters for new projects to facilitate navigation.
- Fish and wildlife habitat: FFSL will strive to maintain, enhance, or restore aquatic, wetland, riparian, and terrestrial habitat under its jurisdiction.
- Aquatic beauty: FFSL will strive to maintain or improve visual conditions in and along the Bear River, recognizing that aquatic beauty increases the value of the Bear River as a community resource.
- Public recreation: FFSL will consider and support diverse recreation activities and facilities at sustainable levels.
- Water quality: FFSL will consider and support the State of Utah's anti-degradation policy for water quality.

When implementing 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 BRCMP, allows for multiple-use management, can be modified over time based on new data, and avoids pitfalls of setting a "restored" ecological condition as a management target. For example, in managed systems like the Bear River, setting restoration goals must account for normal conditions—e.g., invasive species and hydrologic modifications—that make restoration to some earlier condition unrealistic or in some cases unattainable. The BRCMP has established desired future conditions for Ecosystem, Water, and Community Resources. The subsequent management goals and objectives for each sub-resource provide a means for working toward a desired future condition for the Bear River.

River Use Classes

As described in Chapter 1, sovereign lands are classified in Utah Administrative Code R652-70-200 based on their current and planned uses, and FFSL uses these classes to guide management of sovereign lands with diverse current and desired future conditions. Table 3.1 lists and describes the river use classes used to guide management and use on the Bear River.

Table 3.1. Classification of Sovereign Lands

River Use Class	Description
Class 1	Manage to protect existing resource development uses
Class 2	Manage to protect potential resource development options
Class 3	Manage as open for consideration of any use
Class 5	Manage to protect potential resource preservation options
Class 6	Manage to protect existing resource preservation uses

Source: Utah Administrative Code R652-70-200.

A map book of how these use classes are applied to Bear River sovereign lands is found in Chapter 1, Figure 1.8. From a management perspective, FFSL recognizes that different activities have different impacts on sovereign lands. Table 3.2 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 3.2 will be reviewed on a case-by-case basis to arrive at an appropriate use determination.

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 or requirements. The site-specific analysis will consider potential impacts (beneficial and adverse) of the proposed project to Bear River resources. Certain BMPs must be incorporated into 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 BRCMP 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 potential conflicts, e.g., boat ramps and utilities in the same location. Finally, under certain jurisdictions such as Clean Water Act (CWA) permit conditions, Federal Energy Regulatory Commission (FERC) Management Areas, or FEMA-accredited levee operation and maintenance, some proposed actions may not be authorized regardless of FFSL river use class or use determination.

Table 3.2. Use Determinations for Proposed Actions by River Use Class

Proposed Action*	Class 1	Class 2	Class 3	Class 5	Class 6
Bed, Bank, and Vegetation Management					
Bank stabilization (bio-engineering)	A	A	A	A	A
Bank stabilization (hardened)	A	A	P	P	P
Dredging†	P	P	P	P	P
Fire prevention treatments	A	A	A	P	P
Grade controls	P	P	P	P	P
Herbicide treatment (authorization required)	A	A	A	A	A
Vegetation planting and propagule harvesting (e.g., willow whips)	A	A	A	A	A
Vegetation removal	A	A	A	P	P
Education and Research					
Education and interpretation	A	A	A	A	A
Scientific research instruments	A	A	A	A	A
Survey and monitoring activities	A	A	A	A	A
Habitat Management					
Aquatic habitat structures	A	A	A	A	A
Wildlife habitat (e.g., nesting structures)	A	A	A	A	A
Infrastructure					
Above-ground water, oil and gas, sewer, and communication lines§	P	P	N	N	N
Below-ground or buried utilities†	A	A	A	A	P
Bridges (pedestrian)†	A	A	A	P	P
Bridges (vehicle)†	A	A	A	P	N
Dams	P	P	P	N	N
Intake canals	P	P	P	P	P
Irrigation pumps	A	A	A	A	A
Fences	A	A	A	A	A
Outfall structures	A	A	A	P	P
Overhead power lines‡	P	P	P	P	P
Regulatory markers (e.g., buoys, signage)	A	A	A	A	P
Trash booms	A	A	A	P	P
Recreation					
Boat docks (permanent)†	N	N	N	N	N
Boat docks (seasonal/temporary)†	A	A	A	P	P
Boat ramps†	P	P	P	P	P
Navigational hazard removal	A	A	A	A	A
Other recreation structures (permanent)†	P	P	P	P	P
Other recreation structures (temporary/seasonal)†	A	A	A	P	P

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

* Actions generally 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).

† 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. Irrigation pumps and electrical utilities servicing pumps installed and maintained by private landowners are exempt from this condition. Above-ground utilities that cross the river require authorization because sovereign lands include the air space over the river.

‡ Height to be determined during site-specific planning and based on National Electrical Code power line clearance guidelines (National Electrical Code 2017).

§ Potentially allowable if attached to existing permitted structures.

Class 4 is not applied to the BRCMP planning area because adequate information about Bear River sovereign lands exists to develop a planning document.

Resource Management Issues

Throughout the 2016–2017 BRCMP planning process, numerous management issues regarding Bear River resources were raised during the public comment period, municipal meetings, stakeholder workshops, and BRCMP planning team meetings. Within each resource, broader management issues were distilled 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. For example, navigational hazards can be discussed from recreation, infrastructure, and public safety perspectives, and 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 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.

Management Goals and Objectives

The goals and objectives reflect the intention of FFSL to protect and sustain the Pubic 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 along the Bear 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).

Privately owned agricultural lands make up most of the lands adjacent to the planning area (FFSL 2015). Because these lands border FFSL's jurisdiction along much of the Bear River, FFSL will work proactively and cooperatively with interested landowners to implement applicable management goals and objectives.

Interagency Coordination

Effective coordination and communication with government agencies regarding Bear River resources are vital to ensuring the health and long-term stability of the ecosystem. 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.

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 BRCMP 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 Bear River resource-related permits. They are limited in most cases to FFSL, DWQ, and DWRi, who can each issue permits for projects in or adjacent to the Bear River. Each agency has the potential to impact the resource through permit authorizations, including mitigation. The agency is responsible for monitoring permit compliance. Within portions of Segments A and B, FERC is another jurisdictional agency because it regulates the operation of Cutler Dam and Reservoir.
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 Bear River but is tangentially related. The decisions of these agencies may directly or indirectly impact a particular resource. In addition to federal and state agencies, an intersecting agency can include a county government, municipal government, and regional planning organization. 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 it is coordinating with the appropriate agency to efficiently address resource concerns. 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 Bear River. 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 Bear River.

Best Management Practices

Implementation of BMPs for each resource helps avoid or minimize impacts to Bear 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 Bear River. For a list of BMPs relevant to land uses that extend from the river and beyond, readers can review supplemental literature, e.g., *Riparian Buffer Design Guidelines for Water Quality and Wildlife Habitat Functions on Agricultural Landscapes in the Intermountain West* (Johnson and Buffler 2008), or consult other sources of technical information such as the local offices of the Natural Resources Conservation Service. Users of the BRCMP should review BMPs during their project planning process and demonstrate in the application documents how BMPs are incorporated and/or why they are not practicable.

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3.2 Ecosystem Resources

Desired Future Conditions:

- A sustainable river system that supports human uses, diverse populations of native plant and animal species, and desirable introduced and native fish with limited constraints from invasive and non-native species.
- Recognition that natural disturbance can be beneficial, but avoiding anthropogenic disturbance is needed to the extent practicable.
- Understanding that preservation of areas that provide ecosystem services (e.g., flood attenuation and wildlife habitat) and restoration of degraded ecosystems enhance overall ecological condition.

As discussed in Chapter 1, Section 1.8, river use classes are applied to specific locations on Bear River sovereign lands based on a variety of parameters. Table 3.3 describes what the river use classes mean for ecosystem management.

Table 3.3. River Use Classes and Ecosystem Management

River Use Class	What the Use Class Means for Ecosystem Management
Class 1	Greater potential for actual loss or degradation of habitat. Balance between existing authorizations and uses and potential for fish and wildlife habitat. High potential for wildlife habitat restoration, including improving native vegetation communities, bank stability, and water quality, as described in Chapter 2, Figure 2.20.
Class 2	Potential future loss or degradation of habitat. Balance between existing authorizations and uses and potential for wildlife habitat. High potential for wildlife habitat restoration, including improving native vegetation communities, bank stability, and water quality, as described in Chapter 2, Figure 2.20.
Class 3	Allows for conservation of fish and wildlife habitat through implementation of BMPs and other types of mitigation.
Class 5	Greater potential for ecosystem protection and conservation. Lands may resemble those eligible for conservation easement status. No current regulatory restrictions on use or protection. High potential for streambank and instream wildlife habitat restoration.
Class 6	Preservation of ecosystem services and ongoing opportunities for adaptive management and habitat improvement projects. Current regulatory protection of adjacent land use. High potential for streambank and instream wildlife habitat restoration.

Wildlife Habitat

Table 3.4 presents management goals and objectives for wildlife habitat that are common to all classes. Figure 3.1 provides a list of BMPs for wildlife habitat in the planning area.

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

Wildlife Habitat Goal 1: Protect and sustain native habitats in and along the Bear River.
Objective: Cooperate with agencies, partners, and interested landowners to identify and maintain areas with high wildlife habitat value.
Objective: Cooperate with partners and interested landowners 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.
Objective: Coordinate with city and county planning departments to evaluate potential direct and indirect impacts of proposed projects adjacent to and abutting the Bear River.
Management Agencies: FFSL, DWR,
Permitting Agencies: FFSL, DWRi, USACE, DWQ
Intersecting Agencies: County and municipal governments
Wildlife Habitat Goal 2: Restore and enhance native habitats in and along the Bear River.
Objective: Support restoration of the riparian zone, emphasizing connectivity along the river corridor.
Objective: Use native or desirable species in plant lists and seed mixes when conducting restoration or enhancement activities and where necessary appropriate to engineering techniques.
Objective: Coordinate with agencies, restoration partners, and interested landowners to re-establish floodplains and other geomorphic features where appropriate (e.g., point bars, bank woody debris, and low emergent benches).
Objective: Support removal of structures that degrade native habitats.
Management Agencies: FFSL, DWR,
Permitting Agencies: FFSL, DWRi, USACE
Intersecting Agencies: County and municipal governments
Wildlife Habitat Goal 3: Support habitat restoration or enhancement on lands adjacent to the Bear River.
Objective: Coordinate with agencies, partners, and interested landowners on projects that are adjacent to and benefit habitat on sovereign lands.
Objective: Cooperate with agencies, partners, and interested landowners to inventory adjacent lands where restoration or enhancement would benefit navigation, water quality, fish and wildlife habitat, recreation, or aquatic beauty.
Management Agencies: FFSL, DWR,
Permitting Agencies: FFSL, DWRi, USACE
Intersecting Agencies: County and municipal governments
Wildlife Habitat Goal 4: Manage invasive and noxious weed species in and along the Bear River.
Objective: Inventory and map noxious weed occurrences in and along the Bear River.
Objective: Identify concentrations and dispersal vectors for noxious weeds within the river corridor.
Objective: Target and treat invasive weed species (especially *Phragmites*), and treat colonizing invasive species in the planning area.
Objective: Coordinate with landowners who are interested in treating invasive and noxious weed infestations on their property.
Management Agencies: FFSL, UDAF
Permitting Agencies: FFSL
Intersecting Agencies: DWR, NRCS, county and municipal governments

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, aquatic invasive species, and invasive weed species.
- Enhance connectivity between habitat patches.

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

Wildlife Species

Table 3.5 presents management goals and objectives for wildlife species that are common to all classes. Figure 3.2 provides a list of BMPs for wildlife species in the planning area.

Table 3.5. Wildlife Species Management Goals and Objectives Common to All Classes

Wildlife Species Goal 1: Recognize the importance and support the sustainability of viable populations of native and desirable non-native fishes, along with migratory bird species and their habitats.
Objective: Coordinate with agencies, partners, and interested landowners to encourage the creation, restoration, enhancement, and maintenance of a diversity of habitats and adequate cover, reproductive sites, and food supply for fish and migratory birds.
Objective: Support inventory, monitoring, and research of fisheries and migrating bird populations with agencies, partners, and interested landowners, including non-governmental organizations and citizen science groups.
Objective: Support DWQ aquatic wildlife–related beneficial uses, and help ensure compliance with numeric criteria for pollutants.
Management Agencies: FFSL, DWR
Permitting Agencies: FFSL, DWRi, USACE, DWQ
Intersecting Agencies: NRCS, county and municipal governments
Wildlife Species Goal 2: Recognize the importance of watchable wildlife opportunities in and along the Bear River.
Objective: Coordinate with agencies, partners, and interested landowners to increase the biodiversity and numbers of birds and other wildlife species in and along the Bear River through habitat restoration and enhancement.
Management Agencies: FFSL, DWR
Permitting Agencies: FFSL, DWRi, USACE
Intersecting Agencies: NRCS, USFWS, county and municipal governments
Wildlife Species Goal 3: Support the control or eradication of existing aquatic invasive species and terrestrial non-native, invasive species; prevent the spread of existing aquatic invasive species and terrestrial, non-native species; and prevent the introduction of new aquatic invasive species and terrestrial, non-native species to the Bear River.
Objective: Support control and eradication of aquatic and terrestrial non-native, invasive pests that are presently in the river system through coordination with DWR and other agencies.
Objective: Coordinate with DWR on public awareness programs and other strategies for keeping non-native, invasive pest species out of the Bear River.
Management Agencies: FFSL, USFWS, DWR, UDAF
Permitting Agencies: DWQ
Intersecting Agencies: USFWS, NRCS

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 near aquatic resources.
- Refer to DWR key habitats and priority species when planning restoration projects in and along the river (DWR 2005a; Utah Wildlife Action Plan Joint Team 2015).
- Follow Utah invasive species state laws and regulations.
- Refer to the *Utah AIS Management Plan* (DWR 2008; Utah Invasive Species Task Force)

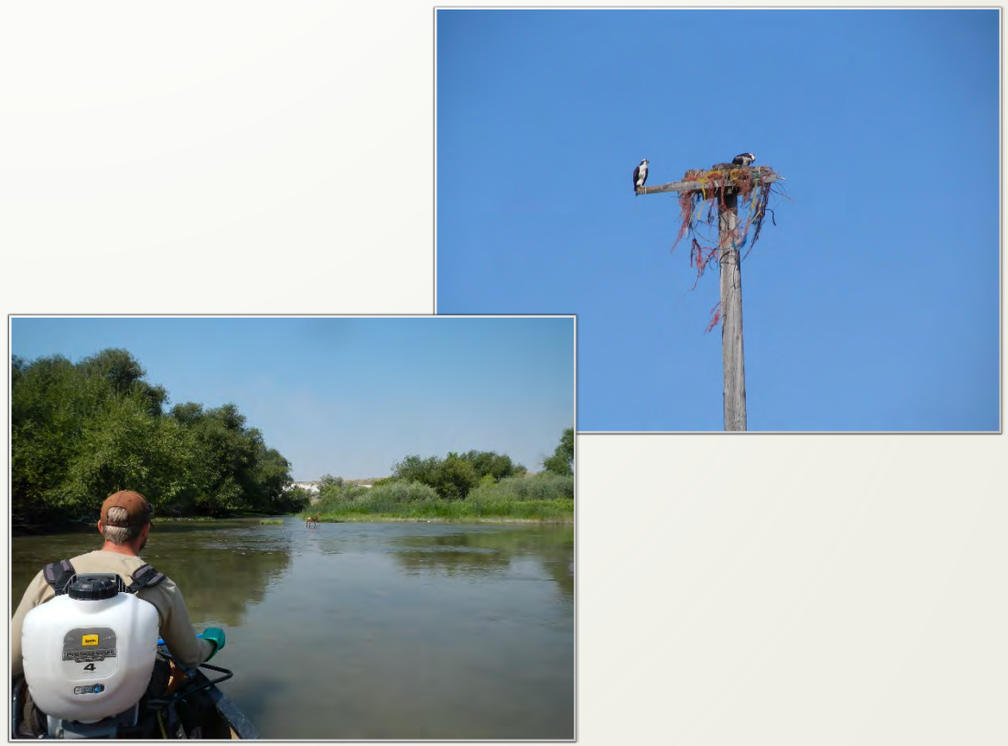

Figure 3.2. Best management practices for wildlife species in the planning area.

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3.3 Water Resources

Desired Future Conditions:

- A sustainable river system with improvements, where possible, to naturalized flows and floodplain connectivity.
- Where possible, maintenance of seasonal variation in discharge and 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.
- Recognize and support existing agricultural and hydropower uses maintained by Bear River flows.

As discussed in Chapter 1, Section 1.8, river use classes are applied to specific locations on Bear River sovereign lands based on a variety of parameters. Some variation may exist with regard to hydrology management from one class to the next. Table 3.6 describes what the river use classes mean for water resource management.

Table 3.6. River Use Classes and Water Resource Management

River Use Class	What the Use Class Means for Water Resource Management
Class 1	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.
Class 2	Potential degradation of local hydrology and water quality is possible without implementation of BMPs and other mitigation measures.
Class 3	Potential degradation of local hydrology and water quality is possible without implementation of BMPs and other mitigation measures.
Class 5	Emphasis is placed on protection of hydrology and water quality, and certain activities may be under additional scrutiny beyond regulation BMPs.
Class 6	Emphasis is placed on protection of hydrology and water quality, and certain activities may be under additional scrutiny beyond regulation BMPs.

Hydrology

Table 3.7 presents management goals and objectives for hydrology that are common to all classes. Figure 3.3 provides a list of BMPs for hydrology management in the planning area; these are adapted from the *Jordan River Corridor Preservation Study* (JE Fuller/Hydrology & Geomorphology and CH2MHill 2007) and are considered equally appropriate for the Bear River.

Table 3.7. Hydrology Management Goals and Objectives Common to All Classes

Hydrology Goal 1: Support studies and research regarding instream structures and, where appropriate, support modification or removal.
Objective: Support comprehensive mapping and inventory of instream structures.
Objective: Assess condition of instream structures to determine impact on hydrology.
Objective: Consider removal or repair of instream structures that are degrading hydrologic conditions.
Objective: Ensure that placement and design of new instream infrastructure will not degrade hydrology (see BMPs following this table).
Management Agencies: FFSL
Permitting Agencies: FFSL, USACE, DWRi, DWQ
Intersecting Agencies: DWR
Hydrology Goal 2: Support restoration efforts that integrate river processes.
Objective: Consider geomorphologic characteristics when managing river restoration efforts. For example, in river segments where the slope is steep, consider the likelihood of scour versus segments where slope is gentle. Also consider the likelihood of deposition.
Management Agencies: FFSL
Permitting Agencies: FFSL, USACE, DWRi
Intersecting Agencies: DWR
Hydrology Goal 3: Recognize the importance of flows that support aquatic, adjacent habitat, and instream processes.
Objective: Support research of flow and releases that would benefit the riverine ecosystem and fluvial processes.
Objective: Coordinate with DWR to study instream flows that support fisheries and associated aquatic and wildlife habitat.
Management Agencies: DWRi, DWRe, DWR
Permitting Agencies: DWRi
Intersecting Agencies: DWQ, FERC, Bear River Commission

BEST MANAGEMENT PRACTICES FOR HYDROLOGY MANAGEMENT IN THE PLANNING AREA

- Use bioengineering techniques when possible.
- 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.

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

Water Quality

Water quality is one component of the Public Trust managed for by FFSL under a balanced and sustainable framework. FFSL will draw on DWQ's designated beneficial uses for water quality and not the river use class system. Therefore, water quality concerns do not vary from one class to the next. Table 3.8 presents management goals and objectives for water quality. Figure 3.4 provides a list of BMPs for water quality management in the planning area, many of which are taken from the lower Bear River TMDL (DWQ 2002).

Table 3.8. Water Quality Management Goals and Objectives Common to All Classes

Water Quality Goal 1: Promote the policy of anti-degradation of Bear 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 maintenance and improvement of existing water quality to protect the existing beneficial uses designated for the Bear River.
Management Agencies: DWQ, FFSL
Permitting Agencies: DWQ
Intersecting Agencies: County and municipal governments, DWRe, NRCS
Water Quality Goal 2: Recognize the importance of minimizing pollutant loads to the river, specifically those that have been identified in the TMDL (e.g., DO, total dissolved solids, and total phosphorus, and total suspended solids).
Objective: Coordinate with DWQ to ensure compliance with numeric criteria for parameters of concern, e.g., DO, total dissolved solids, and total phosphorus, and total suspended solids.
Objective: Coordinate with municipal stormwater management entities, 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 water quality standards.
Objective: Support maintenance of existing and/or restore degraded wetland, riparian, and vegetated infiltration buffers adjacent to sovereign lands.
Management Agencies: FFSL, DWQ
Permitting Agencies: DWRi, DWQ, USACE
Intersecting Agencies: County and municipal governments

BEST MANAGEMENT PRACTICES FOR WATER QUALITY MANAGEMENT IN THE PLANNING AREA

- Use sediment and erosion control fencing during construction activities.
- Where appropriate, use bio-engineering practices for bank stabilization.
- Limit construction activities within the stream corridor, particularly during high-flow periods.
- Treat WWTP discharges.
- Treat stormwater through the use of constructed wetlands, bio-swales, and other features.
- Revegetate the riparian corridor to provide filtration and thermal protection.
- Rehabilitate riparian zones by establishing riparian buffers.
- Stabilize streambanks through revegetation, snag removal and clearing, flow regulation structures, revetments, or deflectors.
- Ensure areas designated as critical point sources meet Utah Pollutant Discharge Elimination System requirements.
- Address high total phosphorus concentrations by implementing the following standard as defined in the Middle Bear River and Cutler Reservoir TMDL (SWCA 2010) and lower Bear River TMDL (DWQ 2002):
  - Total phosphorus concentration of no more than 0.05 milligram per liter throughout the year
  - Total phosphorus concentration of no more than 0.075 milligram per liter at the Cutler Dam outfall
- Address low DO by implementing the following standards as defined in the Middle Bear River and Cutler Reservoir TMDL (SWCA 2010) and in the lower Bear River TMDL (DWQ 2002):
  - 1-day minimum DO of 3.0 milligrams per liter throughout the water column
  - 7-day average DO to be maintained above 4.0 milligrams per liter
  - 30-day average DO to be maintained above 5.5 milligrams per liter

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 (e.g., irrigation and recreation) 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 aquatic beauty of the river ecosystem and human environment without impairment of recreation, education, and art.
- Preservation of cultural resources and recognition of prehistoric and historic landscapes.

As discussed in Chapter 1, Section 1.8, river use classes are applied to specific locations along on Bear River sovereign lands based on a variety of parameters. Table 3.9 describes what the river use classes mean for community resource management.

Table 3.9. River Use Classes and Community Resource Management

River Use Class	What the Use Class Means for Community Resource Management
Class 1	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.
Class 2	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.
Class 3	Emphasis on mitigation to avoid impacts to ecosystem, water, and cultural resources with consideration of multiple-use practices.
Class 5	Preference for activities and mitigation that maintain current agricultural activities, existing cultural resources, and potential for future resource preservation and restoration.
Class 6	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.

Agriculture

The Bear River provides critical water resources that established the foundation for agriculture and early settlements in Box Elder and Cache Counties. Agricultural lands, especially those through which the Bear River flows, are not only an important part of our cultural history, but also the current economy. These lands are also visual and open space resources that provide a strong sense of place, regional identity in the Cache and Bear River Valleys, and significant fish and wildlife habitat.

Management goals and objectives generally seek to support the viability of agriculture as a desirable land use along the river, the use of sustainable agricultural practices, to enhance wildlife habitat on agricultural lands, and to mitigate or reduce environmental impacts to water quality and other important environmental attributes of the river corridor.

Table 3.10 presents management goals and objectives for agriculture that are common to all classes. Figure 3.5 provides a list of BMPs for agriculture management in the planning area, including some from USU Water Quality Extension (USU 2017).

Table 3.10. Agriculture Management Goals and Objectives Common to All Classes

Agriculture Goal 1: Support programs to preserve agricultural lands along the river through agricultural conservation easements or other tools that help ensure the long-term viability of agriculture, and recognize its importance as a vital open space and cultural resource in the region.
Objective: Work with other management agencies, partners, and stakeholder groups to identify opportunities for the preservation of agricultural lands along the river.
Management Agencies: FFSL, UDAF, NRCS
Intersecting Agencies: County and municipal governments
Agriculture Goal 2: Prevent the establishment and transport of noxious and invasive weed species that threaten both the adjacent agricultural lands and the riparian ecosystem.
Objective: Provide outreach and education targeted to adjacent agricultural landowners regarding noxious and invasive weed species that threaten riparian ecosystems and spread to and from agricultural lands through canal systems and other irrigation infrastructure.
Objective: Work with landowners and other management agencies to identify, map, and treat infestations of noxious weeds along the river, within adjacent riparian areas, and along canals and ditches.
Management Agencies: FFSL, UDAF
Permitting Agencies: FFSL
Intersecting Agencies: DWR, USFWS, county and municipal governments
Agriculture Goal 3: Support "in-river" agricultural infrastructure that maintains or enhances the Public Trust.
Objective: Provide outreach and education materials describing BMPs for pumps, fences, and other instream structures.
Objective: Work with landowners and other partners to identify and upgrade instream structures or agricultural infrastructure that impacts navigation, recreation, water quality, fisheries and wildlife habitat, and aquatic beauty.
Management Agencies: FFSL, NRCS, UDAF, conservation districts
Permitting Agencies: FFSL, DWRi
Intersecting Agencies: Counties and municipalities, USU Water Quality Extension, DWR
Agriculture Goal 4: Support projects that apply BMPs and conservation practices to reduce streambank erosion, improve water quality, and preserve or enhance wildlife habitat on adjacent agricultural lands.
Objective: Work with private landowners and other management agencies to maintain, improve, or establish vegetated buffers, including riparian vegetative corridors, vegetated swales, or constructed wetlands to trap sediment, filter nutrients, and provide wildlife habitat.
Objective: Encourage the construction of off-stream watering systems that reduce streambank erosion, nutrient loading, and bacterial contamination while also reducing herd injuries and reducing health risks such as foot disease and injury in livestock.
Objective: Support targeted grazing practices to improve plant species composition of riparian areas. Support responsible grazing techniques (such as provision of shade or supplemental feed in areas away from the river) to disperse livestock and reduce concentrations of livestock on the streambank.
Management Agencies: FFSL, NRCS, UDAF, DWQ
Permitting Agencies: FFSL, DWRi
Intersecting Agencies: UDWR

BEST MANAGEMENT PRACTICES FOR AGRICULTURE MANAGEMENT IN THE PLANNING AREA

Conservation tillage: Leave harvested plant materials on the soil surface to reduce runoff and soil erosion.

Crop nutrient management: Manage all nutrient inputs to help ensure that nutrients are available to meet crop needs while reducing nutrient runoff.

- Develop nutrient management plan and maintain a record of nutrient application for a minimum of 3 years.
- Apply supplemental nutrients only when manure is not sufficient.
- Scout fields for signs of nutrient deficiency or excess.

Integrated weed management: Use various methods to treat weeds while protecting soil, water, and air quality.

Conservation buffers: Use vegetation strips to provide additional barriers for surface water protection, which prevent potential pollutants from running off into surface waters.

Irrigation management: Manage irrigation to increase efficiency and reduce non-point source pollution of groundwaters and surface waters.

Grazing management: Manage grazing to lessen the water quality impacts from livestock (e.g., reduce erosion potential).

- Provide off-channel water sources as appropriate.

Animal feeding operations management: Use runoff control, proper waste storage, and nutrient management to minimize the impacts of animal feeding operations, as follows:

- Berm ditch gutter, or pipe clean stormwater away from manure stockpiles.
- Locate manure stockpiles and lagoons above the floodplain.
- Contain all runoff from manure stockpiles.

Erosion and sediment control: Employ practices to conserve and reduce the amount of sediment reaching waterbodies, overall protecting agricultural land and water quality.

Manure application warrants BMPs to maximize the beneficial use of manure while minimizing potential water pollution:

- Apply manure using practices to reduce the amount of manure entering waterbodies.
- Incorporate manure as soon as possible after application.
- Apply manure uniformly.
- Limit solid manure application on frozen or saturated ground to prevent runoff.

Sources: Davis et al. (2010); (USU 2017).

Figure 3.5. Best management practices for agriculture management in the planning area.

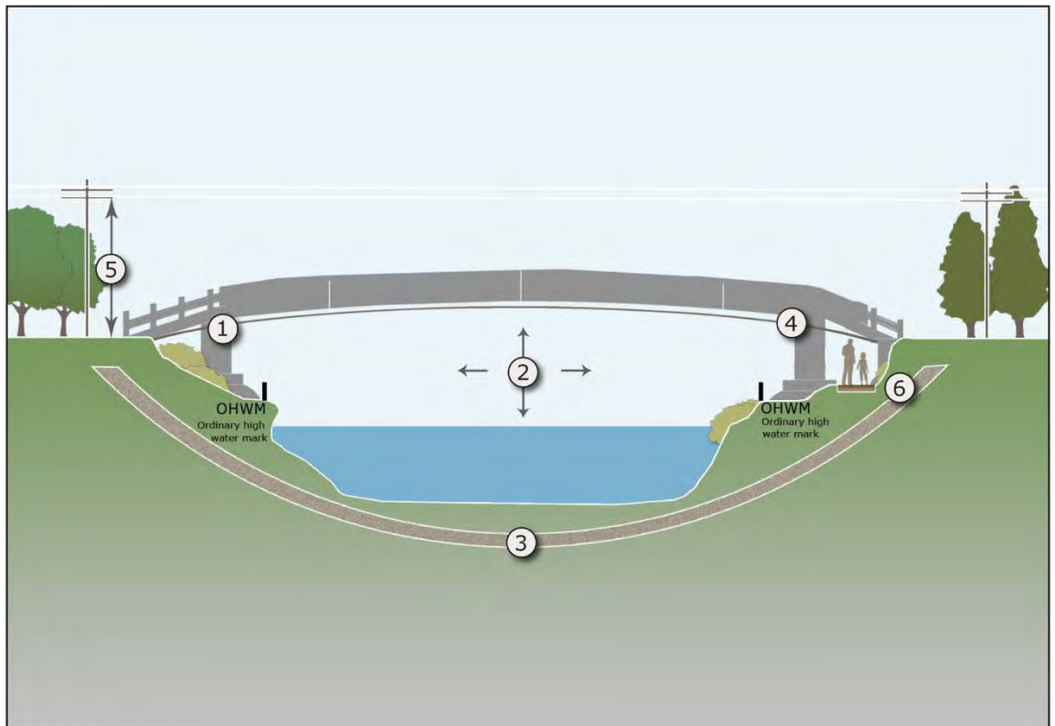
Infrastructure

Infrastructure is critical for various services that benefit local residents, the agricultural community, and businesses. However, without proper design, installation, and maintenance, infrastructure can have negative effects on navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality. Infrastructure management goals and objectives generally seek to 1) minimize the impacts of new and existing infrastructure and 2) protect elements of the river system such as the river channel and its banks. The appropriate placement of infrastructure, proper infrastructure design and installation, and ongoing maintenance are a priority for FFSL to protect bank stability, fish and wildlife habitat, geomorphic processes, cultural resources, and adjacent land uses. Table 3.11 presents management goals and objectives for infrastructure that are common to all classes.

Table 3.11. Infrastructure Management Goals and Objectives Common to All Classes

Infrastructure Goal 1: Minimize impact of new infrastructure.
Objective: Avoid creating new navigational hazards as a result of infrastructure development.
Objective: Restore instream and adjacent habitat damaged during construction of new infrastructure.
Objective: 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.
Management Agencies: FFSL
Permitting Agencies: FFSL, DWRi, USACE, DWQ
Intersecting Agencies: County and municipal governments, DWR, DWRe
Infrastructure Goal 2: Minimize impact of infrastructure removal.
Objective: Avoid damage to adjacent habitats during infrastructure removal.
Objective: Restore habitat, as per a revegetation or restoration plan, damaged during infrastructure removal.
Objective: 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.
Management Agencies: FFSL, DWQ
Permitting Agencies: FFSL, DWRi
Intersecting Agencies: County and municipal governments
Infrastructure Goal 3: Support flood control measures that minimize impacts to the bed and bank of the Bear River.
Objective: Coordinate with local government and other management agencies during emergency or high flow events that require flood control action.
Objective: Support restoration of habitat damaged during flood events with an emphasis on bank stabilization and re-vegetation with appropriate species.
Management Agencies:, DSPR, DWRe, USACE, FEMA
Permitting Agencies: FFSL, DWRi, USACE
Intersecting Agencies: County and municipal governments, DWR, DWRe
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 densely rooted plant material to protect banks and decrease excessive erosion or scour, and incorporate appropriately placed and sized rocks to anchor bioengineering as needed.
Management Agencies: FFSL
Permitting Agencies: USACE, FFSL, DWRi
Intersecting Agencies: NRCS

Figure 3.6 illustrates the correct placement of infrastructure in and along the Bear River. Figure 3.7 provides a list of BMPs for the permitting, construction, and removal of infrastructure in the planning area.



Legend

1. Appropriate bridge span across river
2. Impacts to 10-year flood level avoided
3. Utilities buried below 100-year scour depth
4. Above-ground utilities attached to existing structure
5. Minimum powerline height as per federal regulations
6. Underpass access for pedestrian, bicycle, and wildlife, where appropriate

Figure 3.6. Correct placement of infrastructure in and along the Bear 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 Bear River corridor, owners should come into compliance through the permitting process or 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, where voltages permit, 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 (as appropriate based on infrastructure owner and where voltages permit) and not placed on the bed of the channel.
- New infrastructure should be located in areas to minimize impacts to fluvial or geomorphic processes.
- Infrastructure should be designed or modified with BMPs to minimize fish entrapment.

Design and infrastructure for new bridges:

- The clear span of bridges should cross the main channel without piers or other obstructions in the channel.
- Bridges should not impact the 10-year (10% annual chance) flood flow depth, velocity, water surface elevation, and channel section.
- Bridges should be located (if possible) on a straight channel segment and oriented perpendicular to the flow.
- Bridges should provide sufficient freeboard above the 10-year flood flow event to allow for clear navigation.
- Bridge underpasses should accommodate pedestrian travel, bicycle traffic, and wildlife passage where appropriate.

Figure 3.7. 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 typical dredge depth.
- 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 Bear River:

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

New proposed diversion dams and intake canals:

- New diversion dams and canals should not impede navigation or passage of desirable fish species.
- Proposed new dams should include a FEMA Conditional Letter of Map Revision, including mitigation of all adverse flooding impacts.
- New diversion dams should contain structures to exclude fish and 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 and stream alteration permits should be obtained for new diversion dams.
- Intake canals should be designed and installed to dissipate excess energy and erosion where water is diverted from the river.
- Intake canal banks should be stable (preferably using bio-engineering methods), thereby reducing contribution of sediment to the river.

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

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 almost 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 3.12 presents management goals and objectives for cultural resources that are common to all classes. Figure 3.8 provides a list of BMPs for cultural resources management in the planning area.

Table 3.12. Cultural Resources Management Goals and Objectives Common to All Classes

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

BEST MANAGEMENT PRACTICES FOR CULTURAL RESOURCES MANAGEMENT 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 Bear 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) in and along the Bear 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 and developing protection strategies for cultural resource sites for public education and recreation purposes.

Figure 3.8. Best management practices for cultural resources management in the planning area.

Recreation

Recreation includes many activities on the Bear River, and the management goals and objectives presented here seek to enhance and provide safe recreation experiences. The BRCMP 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 3.13 presents management goals and objectives for recreation that are common to all classes. Figure 3.9 provides a list of BMPs for recreation management in the planning area.

Table 3.13. 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, while reducing impacts to the natural environment and wildlife habitats.
Objective: Minimize the impacts of recreation infrastructure on the river environment and on existing and potential development (e.g., utility corridors) through authorization conditions.
Objective: Support signage in areas near rookeries (e.g., white-faced ibis, Franklin's gull, great blue heron) where recreation activities should be restricted during nesting season.
Objective: Support signage near new restoration or in areas of highly erodible banks where boat wakes should be limited.
Management Agencies: FFSL, DSPR
Permitting Agencies: FFSL, USACE, DWRi
Intersecting Agencies: USFWS, DWRe, DWR, county and municipal governments
Recreation Goal 2: Encourage recreational opportunities in and along the Bear River where appropriate, and allow for a variety of recreation interests.
Objective: Coordinate with cities, counties, agencies, partners, and interested landowners to improve existing recreation infrastructure or to add recreation infrastructure, and create new recreation opportunities in the planning area (e.g., wildlife watching platforms, boater access points, and urban fisheries).
Objective: Coordinate with agencies, partners, and interested landowners to improve opportunities to view wildlife.
Objective: Encourage the application of appropriate design standards to support increased awareness 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.
Objective: Address conflicts between recreation users (e.g., between motorized and non-motorized boaters in zoned waters or between boaters and wildlife).
Management Agencies: FFSL, DSPR
Permitting Agencies: FFSL
Intersecting Agencies: DWR, county and municipal governments, USFWS
Recreation Goal 3: Support development and maintenance of recreation infrastructure.
Objective: Support the improvement or removal of recreation infrastructure that is dysfunctional, obsolete, or incompatible with other uses or river classes as opportunities allow.
Management Agencies: FFSL, DSPR
Permitting Agencies: FFSL
Intersecting Agencies: DWR, county and municipal governments, USFWS
Recreation Goal 4: Integrate recreation and restoration opportunities in and along the river as appropriate.
Objective: Consider recreational navigation of the river when designing restoration projects.
Management Agencies: FFSL
Permitting Agencies: USACE, FFSL, DWRi
Intersecting Agencies: DWR, DSPR, DWRe, USFWS, county and municipal governments

BEST MANAGEMENT PRACTICES FOR RECREATION MANAGEMENT IN THE PLANNING AREA

- Develop boater access points and portages with safe, flexible, and functional designs that meet 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 boater access points on the Bear River. This design allows for variable streamflows 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.
- 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 boater access points.
- Maintain or improve aquatic beauty when designing new recreation facilities.
- Promote the planning area as a birding area.
- Limit new bridges and dams because they tend to degrade the experience of boaters on the river.
- Modify as needed structural water-conveyance devices with alternatives that allow for recreation improvements.
- 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 (NPS 2004) as an information source 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 restrooms and waste bins, and convenient access to trail and transit systems.

Illustration courtesy of G Brown Design.

Figure 3.9. Best management practices for recreation management in the planning area. Illustration courtesy of G Brown Design.

Access

Access to the bed and banks of Bear River sovereign lands is inherent in their status as sovereign lands. Management goals and objectives generally seek to facilitate safe access while protecting private landowners' rights adjacent to the river. Ensuring proper spacing and minimizing impacts resulting from limited access (e.g., highly concentrated use, user conflicts, and habitat degradation) 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 3.14 presents management goals and objectives for access that are common to all classes. Figure 3.10 provides a list of BMPs for access management in the planning area.

Table 3.14. Access Management Goals and Objectives Common to All Classes

Access Goal 1: Balance needs for access with river protection.
Objective: Evaluate access points in an area before approving new access as part of an authorization application process.
Objective: Support development of new public access points where appropriate.
Objective: Minimize the impacts of new access points on the river environment through appropriate design and siting during the authorization application process.
Objective: 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).
Management Agencies: FFSL, DSPR, DWR
Permitting Agencies: FFSL, DWRi
Intersecting Agencies: County and municipal governments
Access Goal 2: Through the permitting process, ensure that new development does not unnecessarily impede access.
Objective: 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).
Objective: Support siting new river access points in areas that connect to other trails and public transit.
Management Agencies: FFSL
Permitting Agencies: FFSL, DWRi
Intersecting Agencies:
Access Goal 3: Where possible, remove obstacles that limit or prevent access.
Objective: Improve navigation on the river through removal of navigational hazards, installation of new portages, and the use of signage.
Objective: Work to mitigate non-native species that may impede river access.
Management Agencies: FFSL, DSPR, DWR
Permitting Agencies: FFSL
Intersecting Agencies: County and municipal governments

BEST MANAGEMENT PRACTICES FOR ACCESS MANAGEMENT IN THE PLANNING AREA

- Develop boater access points and portages with safe, flexible, and functional designs that meet 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 boater access points on the Bear River. This design allows for variable streamflows 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.
- 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 boater access points.
- Maintain or improve aesthetic beauty when designing new recreation facilities.
- Promote boat trips with associated boater access points.
- Promote the planning area as a birding area.
- Limit new bridges and dams because they tend to degrade the experience of boaters on the river.
- Modify as needed structural water-conveyance devices with alternatives that allow for recreation improvements.
- 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 boater use (see general infrastructure BMPs).
- 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 access point has a put-in and a corresponding take-out.
- Use NPS's design guide for canoe and kayak launches (NPS 2004) or other relevant guidance as an information source 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 consider nearby recreational 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.

Figure 3.10. Best management practices for access management 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 in and 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 3.15 presents management goals and objectives for public safety that are common to all classes. Figure 3.11 provides a list of BMPs for public safety management in the planning area.

Table 3.15. Public Safety Management Goals and Objectives Common to All Classes

Public Safety Goal 1: Improve boater safety by addressing permanent and temporary navigational hazards.
Objective: Support removal (or maintenance) of temporary navigational hazards such as large woody debris (assuming it is not critical fish habitat), garbage rafts, and eroding banks.
Objective: Remove permanent navigational hazards when possible or incorporate into restoration activities that allow for avoidance.
Objective: Support removal of abandoned fencing material and sprinkler pipe from the river.
Management Agencies: FFSL, DWR, DSPR
Permitting Agencies: FFSL, DWRi
Intersecting Agencies: County and municipal governments
Public Safety Goal 2: Evaluate new permit applications with public safety in mind and require any needed public safety measures (e.g., for navigation, fire prevention, or traffic control).
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. Require the installation of portages and related signage when appropriate.
Management Agencies: FFSL, DSPR
Permitting Agencies: FFSL, DWRi
Public Safety Goal 3: Address safety issues in the planning area.
Objective: Support state and local law enforcement efforts to minimize boater speeding.
Objective: Coordinate with state and local agencies (e.g., law enforcement and the Bear River Health Department) to address safety issues such as boat speed, fire, flood, and transient communities.
Objective: Support crime prevention and enforcement/patrolling by coordinating with other entities providing such services.
Objective: Improve boater and recreation user safety by promoting safe boating practices in conjunction with DSPR
Management Agencies: FFSL, DSPR

BEST MANAGEMENT PRACTICES FOR PUBLIC SAFETY MANAGEMENT IN THE PLANNING AREA

- Carefully consider new infrastructure design to maintain enough clearance for boaters and ensure maximum space for natural river movement (e.g., bridges can be constriction points and may cause flood control issues).
- Within permit conditions, require restoration of vertical riverbanks to a gentler relief using laying back dredge berms or levees where possible. These measures will help reduce erosion and improve public access and safety. Refer to *Riparian Buffer Design Guidelines for Water Quality and Wildlife Habitat Functions on Agricultural Landscapes in the Intermountain West* (Johnson and Buffler 2008).
- 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's design guide for canoe and kayak launches (NPS 2004), other agency design standards, and other relevant planning documents (e.g., Salt Lake County's *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 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.
- Incorporate bioengineering methods to stabilize shorelines (and protect vegetation) for sheltering boater access points.
- Reduce stands of Phragmites and other non-native vegetation to lower the fire risk and to discourage the development of transient camps.
- Contact Bear River Health Department to report encampments, flooding, and other public health concerns.
- Direct other public safety concerns to the local police departments.

Bear River Health Department
www.brhd.org

Figure 3.11. Best management practices for public safety management in the planning area.

Education

Supporting and expanding educational programs and information about FFSL's role and jurisdiction and the value of the Bear River are important across all use classes. Table 3.16 presents management goals and objectives for education. Figure 3.12 provides a list of BMPs for education management in the planning area.

Table 3.16. Education Management Goals and Objectives Common to All Classes

Education Goal 1: Support education about the importance of the Bear River and the need to conserve it as a healthy, functioning ecosystem.
Objective: Support development of information and public awareness programs for adjacent landowners and land-use applicants on how to reduce impacts to the river.
Objective: Support partnerships, research programs, and school education programs in the planning area; integrate research results into management and planning.
Management Agencies: FFSL, DSPR
Permitting Agencies: FFSL
Intersecting Agencies: County and municipal governments
Education Goal 2: Expand informational material regarding FFSL's role in management, jurisdiction, and application of multiple-use management strategies of the Bear River.
Objective: Provide potential land-use applicants with a clear permit application process through the FFSL website and other media.
Management Agencies: FFSL
Permitting Agencies: FFSL
Intersecting Agencies: County and municipal governments

BEST MANAGEMENT PRACTICES FOR EDUCATION MANAGEMENT IN THE PLANNING AREA

- Provide a list of good practices for adjacent landowners regarding dumping, oil changes, tractor cleaning, use of native landscaping, herbicide/pesticide use, etc.
- Coordinate with other agencies, universities, and conservation organizations to 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 3.12. Best management practices for education management in the planning area.

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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 Bear River stakeholders with respect to management, permitting, and research. Permitting new activities can have important implications on the management of the Bear River. Research can inform and improve Bear River management objectives and actions. Currently there is a need for more frequent coordination between and within these spheres. Table 3.17 lists the primary roles of state, federal, and other regulatory and coordinating bodies in permitting, management, and research on the Bear River.

Table 3.17. Primary Roles of State, Federal, and other Regulatory and Coordinating Bodies in Permitting, Management, and Research on the Bear River

Agency		Permitting and Compliance	Management	Research
Utah Department of Natural Resources	FFSL	X	X	X
	DSPR		X	
	DWRi	X		
	DWRe		X	X
	DWR		X	X
Other state agencies	UDAF		X	X
	UDOT		X	
	DWQ	X	X	X
	SHPO	X	X	X
Federal agencies	USACE	X		
	USFWS		X	X
	FERC	X	X	X
	FEMA		X	X
	NRCS		X	X
Local government	Box Elder County		X	
	Cache County		X	
	Municipalities		X	
Coordinating bodies	Bear River Association of Governments			X
	Bear River Commission		X	
	USU			X

Broader geographic coordination is also required in management and permitting in the planning area. As described in Chapter 1, in addition to the Bear River, FFSL has jurisdiction over Great Salt Lake and the Utah portion of Bear Lake. 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 management, should be implemented at a scale that extends beyond the Bear River and that includes coordination and support for activities on tributaries and adjacent lands.

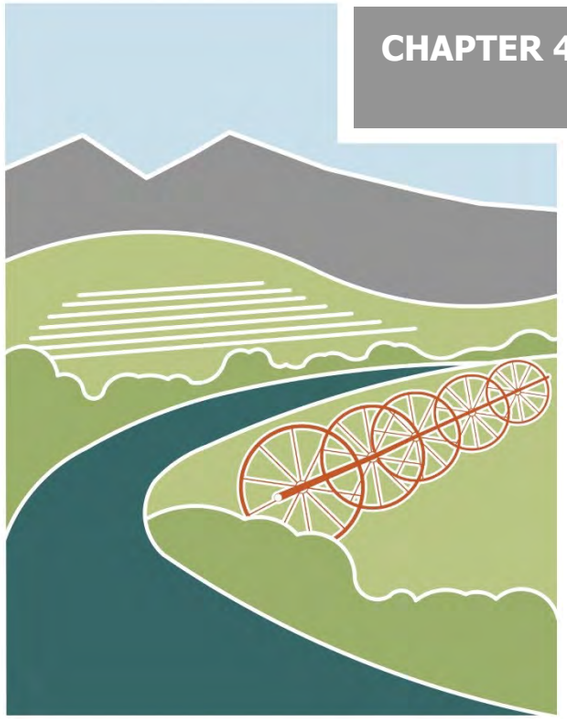
Permitting

As illustrated in Chapter 1, Figure 1.2, multiple entities have jurisdiction over the Bear 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 (water rights and recreation) and USACE (placement of fill below the OHWM). During the public outreach process, stakeholders recommended consolidating permits. FFSL will review the practicality of this relative to our mandate of sovereign lands management.

Research and Management Implementation

Current research on the Bear 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, BMPs, and restoration to improve water quality and habitat condition among other aspects of the Public Trust. USU Water Quality Extension has a plethora of education materials developed from research that address specific relationships between land use and water quality. Ongoing coordination of research and management implementation is also necessary for the success of projects such as noxious and invasive weeds management, navigational hazard removal, and bank stabilization. One example of this is research and monitoring being connected by USU research on control and management of *Phragmites*. For large projects, partnerships are needed, with different actors taking on roles as champion, planner, funder, and implementer. Although the BRCMP does not prioritize specific projects, FFSL supports those projects that improve conditions of the Public Trust: navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality.

CHAPTER 4 – LITERATURE CITED



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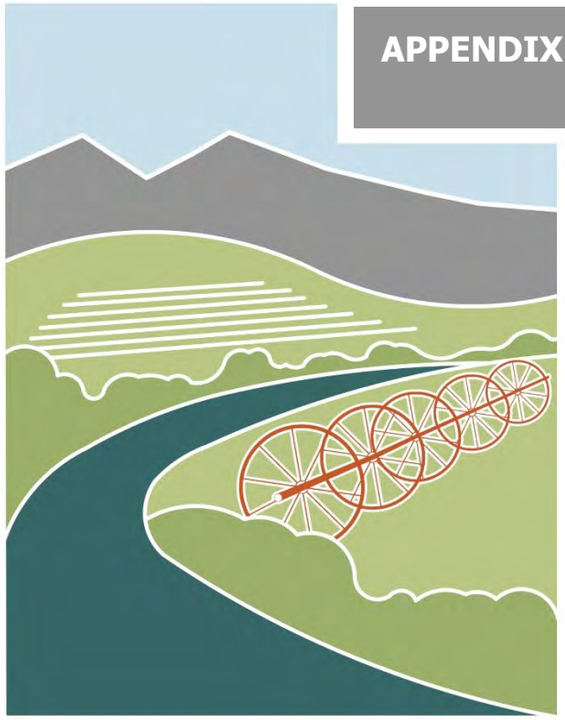
APPENDIX A. PUBLIC INVOLVEMENT AND PUBLIC CONCERNS



APPENDIX A – PUBLIC INVOLVEMENT AND PUBLIC CONCERNS

A.1 Public Involvement

The public outreach process for the 2017 *Bear River Comprehensive Management Plan* (BRCMP) was structured to capture the input and comments from three groups: 1) counties and municipalities, 2) the general public, and 3) stakeholders. A summary of the outreach process for each group and of the input received is presented below.

Counties and Municipalities

Because county and municipal governments often manage property right up to the boundary of sovereign lands or apply zoning to these properties, their participation is integral to the planning process and development of a useful plan. The Utah Division of Forestry, Fire & State Lands (FFSL) made direct contact with county-elected officials and planning staff by mail and telephone to present the rationale for the BRCMP and to answer any questions about the process. Both county and municipal representatives had their own stakeholder kickoff meeting and were invited to the public open house meetings described below.

General Public

Adjacent property owners (including those with agricultural lands), key stakeholders, the general public, and counties and municipalities were engaged during the planning process. All had the opportunity to attend public open house meetings during the scoping and information-gathering phase of the plan (open house series #1) and after the publication of the draft BRCMP (open house series #2).

OPEN HOUSE SERIES #1: PROJECT KICKOFF

The first general public outreach event comprised open house meetings held during the scoping and information-gathering phase of the plan. The purpose of these meetings was to present information regarding the BRCMP process and to seek public input. Suggestions and concerns about the river play an integral role in issue identification and development of management plan objectives. Resource management issues identified during the public outreach process were used to craft the draft BRCMP. Two individual open houses were held, one in each of the two counties through which the river flows.

PUBLIC OPEN HOUSE: Box Elder County
Date and Time: Wednesday, July 27, 2016; 6:00 p.m. to 8:00 p.m.
Location: Box Elder County Courthouse, Commission Chambers
Attendance: 16 individuals signed in to this meeting.

PUBLIC OPEN HOUSE: Cache County
Date and Time: Tuesday, August 2, 2016; 6:00 p.m. to 8:00 p.m.
Location: Cache County, Multi-Purpose Room
Attendance: 23 individuals signed in to this meeting.

An open house format was used for both meetings, with participants allowed to attend anytime during the meeting. At these meetings, FFSL presented a slideshow that provided an overview of the planning process and outcome. All materials were available for review and comment during the posted time.

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. This welcome table included a project overview board with the schedule and key dates.

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 Bear River. Maps were provided of six segments that covered the entire length of the river corridor (Segments A, B, C1, C2, C3, and D). Participants were asked to participate by writing comments and input on the segment maps that responded to three different prompts (questions). Each prompt was designed to get input concerning the participants' relationship and awareness of the Bear River and its management. These same three prompts were also posted on the project webmap, which was available through the project website at www.bearrivercmp.com.

- Prompt #1: How Do You Use the River?
- Prompt #2: Indicate Conditions: Current or Future
- Prompt #3: Future River Management

Comments were linked to one of three resource categories using color-coded dot stickers:

- Ecosystem (green dots)
- Water (blue dots)
- Community (yellow dots)

To provide some context, a series of sample resources for each category were listed.

Key Discussion Items and Input by Resource Category

Ecosystem:

- Ensuring that the Bear River Migratory Bird Refuge continues to be a resource through effective management
- Ensuring that water flow is sufficient to maintain associated wetlands and resources adjacent to the Bear River
- Identification of known conservation easement areas
- Identification of wildlife resource areas (ring-necked pheasant, great blue heron)
- Identification of wildlife nuisance and management issues (beaver)

Water**:**

- Streambank restoration projects underway and future needs
- Identification of areas with erosion and stabilization issues
- Location of pumps for agricultural irrigation
- Location of surface drains that interact with the river
- Identification of water lines

Community:

- Location of utilities and areas where repair may be needed (power, water, gas, telephone)
- Identification of areas related to old lawsuits (water rights, pumping for agricultural use)
- Location of boater access points (e.g., access ramps, put-ins and take-outs, and canoe launch sites)
- Identification of needed improvements and upgrades for access infrastructure (ramps)
- Identification of locations where improved recreational access is desired (oxbow by Deweyville)
- Location of pump stations
- Location of areas under conservation easements
- Identification of infrastructure resources and needs for repairs (bridges, rail bridges)
- Location of recreational resources areas, such as the marina by Benson
- Recreational use areas: boat launch, fishing, swimming and nature trail by Newton

OPEN HOUSE SERIES #2: DRAFT PLAN REVIEW

The second general public outreach event comprised open house meetings held after the publication of the draft BRCMP. The purpose of the event was to present the draft BRCMP and to provide information on how to comment. Two individual open houses were held, one in each of the two counties through which the river flows.

PUBLIC OPEN HOUSE: Cache County
Date and Time: Tuesday, June 6, 2017; 6:00 p.m. to 8:00 p.m.
Location: Cache County, Multi-Purpose Room
Attendance: 16 individuals signed in to this meeting.

PUBLIC OPEN HOUSE: Box Elder County
Date and Time: Tuesday, June 13, 2016; 6:00 p.m. to 8:00 p.m.
Location: Box Elder County Courthouse, Commission Chambers
Attendance: 23 individuals signed in to this meeting.

An open house format was used for both meetings, with participants allowed to attend anytime during the meeting. At these meetings, FFSL presented a slideshow that provided a summary of the planning process and overview of the material contained within the plan. All materials were available for review and comment during the posted time.

A welcome table was set up to greet visitors, to help them understand the purpose of the open house meeting, and to provide a mailing and/or email address for future notifications.

Large-format information boards were placed on easels with example planning process and sample content contained in the BRCMP to prompt discussion. Information board topics consisted of:

- Project schedule
- Project next steps
- Conceptual river use classifications
- River use class examples along the Bear River and broken down by planning segment
- Activity matrix
- Example branch and leaf diagram presenting current condition information per resource
- Current condition comment by planning segment
- Example management goals and objectives.

Key discussion topics and input included the following:

- Definition of public trust resources
- Timing for updating the BRCMP
- FFSL jurisdiction
- How Cutler Reservoir is considered in the plan
- FFSL and PacifiCorp jurisdictional overlap
- How noxious weeds are addressed in the plan

Stakeholders

Individuals, organizations, and agencies with a specific relationship to the Bear River were invited to attend stakeholder meetings. Key members of stakeholders had the opportunity to attend an open house–style workshop during the scoping and information gathering phase of the plan.

This first series of stakeholder workshops was held to provide county and municipal stakeholders with the opportunity to speak to FFSL, ask questions, and submit suggestions regarding the BRCMP. Two workshops were held, one in each county. Invitees were directed to attend the workshop in their county. A second series of stakeholder workshops was held to answer questions about the planning process and gather information used to develop the current condition (Chapter 2) and management framework (Chapter 3) sections.

Two workshops were held in this second series, one for each of the following stakeholder groups: 1) environmental and recreation groups and 2) agriculture and irrigation. A third series of stakeholder workshops was held after the publication of the draft BRCMP to gain input on the plan. Three workshops were held, one for the environmental and recreation groups and two for the agriculture and irrigation group.

STAKEHOLDER MEETING SERIES #1: PROJECT KICKOFF

STAKEHOLDER WORKSHOP: County and Municipal Stakeholders, Box Elder County
Date and Time: Wednesday, July 27, 2016; 2:00 p.m. to 4:00 p.m.
Location: Box Elder County Courthouse, Commission Chambers
Attendance: 8 individuals signed in to this meeting.

Key discussion topics and input included the following:

- Endorsement of the Willard Spur as a key ecosystem resource
- Concerns regarding the impact on the Willard Spur from future water flow regulation of the Bear River by the proposed dam
- Articulation of the annexation intent boundaries for Brigham City
- Location of conservation easements and agricultural protection overlay zones

STAKEHOLDER WORKSHOP: County and Municipal Stakeholders, Cache County
Date and Time: Tuesday, August 2, 2016; 2:00 p.m. to 4:00 p.m.
Location: Cache County, Multi-Purpose Room
Attendance: 5 individuals signed in to this meeting.

Key discussion topics and input included the following:

- Location of conservation easements
- Identification of county-owned property

STAKEHOLDER MEETING SERIES #2: PROJECT KICKOFF AND DATA GATHERING

STAKEHOLDER WORKSHOP: Environmental and Recreation Groups
Date and Time: Tuesday, November 29, 2016; 5:00 p.m. to 7:30 p.m.
Location: James V. Hansen Wildlife Education Center, Bear River Migratory Bird Refuge, Box Elder County
Attendance: 8 individuals signed in to this meeting representing recreation stakeholders, and 10 people signed in to this meeting representing environmental stakeholders.

Key discussion topics and input included the following:

- Conflicts between motorized and non-motorized boaters
- Managing boat speeds to minimize conflicts and protect streambanks
- Lack of boating access, especially for recreation and hunting purposes
- River classification concerns
- Enforcement responsibilities
- How Cutler Reservoir is considered in the plan
- BRCMP schedule

STAKEHOLDER WORKSHOP: Agriculture and Irrigation Group
Date and Time: Tuesday, November 29, 2016; 6:00 p.m. to 8:00 p.m.
Location: Cache County, Multi-Purpose Room
Attendance: 22 individuals signed in to this meeting.

Key discussion topics and input included the following:

- Water rights concerns, including livestock watering
- How tile drains and land drains are considered
- Defining a pump head vs. a structure as part of the fee table
- Clarification of jurisdiction
- Communication strategies

STAKEHOLDER MEETING SERIES #3: DRAFT PLAN REVIEW

STAKEHOLDER WORKSHOP: Agriculture and Irrigation Group
Date and Time: Wednesday, June 14, 2016; 6:00 p.m. to 8:00 p.m.
Location: Cache County, Multi-Purpose Room
Attendance: 3 individuals signed in to this meeting.

Key discussion topics and input included the following:

- Issue of fences on sovereign lands of the Bear River
- Clarification that even though pumps are allowed in all use classes, a permit is still required
- Consideration of potentially allowing permanent boat docks in use Class 1
- Rewording of Hydrology Management Goal 1 regarding infrastructure
- Communication strategies

STAKEHOLDER WORKSHOP: Agriculture and Irrigation Group
Date and Time: Tuesday, June 27, 2016; 6:30 p.m. to 8:30 p.m.
Location: Bear River Association of Governments, Logan, Utah
Attendance: 7 individuals signed in to this meeting.

Key discussion topics and input included the following:

- Delivery of irrigation water
- Balancing public trust resources and irrigation
- Getting irrigators to attend meetings and how to provide them with information on permitting requirements
- Permitting process
- Outfall structures
- How grazing is treated in the plan, especially in relation to water quality
- Fencing and fence posts on sovereign lands
- Enforcement
- How to permit a single drainage into the Bear River that has multiple contributing drainages

STAKEHOLDER WORKSHOP: Environmental and Recreation Groups
Date and Time: Wednesday, June 28, 2016; 5:30 p.m. to 8:30 p.m.
Location: James V. Hansen Wildlife Education Center, Bear River Migratory Bird Refuge, Box Elder County
Attendance: 6 individuals signed in to this meeting representing environmental stakeholders, and 1 individual signed in to this meeting representing recreation stakeholders.

Key discussion topics and input included the following:

- Bike path along the Bear River
- Off-street parking and river access
- Additional proposed boater access points
- Goals and objectives language
- More comprehensive discussion of the development pressure on the Bear River
- Instream flows
- Recreation access in all classes
- How the Cutler Federal Energy Regulatory Commission relicensing process beginning in 2018 and the Bear River Development Act will affect the plan

A.2 Public Comments

The formal 45-day public comment period for the draft BRCMP began on May 22, 2017, and ended on July 7, 2017. Comments could be submitted at the second open house series, a stakeholder workshops, online at the FFSL BRCMP website, by email, or by mail. FFSL received 10 submissions 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 and habitat, restoration, infrastructure, recreation, access, permit requirements, sovereign lands, and best management practices, to name a few. From the submissions, 85 individual comments were extracted for review of acceptance or non-acceptance. Individual comments are numbered per letter number (1–10). These individual comments are part of the project record and are included below in Table A1, along with comment responses as required by rule and statute Utah Administrative Code R652-90-600 (1)(b-d) and Utah Code 65-A-2-4. Verbal comments were generally consistent with those provided in the comment submissions.

Table A1. Public Comments

Submission Number	Comment Location	Commenter	Topic	Comment Number	Comment	Disposition/Response to Comment
1	Paragraph 2-3	Tom Bowen	Bear River Development Project	1.1	Not a word has been said in any of the public meetings that I have attended about the Bear River Project and the impact it will have on the master plan if it is actually implemented. It seems crazy to me that this matter it is being ignored when its impact will dramatically affect the River's flow. It will, among other things, eliminate high water flows which will impact wildlife, as well as vegetation. The regulated flow will remove any remaining semblance of the "wild nature" of the River. It will also dramatically impact the Great Salt Lake by reducing the inflow from the River by 71,687,220,000 gallons of water per year. It will destroy the Willard Spur which is located at the mouth of the River, although technically in the Lake, which depends on the high water flow to regenerate its wildlife habitat It seems that FFSL is intentionally skirting around this issue because of the Legislature's mandate to the Division of Water Resources that the project be built. It should at least be acknowledged in the master plan.	Discussing the Bear River Project in the BRCMP is outside the scope of the public planning process, in part because details of the Bear River Project are unknown at this time. The construction of the Bear River Project is currently not expected to be needed until approximately 2050. That said, an environmental review under the National Environmental Policy Act is expected to be completed before project implementation.
1	Paragraph 4-7	Tom Bowen	Restoration, permitting process	1.2	As for permitting guidelines, several years ago the Chesapeake Duck Club obtained a permit to mitigate bank erosion on its property; unfortunately, we were limited to chaining cedar trees upside down along the river bank. We thought that it was dumb at the time; but, nevertheless, we spent our money to transport the trees and install them (upside down) in the water. We felt particularly aggrieved since there was so much junk on the other side of the River that had been used for bank stabilization. The project was a total bust and a complete waste of money and manpower. Thus, we were penalized for following the law, while those who didn't were rewarded with a stable bank at little or no cast; and no red tape. The erosion continues unabated. We sent photos to FFSL documenting the problem but we were told that there is no money available to help us. Having been abandoned by FFSL, we don't know what to do. The method mandated by FFSL didn't work, so where do we now turn and what can we do? FFSL appears to be sympathetic but it's broke. It will be helpful if guidelines are established as to what can be done. Short of rusty cars and cement chunks (which line the South bank of the River and appear to work just fine), what materials are acceptable? Can we use large rocks? If so, how can they be used? What size? Do they need to be contained in wire baskets or can they be placed directly into the River? Do we need an engineer's stamp? If we cannot use large rocks, what can we use? Do we need approval from the Corps of Engineers? What's the process and, on average, how long will it take? Detailed information on the permitting (lease?) process, and the type and specifications of authorized materials, will be very useful to those on the River who watch, helplessly, as the bank slips away and the bureaucracy, either from lack of action or lack of money, prevents them from doing something about it.	The first two paragraphs of your comment are outside the scope of the public planning process for the BRCMP. FFSL would be happy to further discuss your concerns regarding the permit to mitigate bank erosion. The questions in the third paragraph of your comment can be answered during the permitting process on a case-by-case basis. In addition, best management practices in Chapter 3 of the BRCMP provide guidelines for permittees (e.g., Figure 3.3 Best management practices for hydrology management in the planning area). In general, the development of the BRCMP provides better planning coordination and clear and consistent guidance regarding FFSL management objectives and permitting requirements.

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2	n/a	Bob Barrett, USFWS	Instream flows	2.1	Recognize water rights by providing our public holders right - add goal that encourages partnerships for instream flow to preserve ecosystem of Bear River for wildlife habitat and wildlife species	Hydrology Goal 3 recognizes the importance of instream flows. The objectives for Hydrology Goal 3 support research of flow and releases that would benefit the riverine ecosystem and fluvial processes, and encourage coordination with the Utah Division of Wildlife Resources to study instream flows that support fisheries and aquatic and wildlife habitat.
3	Paragraph 2	Elliott Mott	Water trail, boater access points	3.1	The Bear River is a marvelous recreational resource so it is my hope planning and recreation departments will grasp the valuable information provided in the BRCMP when finalized, and invest in the water trail across the Cache and Box Elder County landscape. It is my hope officials will work to make the Bear River more boater friendly for human-powered outdoor enthusiasts by developing boat access points at key locations. Distilled to its essence, all muscle-powered boaters require is road access to the river, a sloping river bank and off-street parking. Muscle-powered boaters do not require concrete ramps or docks – so the facilities desired are relatively inexpensive to construct and easy to maintain. Securing right-of-way easements at strategic locations to allow for off road parking is an important early strategic planning step in helping to make the Bear River Water Trail more boater friendly.	Thank you for your comment. The recreation goals in Chapter 3 support recreational activities such as boating, especially Recreation Goals 2 and 3. The BRCMP also discussed the need for more boater access points on the river and lists several potential boater access locations.
3	Paragraph 3	Elliott Mott	Adjacent bike path, access	3.2	In addition to river access, it is my hope the BRCMP will hard-wire in the ability for local governments to develop a parallel bike path along the Bear River like the present bike paths along the Ogden, Weber, Jordan, Provo and Sevier Rivers. These bike paths are incredible recreation assets for the communities they serve, and offer important bike shuttle opportunities for boating enthusiasts. My fear is that legacy farming/ranching families will sell out to developers before these important crucial planning provisions are in place to preserve public access to the water trail, and for a bike path adjacent to the Bear River. From my perspective as a kayak and cycling enthusiast, laying the groundwork for these vital provisions is the overarching reason the Bear River Comprehensive Management Plan is important.	FFSL does not have jurisdiction over land adjacent to the river that would be used for a bike path. However, the recreation goals and objectives in Chapter 3 (e.g., Recreation Goal 2) support the creation of new recreation opportunities in the planning area, which could include a bike path.
3	Paragraph 4	Elliott Mott	Boater access points	3.3	I wish to modify my earlier comments about access points and the water trail sections I float within the Plan's defined landscape. (In this paper, I have factored out Rich County and water trail adventures I do on Cutler Reservoir, the Logan and Littler Bear Rivers.) In Cache County, I float two sections: 1) Cornish to Trenton, 8.87 Miles; 2) Trenton to Benson Bridge, 17.68 Miles. In Box Elder County, there are seven sections: 1) Cutler Dam Bridge to Hampton's Ford, 5.10 miles; 2) Hampton's Fort to SR-102 (Deweyville), 10.41 miles; 3) SR-102 (Deweyville) to Raymond Hanson Park, 7.41 miles; 4) Raymond Hanson Park to SR-240 (Honeyville), 5.73 miles; 5) SR-240 (Honeyville) to Corinne, 16.49 miles; 6) Corinne to Bear River Migratory Bird Refuge, 8.52 miles; and 7) Bear River Migratory Bird Refuge to site of former Duckville Gun Club (inside the refuge), 8.19 miles. Only three of these access points is developed, most are unimproved river banks. As such, most access points bookending these water trail sections are flow dependent and the water trails they define are not always accessible or navigable. It would be wonderful if water trail access could be developed in the Amalga area to shorten the second Cache Valley section, and midpoint along the Honeyville to Corinne section in Box Elder County to shorten that section. On the open call group floats we frequently combine shorter water trail sections to make floats last longer.	The water trail information in the BRCMP Chapter 2 Boating section has been updated based on your comment.

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3	Paragraph 5	Elliott Mott	Boater access points	3.4	My orientation is from the perspective of a volunteer leader organizing open-call group floats. This defines the sections we float; but, I believe a single enthusiast could access the river more readily and in more places than a group can – to include sneaking across private posted land undetected – whereas a large group cannot maneuver in secret so readily. My methodology is to not use any site which is posted. There certainly are sites I would like to use but which are fenced off or posted or across private property where permission is required; securing the latter is usually a hassle so I have learned to avoid these water trail access sites. Virtually every put-in/take-out site for the water trail sections listed above has issues, but I use them because they work, and because they are the best river access locations currently available in the BRCMP planning area. The biggest challenge we face is parking space along roads.	Thank you for your comment. A sentence about the parking challenges at informal boater access points has been added to the BRCMP.
3	Paragraph 1	Elliott Mott	Development of rural land	3.5	The importance of getting the BRCMP correct is immense for the sake of future generations. It needs to be emphasized that legacy farming/ranching families are seeing their off spring disinterested in pursuing traditional lifestyles and are prone to cash out (sell off) their properties in the planning area making way for development of the rural agricultural lands whose wonderful ambiance we city dwellers so enjoy cycling and boating through today.	Thank you for your comment. This is outside the scope of the public planning process because lands adjacent to the river are not sovereign land and therefore are not managed by FFSL.
3	Paragraph 2	Elliott Mott	Access, adjacent multiple-use trail	3.6	Planning officials at all levels need to take the long view and preserve recreation access to the Bear River Water trail across the planning area, and also put in place plans to construct a multiple-use trail adjacent to the Bear River from the Idaho state line north of Cornish to the National Bird Refuge west of Brigham City.	FFSL does not have jurisdiction over land adjacent to the river that would be used for a multiple-use trail. However, the recreation goals and objectives in Chapter 3 (e.g., Recreation Goal 2) support the creation of new recreation opportunities in the planning area, which could include a multiple-use trail. FFSL would be happy to participate in local planning efforts that benefit the public's use and enjoyment of the river.
3	Paragraph 3	Elliott Mott	Boater access points, water trail	3.7	Given the quality of the Bear River Water Trail across the Cache and Box Elder landscape it is amazing to me that tourism and recreation officials have not capitalized upon the potential to stage annual events such as a "Cache Valley Regatta" or a "Box Elder Paddlefest" showcasing this amazing natural resource. All that is needed is the development of access points as the necessary resource (the river) is all ready in place, plus some basic event organization. In a state which claims to be "Life Elevated" the promotion of muscle-powered water trail activities seems to be a win-win situation. The high-tech industries flocking to Utah and Salt Lake Counties are fueled by a workforce seeking quality outdoor recreation opportunities and not a wall street lifestyle. Logan and Brigham City officials would be wise to cater to this workforce by promoting active lifestyles in their communities and this includes proactive development of the Bear River Water Trail across the planning area. The provisions identified in the BRCMP under recreation, boating and access is a good start.	Thank you for your comment.
3	n/a	Elliott Mott	Instream flows	3.8	Maintaining adequate stream in-flow into the Bear River sufficient to maintain and protect the historical ecosystem is a paramount CORE objective of the BRCMP needs to be stated. Without adequate flow the ecosystem will die.	Hydrology Goal 3 recognizes the importance of instream flows. The objectives for Hydrology Goal 3 support research of flow and releases that would benefit the riverine ecosystem and fluvial processes, and encourage coordination with the Utah Division of Wildlife Resources to study instream flows that support fisheries and aquatic and wildlife habitat.

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4	n/a	Eve Davies, PacifiCorp	Sovereign lands	4.1	PacifiCorp would like to see some sort of visual representation and comment regarding the sovereign land status of the PCorp parcels in Sections 26 and 27. We suggest something like "Land parcels marked with xx on Maps 8 and 9 indicate areas that may not contain jurisdictional sovereign lands." Or something like that…	At this time, FFSL is not planning on making that change to the classification map. There is currently nothing to justify making an exception and including it in the BRCMP. FFSL is concerned that if we begin highlighting exceptions to sovereign lands without substantial proof, numerous landowners will come forward with similar unsubstantiated claims resulting in inconsistent and ineffective management of the Bear River. As we have noted in Section 1.2 of the BRCMP (and Jordan River CMP), the plan is not an adjudication of FFSL ownership. It is simply an FFSL planning tool that provides guidance for land management on the Bear River. FFSL does recognize that certain title and boundary questions in the planning area may have to be addressed on a case-by-case basis in the future. FFSL will work with our legal representation to address this issue.
4	n/a	Eve Davies, PacifiCorp	Sovereign lands	4.18	Pages 1,5,7,8 – Note that exceptions to the State's claim of fee title ownership to the bed and banks exist.	The change on page 8 has been made. No exceptions will be noted on the remaining pages (no changes will be made).
4	n/a	Eve Davies, PacifiCorp	Cutler Dam	4.19	Page 8—Added detail regarding Cutler as the only major water impoundment in the plan area.	The additional detail for Cutler Dam can already be found in Chapter 2 in the Infrastructure section. The location of the dam has been added to the text in Chapter 1.
4	n/a	Eve Davies, PacifiCorp	Water quality	4.20	Page 9—Note TMDL [total maximum daily load] implementation still pending. Cutler WQ will be significantly impacted until Logan City completes tertiary treatment, now not scheduled to occur until at least 2020 (it keeps moving back).	The text has been edited to state that the TMDL implementation is ongoing.
4	n/a	Eve Davies, PacifiCorp	Sovereign lands	4.21	Page 21/Map 5—Island in the river should not show as sovereign lands—denote channel only.	This change has been made.
4	n/a	Eve Davies, PacifiCorp	Sovereign lands	4.22	Page 22/Map 6—Island in the river should not show as sovereign lands—denote channel only.	This change has been made.
4	n/a	Eve Davies, PacifiCorp	Sovereign lands	4.23	Page 24-25/Map 8-9—Per our discussions with FFSL, PacifiCorp requests that all PacifiCorp-owned lands associated with the Bear sovereign lands plan in Sections 25 and 26 and within the Cutler FERC Boundary should indicate in some fashion that the sovereign land status/jurisdiction is still being determined.	See response to PacifiCorp comment number 4.1. No change will be made.
4	n/a	Eve Davies, PacifiCorp	Bear River flows	4.24	Page 61/ End of Section 2.2—Due to the requirement, in law, Compact, contract, and permit that PacifiCorp deliver only the water required by and necessary to provide irrigation, this statement needs to be deleted or altered to show the intent towards a future goal that could be attainable with potential changes in Utah water law and associated contracts/permits. See corresponding redline for suggested edit.	The suggested edit has not been made, but the text has been revised for clarity.

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4	n/a	Eve Davies, PacifiCorp	Restoration	4.25	Page 63/Figure 2.22—Legend item 4 should include properly sized and placed rock; otherwise bank stabilization efforts in riverine areas will not be ultimately successful.	Rock has been added to legend item 4 in Figure 2.22 (now Figure 2.21).
4	n/a	Eve Davies, PacifiCorp	Wildlife, river segment boundaries	4.26	Page 65/Figure 2.23—Clarify river segment boundaries, especially between A, B, and C1 (is Cutler Dam a boundary segment or is all of Cutler in Segment B?). Segment A Habitat Mgmt and WWA's list includes items that are likely part of Segment B. Characteristic fish species for all segments should include carp; particularly as the previous habitat figure noted it is dominated by warm water systems (numbers of Brown trout and Mountain whitefish are exceedingly low in Segment B, at least, but appear from Figure 2.23 to be dominant species.	Cutler Dam is the divider between Segments B and C1. This figure has been reviewed, and edits have been made for clarity.
4	n/a	Eve Davies, PacifiCorp	Cutler Dam	4.27	Page 75/Table 2.10 (legend)—There is no reservoir below Cutler Dam—please clarify.	The text has been clarified.
4	n/a	Eve Davies, PacifiCorp	Canals, river segment boundaries	4.28	Page 83/Figure 2.28—If Cutler Dam is the divider between segments B and C, then the Hammond (Eastside) and West Main (Westside) canals should show on segment B, not C. Please clarify.	Cutler Dam is the divider between Segments B and C1. Hammond and West Main Canal have been moved to Segment B.
4	n/a	Eve Davies, PacifiCorp	Cutler Dam	4.29	Page 86/Segment B—see corresponding redline for suggested edits. It is important to note that an impoundment of the Bear River did exist at the time of statehood. (Text) suggests reservoir did not exist until 1927—that was the date of the taller current dam, but Wheelon Dam is still there (generally submerged at normal current operating levels) which created an impoundment that was preset prior to statehood. The 1927 construction only enlarged the pre-existing reservoir.	The text has been edited to reflect that Cutler Dam increased the height and extent of the impoundment previously formed by the Wheelon Dam.
4	n/a	Eve Davies, PacifiCorp	Water Quality	4.30	Page 88/Figure 2.30—For clarity, each green block shown above should be titled 'Segment X Beneficial uses and impaired criteria', rather than 'Segment X Beneficial Uses' as present. Further, the category 'current water quality monitoring sites' is incomplete as noted—PacifiCorp is required by our FERC license terms to monitor water quality throughout Cutler Reservoir quarterly, every five years, for the duration of the current Cutler license. 2018 is the next scheduled monitoring year.	The box header title has been edited. The figure has been edited to clarify the operator of the monitoring sites. Text has been added to indicate that PacifiCorp also conducts water quality monitoring in Cutler Reservoir.
4	n/a	Eve Davies, PacifiCorp	Canals, river segment boundaries	4.31	Page 95/Figure 2.31—Again, clarify segment boundaries. If Cutler Dam is the boundary, Bear River Canal Company should not be characterized as 'Limited irrigation or water diversions' as noted above, as these diversions (Eastside and Westside) are the largest and oldest diversions on the Bear River. Bear River Canal Company is also shown as a Diversion is Segment C1—is that correct? It should also be noted that these diversions (and any others within the Cutler FERC Project Boundary, including pump locations) are not located on sovereign lands, by definition. Largest and oldest diversion (900 cfs) on the Bear comes off in Segment B, at Cutler Dam. The entire Bear River is operated to meet this diversion right, so should be shown. However, although they are within the Planning Area, they are not on sovereign lands.	Cutler Dam is the divider between Segments B and C1. Utah Division of Water Rights data indicate that the Bear River Canal Company has water rights associated with the West Main Canal and Hammond Main Canal. Therefore, Bear River Canal Company is shown in both Segments B and C1. The text "limited irrigation or water diversions" has been removed for clarity. No change will be made regarding sovereign lands.

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4	n/a	Eve Davies, PacifiCorp	Sovereign lands	4.32	Page 98/Fences—Clarify the sovereign land status, given the 90+ miles of fences within the Cutler FERC Project Boundary.	The text has been edited for clarification.
4	n/a	Eve Davies, PacifiCorp	Sovereign lands	4.33	Page 102-103/Dams—Given the data supplied to FFSL, and as discussed with FFSL staff, PacifiCorp requests clarification as indicated regarding the sovereign land status determination that will occur in Sections 26 and 27. See corresponding redline for requested edits.	See response to PacifiCorp comment number 4.1. No change will be made.
4	n/a	Eve Davies, PacifiCorp	Flood control	4.34	Page 105/Flood Control—See corresponding redline for additional information regarding EAPs.	The suggested change has been made.
4	n/a	Eve Davies, PacifiCorp	Sovereign lands, canals	4.35	Page 106/Figure 2.44—Segment B block should indicate that Cutler Dam sovereign land status is being determined, and that the Hammond (Eastside) and West Main (Westside) canals are not on sovereign lands, by definition. (Figure) Lacks major canals (two) located at the Dam; note however, although they are within the Planning Area, they are not on sovereign lands.	Figure 2.44 has been removed from the plan because Figure 2.27 (Existing hydrologic condition in the planning area by river segment) better describes the major inflows and outflows on the Bear River and Table 2.22 (Major canals in the Planning Area) lists the major canals in the planning area. No change will be made regarding sovereign lands.
4	n/a	Eve Davies, PacifiCorp	Cultural resources	4.36	Page 107/Cultural Resources—See corresponding redline for suggested edits. The planning area is very near the Bear River Massacre site; documented use by the Shoshone tribe and likely other native Americans has been noted throughout the planning area. Not sure where it should be noted (doesn't fit in either pre-historic or historic), but the Bear River Massacre Site is just over the state line in Idaho—there was a huge concentration of Shoshone-Bannock activity documented all along the Bear River above Cutler. Also, I was told by a 90+yr old Cache Valley resident that there was an old Pony Express stop in the North Marsh Unit of Cutler—the old road he indicated does line up exactly with another east-west road in Petersboro, that is visible to the west from the site. No idea what to do with that information…	FFSL completed a cultural resources record search and included appropriate documented sites in or near the planning area in the BRCMP. Cultural resources that have not been surveyed or documented are not included in the plan, but the potential for the existence of undocumented sites is now noted.
4	n/a	Eve Davies, PacifiCorp	Cultural resources	4.37	Page 109/Figure 2.45—See corresponding redline for suggested edits. Clarify location of cultural and historic resources in the planning area regarding sovereign land status.	No change will be made.
4	n/a	Eve Davies, PacifiCorp	Canals, river segment boundaries	4.38	Page 111/Figure 2.47—Clarify segment boundaries: Is Hammond Main Canal in Segment B or C? Please clarify.	Based on information from SWCA's cultural resource specialist, Hammond Main Canal should be shown in segments B and C1. The figure has been edited.
4	n/a	Eve Davies, PacifiCorp	Sovereign lands, boating	4.39	Page 115/Boating—See corresponding redline for requested edits clarifying both Cutler Use Boater Zones (per Utah code) and sovereign land status of Cutler recreation sites in the planning area.	The text has been edited for clarification.
4	n/a	Eve Davies, PacifiCorp	Wildlife	4.40	Page 117/Hunting and Fishing—Clarify statement regarding fish passage at Cutler Dam; see corresponding redline for suggested edits.	No change will be made.

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4	n/a	Eve Davies, PacifiCorp	River segment boundaries, sovereign lands	4.41	Page 119/Figure 2.53—Again, please clarify segment boundaries: Segment B should also include Clay Slough and Upper Bear River boater access sites in the list; does Segment A include Cutler Reservoir and Marsh IBA? Also should note that Cutler sites in particular are within the planning area but not on sovereign lands.	Clay Slough access has been added to Segment B. Upper Bear River access (canoe trailhead) is shown in Segment A and its location was verified. The location of Cutler Reservoir and Marsh IBA was also verified. No change was made regarding sovereign lands.
4	n/a	Eve Davies, PacifiCorp	Public safety	4.42	Page 124/Public Safety—See corresponding redline for requested edits: clarify EAPs cover and plan for more than just dam failure.	This change has been made.
4	n/a	Eve Davies, PacifiCorp	River use classes	4.43	Page 133/Table 3.2—See corresponding redline. Please edit to a 'P' (potentially allowable) for Classes 1 and 2, as we have 'permanent' boat docks (30 years seems long enough to be considered permanent, although admittedly not on sovereign lands, by definition, it seems this is a useful category. Ours (and others) are definitely more than seasonal/temporary.	No change will be made. The docks at Cutler Reservoir are not considered permanent by FFSL. In addition, they may not be located above sovereign lands.
4	n/a	Eve Davies, PacifiCorp	Restoration	4.44	Page 137/Table 3.3—Define 'Instream restoration'—to what or when? May conflict with existing water rights.	The text in this table has been edited for clarification. The instream habitat discussion in Figure 2.21 has been removed to reduce confusion between "structural" instream habitat restoration and instream flows.
4	n/a	Eve Davies, PacifiCorp	River use classes, management goals and objectives	4.45	Page 143/Section 3.3 –See corresponding redline for requested edits throughout the DFCs, and in Tables 3.6 and 3.7. Several statements as written may conflict with (or may be perceived as conflicting with) existing water rights, practices, and required (by Compact and contracts) river operation.	Some changes have been made to this section based on these suggested edits and some have not. Some of the text has been clarified.
4	n/a	Eve Davies, PacifiCorp	Best management practices	4.46	Page 145/Table 3.3—See corresponding redline for suggested edit.	The first bullet in the figure has been modified with new language.
4	n/a	Eve Davies, PacifiCorp	Best management practices	4.47	Page 147/Figure 3.4—Note the existence of the Cutler Reservoir and middle Bear River TMDL; also note current ongoing update to the 2002 Lower Bear TMDL.	The TMDL language in this figure has been edited.
4	n/a	Eve Davies, PacifiCorp	Best management practices	4.48	Page 152/Table 3.11—Include appropriately placed/sized rock to anchor bioengineering, especially in riverine and reservoir segments, given ice scour. See corresponding redline for suggested edit.	Text regarding use of appropriately placed/sized rock has been added.
4	n/a	Eve Davies, PacifiCorp	Best management practices	4.49	Page 159/Table 3.9—See requested corresponding redline edit to clarify structural changes.	No change will be made.
4	n/a	Eve Davies, PacifiCorp	Best management practices	4.50	Page 161/Table 3.10—Similar to previous comment, see requested corresponding redline edit to clarify structural changes.	No change will be made.
4	n/a	Eve Davies, PacifiCorp	Best management practices	4.51	Page 163/Table 3.11—See requested corresponding redline edit to clarify boater access shoreline stabilization methods.	No change will be made.
4*	Page 6, paragraph 2	Eve Davies, PacifiCorp	Sovereign lands	4.2	*The boundary of sovereign land underlying a river (or reservoir) is intrinsically more difficult to define than that of a lake because rivers are more susceptible to movement and shifts in location over time.*	No change will be made.

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4	Page 45, last paragraph (referring to Figures 2.10 through 2.16)	Eve Davies, PacifiCorp	Wildlife	4.3	What is the source of the species? Some could use updates.	Clarification on how the lists of characteristic species were developed was added to Chapter 2. These lists are not exhaustive and may not represent all species that have been identified in the planning area.
4	Page 60, Restoration	Eve Davies, PacifiCorp	Restoration	4.4	My own pet peeve—for exactly the reason you specify below (Restore to what? When is reference frame?), strongly suggest replacing "restoration" throughout with "reclamation". "Restoration" is ecologically bogus and when people say it, they almost always mean reclamation. Just my thing.	No change will be made.
4	Page 66, Table 2.6	Eve Davies, PacifiCorp	Wildlife	4.5	Grasshopper sparrows occur at Cutler—in the Cutler Canyon area; Bobolink are at Cutler in the South Marsh; AWP utilize Cutler Reservoir on a daily basis; ferruginous hawk are observed esp in winter throughout Cutler areas; long-billed curlew occur esp on the west side of the North Marsh and Cutler Reservoir mgmt. units; sharp-tailed grouse are found in the Cutler Canyon mgmt. unit; short-eared owls are common in the South Marsh esp, and the North Marsh units of Cutler. It should be noted that BCT are occasionally still collected in the Bear River and Cutler (but very rarely in recent years), although historically they were exceedingly abundant in the mainstem Bear River throughout the planning area—I have historic photos of huge strings of monster trout from the river just downstream of Cutler Dam.	Documentation of the presence of these species in the planning area has been modified to reflect this comment. Specific changes were made to the Bonneville cutthroat trout (BCT) description to qualify historic verse current individuals/populations.
4	Page 68, paragraph 3	Eve Davies, PacifiCorp	Wildlife	4.6	Several sites in Cutler Reservoir and two sites in the Bear River above Cutler Reservoir were surveyed in 2005 and 2006 (Budy et al. 2006). PacifiCorp also periodically has surveyed fish species since 1994 in conjunction with UDWR-carp dominated all of these surveys. The Budy surveys also included a single BCT that was located in the North Marsh mgmt. unit of Cutler. Although an outlier, it should be noted.	A search of the Budy et al. 2006 document found no reference to BCT. No change has been made. Language in Table 2.6 indicates that BCT are periodically found in the main stem of the Bear River and Cutler, but occurrences are rare.
4	Page 69, Table 2.7	Eve Davies, PacifiCorp	Wildlife	4.7	Should include BCT with at least one recent record, and historic abundance throughout the planning area.	A search of the Budy et al. 2006 document found no reference to BCT. No change has been made. Language in Table 2.6 indicates that BCT are periodically found in the main stem of the Bear River and Cutler, but occurrences are rare.
4	Page 69, paragraph 2	Eve Davies, PacifiCorp	Wildlife	4.8	DWQ has conducted periodic macroinvertebrate sampling of the Bear River at two locations between 1998 and 2005: 1) Bear River above Cutler Reservoir and 2) Bear River south of Bear River City (DWQ 2017). Didn't the Cutler Reservoir and Middle Bear TMDL also have macroinvertebrate sampling?….SWCA has this data, I think…	No macroinvertebrate sampling data were identified for Cutler Reservoir and the Middle Bear TMDL.

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4	Page 71, Table 2.10	Eve Davies, PacifiCorp	Wildlife	4.9	Need a copy of this table to add species at Cutler locations—e.g., we have two osprey nest platforms occupied at Cutler; also see question below.	Osprey appears in Table 2.10. Table 2.10 contains information from specific eBird sites. Although FFSL recognizes that ospreys occur at other locations around Cutler Reservoir, Table 2.10 only includes eBird information.
4*	Page 102, paragraph 1	Eve Davies, PacifiCorp	Sovereign lands	4.10	*The planning area for the BRCMP consists of ~~portions of~~ the river channel through Cutler Reservoir but does not include the remainder of the reservoir or the reservoir banks.* To connote sections in Sections 26 and 27.	No change will be made. See response to PacifiCorp comment number 4.1.
4	Page 108, paragraph 1	Eve Davies, PacifiCorp	Cultural resources	4.11	According to existing data, previously documented historic sites on the Bear River consist of canals, a railroad, bridges, a hydroelectric plant, transmission lines, buildings, structures, and artifact scatters. Suddenly wondering if all the 1930s and 40s era cars that lined the reservoir (I have photos—many hundreds) that we removed were cultural resources…	No change will be made.
4	Page 109, Figure 2.45	Eve Davies, PacifiCorp	Cultural resources, sovereign lands	4.12	Utilities include telephone, electric, sewer, water, and transmission lines, e.g., Cutler Hydroelectric Power Plant Historic District. Utility lines can be placed above grade or can be bored under the Bear River. [The Cutler Hydroelectric Power Plant] is historic but is not on sovereign lands—is there a way to distinguish this?	"Cutler Hydroelectric Power Plant Historic District" has been deleted from the text.
4	Page 111, Figure 2.47	Eve Davies, PacifiCorp	Cultural resources, sovereign lands	4.13	Cutler Hydroelectric Power Plant Historic District is within Planning area but not on sovereign lands.	No change will be made.
4	Page 116, paragraph 4	Eve Davies, PacifiCorp	Hunting	4.14	The most popular waterfowl hunting area is north of Benson Marina in Cutler Reservoir east to Big Bend (Johnson 2017). Not sure this is true—we have the same crowding both north and south of Benson Marina, essentially extending from Cutler Marsh Marina (on Valley View Hwy), and extending up to the Cutler Canyon area, although most blinds are constructed in the North Marsh and Reservoir mgmt. units.	The text has been edited for clarification.
4	Page 25, paragraph 2	Eve Davies, PacifiCorp	Sovereign lands	4.15	Education is an important component of successfully managing the planning area because it provides direction to user groups for the appropriate use of the Bear River, clarifies FFSL's jurisdiction and management authority on sovereign lands of the Bear River, and fosters public appreciation of the river and understanding of its value and the need to protect it.	The change has been made.

Submission Number	Comment Location	Commenter	Topic	Comment Number	Comment	Disposition/Response to Comment
4	Page 128, paragraph 6	Eve Davies, PacifiCorp	Water quality	4.16	In addition, the USU Utah Water Research Laboratory is conducting research on the Bear River, including efforts to estimate and track phosphorus levels in the river and to measure nutrient loading, suspended sediments, and general water quality in Cutler Reservoir (USU 2010). PacifiCorp also conducts quarterly wq monitoring every 5 years at Cutler, as well as a wise variety of wildlife, habitat, and recreation monitoring annually.	Information on PaciCorp's water quality monitoring has been added to the text.
4	Page 132, paragraph 1	Eve Davies, PacifiCorp	Desired future condition, restoration	4.17	As with any planning construct, a desired future condition has limitations but, in the case of the BRCMP, allows for multiple-use management, can be modified over time based on new data, and avoids pitfalls of setting a "restored" ecological condition as a management target.	No change will be made.
5	1st bullet	Carly Burton, Bear River Water Users Association	Public trust resources	5.1	Initially, the planning document that was made available in 2016 stated that under the proposed management plan, the uses would be regulated to ensure protection of navigation, fish & wildlife aquatic beauty, public recreation and water quality. No mention was made of the importance of irrigation and agriculture in the local economy along the Bear River. The Association is pleased to note that in the 2017 draft plan document, the importance of agriculture was given a high priority, as important as the other designated plan priorities and uses on the Bear River.	Thank you for your comment.
5	2nd bullet	Carly Burton, Bear River Water Users Association	Sovereign lands	5.2	FF&SL also indicated at the public meetings that the state's limit of its jurisdiction is from "bank to bank" along the river. We are concerned that the definition of "bank to bank" is not well defined in many reaches of the river and may be subject to wide interpretation, especially where the river bed is a gradual slope up to ground that is not inundated. In those cases would the limit to the State's authority be based on normal high water, historic high water or some other definition? How does the navigability standard of "the ordinary high water mark at time of Statehood" relate to the "bank to bank" definition?	FFSL generally manages the river from the top of the riverbank to the top of the opposite riverbank. As stated on page 6 of the plan, "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 Bear River, as part of a permit authorization process, a case-by-case demarcation of the OHWM may be required." Any questions or concerns about FFSL's jurisdiction can be addressed on an individual, case-by-case basis. As the plan indicates on page 5, the BRCMP 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.
5	3rd bullet	Carly Burton, Bear River Water Users Association	Permitting process	5.3	How will the agricultural interests be administered? Will there be individual permits required or will there be one permit for the combined collection of pumpers who have pumps and pipelines in the Bear River?	Whether individual permits will be issued for each piece of agricultural infrastructure or whether one permit will be issued for a combined collection of agricultural infrastructure will be determined on a case-by-case basis. Individual permits would be preferable in most cases.

Submission Number	Comment Location	Commenter	Topic	Comment Number	Comment	Disposition/Response to Comment
5	4th bullet	Carly Burton, Bear River Water Users Association	Permitting process and requirements, public trust resources	5.4	What will be the substance of the permit requirements for agricultural pumpers including the annual cost and the duration of the permit? Will the permit issuance be subject to a public process or agency review? Given the stated scope of review, i.e., "protection of navigation, fish and wildlife habitat, aquatic beauty, public recreation and water quality" is FF&SL taking the position that such uses are equal in priority to agricultural water diversions?	The substance of the permit requirements will be determined in cooperation with applicants/permittees after the permit application has been submitted, and these will not be detailed in the BRCMP. 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. Therefore, FFSL must balance the impact of water diversions and associated uses with the protection of public trust values (navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality; Utah Administrative Code R652-2-200). There is no particular hierarchy of uses on sovereign lands.
5	5th bullet	Carly Burton, Bear River Water Users Association	Cutler Dam	5.5	How will Cutler Dam and Cutler Reservoir be addressed in the overall plan and how will these issues be addressed in light of the FERC licensing and requirements for the dam and operation of the reservoir?	FFSL will coordinate as needed with PacifiCorp/Rocky Mountain Power on the FERC relicensing process and Cutler Dam operations that affect sovereign lands.
5	6th bullet	Carly Burton, Bear River Water Users Association	Permitting process and requirements, water rights	5.6	How will agricultural pumpers who have pumps and piping in Cutler Reservoir be addressed?	FFSL does not adjudicate water rights in Utah, and nothing in the plan is intended to regulate or affect any vested water rights. Agricultural pumpers with pumps and piping in Cutler Reservoir can be addressed on an individual, case-by-case basis.
5	7th bullet	Carly Burton, Bear River Water Users Association	Sovereign lands	5.7	How will FF&SL address the "Submerged Lands Act" which codifies navigability but also provides exceptions at the time when public surveys were done, if the meander line of the river was not established and the lands were thereby subject to private and not to State ownership? Is it the intent of FF&SL to determine land ownership and boundaries as part of the comprehensive management plan process, or simply assume land ownership without the benefit of a title search? If the plan is not a legal determination, when will those issues be adjudicated and boundaries established between landowners and FF&SL?	It is not the purpose or intention of the BRCMP to address legal questions such as landownership relative to the Submerged Lands Act. Furthermore, it is not the intention of FFSL in the BRCMP to adjudicate landownership or property boundaries. Boundaries may be determined on individual, case-by-case basis as needed.
5	8th bullet	Carly Burton, Bear River Water Users Association	Permitting process and requirements	5.8	What is the intent of and what are the restrictions that will be included in permits? Will these restrictions change over time?	Permit conditions may change over time as necessary to fulfill the obligations of the Public Trust and are not detailed in the BRCMP. General permit conditions will be determined following adoption of the plan; permit conditions will also be determined on an individual, case-by-case basis.

Submission Number	Comment Location	Commenter	Topic	Comment Number	Comment	Disposition/Response to Comment
5	9th bullet	Carly Burton, Bear River Water Users Association	Permitting process and requirements	5.9	The draft permit that was made available to the Association indicated that a bond may be required by the permitted under certain circumstances. What circumstances would require the posting of a bond and what would be the amount of the bond requirement. What would the cost be to the permitted.	Although it is uncommon, a bond may be required on a case-by-case basis depending on the permitted activity and the consequences for FFSL if the activity is abandoned without upholding the permit terms and conditions. This comment involves the permit (not the BRCMP) and will not be addressed in the plan.
5	10th bullet	Carly Burton, Bear River Water Users Association	Water quality	5.10	On page 62 of the draft plan document, the plan noted that "Agricultural practices and grazing activities along the river contribute to water quality degradation, such as nutrient loading and low DO. While the Association notes that certain agricultural activities can contribute to water quality issues, the plan did not address other sources of water quality degradation including municipal sewage discharges, industrial waste discharges, natural water quality degradation from natural pollutant sources and other sources. The Association assumes that any water quality issues on the Bear River are the responsibility and are administered by Utah Department of Environmental Quality, not FF&SL.	Yes, the Utah Division of Water Quality would be the lead agency regarding water quality on the Bear River; however, FFSL could be a participant in projects to improve water quality. FFSL could be considered jointly responsible for permitting activities that may degrade water quality because of the mandate to protect Public Trust values.
5	11th bullet	Carly Burton, Bear River Water Users Association	Irrigation, navigation	5.11	On page 96 of the draft plan document, the plan addresses the issue of irrigation pumps or piping that may be an impediment to navigation. The Association questions what type of navigation would be restricted and what potential remedies and costs would be required by the permitted and would the permitted be forced to pay all costs for modification to their existing pump and piping system.	The Public Trust doctrine is generally not specific regarding the types of navigation that are protected. However, FFSL has not observed pumping activities that would need to be addressed because they substantially restrict navigation at this time. Future issues with irrigation pumps or piping and navigation may be addressed on an individual, case-by-case basis.
5	12th bullet	Carly Burton, Bear River Water Users Association	Irrigation	5.12	On page 97 of the draft document, the plan addresses existing irrigation distribution systems including diversion, conveyance and return flow facilities. The plan states that poorly designed systems can result in increased erosion of stream banks in the vicinity of the existing structures. How will the determination be made of whether or not these systems are poorly designed and what options does the permitted have to improve the facilities and at what cost to who.	A determination of poorly designed irrigation distribution systems on the Bear River will require inventory and monitoring to identify systems that may be causing streambank erosion. FFSL would likely try to partner with the owner of the system to make needed improvements. FFSL plans to ask for streambank restoration funds that could be available for such projects.
5	Last paragraph	Carly Burton, Bear River Water Users Association	Water user (irrigation) constraints	5.13	In summary, the Bear River Water Users Association is concerned that there will be constraints placed on the water users, either financially or physically, that could potentially undermine the long-standing irrigation uses that have existed for over one hundred years in some cases. We are anxious to continue a dialogue with FF&SL to address our concerns and to ensure that the water users will be able to continue irrigation in a manner that will not be constrained by over-reaching burdens and costs set forth in any permit or comprehensive management plan issued by FF&SL.	Constraints may be placed if irrigation activities negatively affect identified values that FFSL must protect under the Public Trust. Prescriptive easements do not apply to public land. FFSL anticipates and looks forward to continuing a dialogue and partnership with irrigators and is happy to work with particular permittees on an individual case-by-case basis.

Submission Number	Comment Location	Commenter	Topic	Comment Number	Comment	Disposition/Response to Comment
6	n/a	Lee Kreutzer, National Park Service	Historic trails	6.1	National Trails Intermountain Region of the National Park Service (NPS) administers the California National Historic Trail (NHT). The NPS appreciates recognition of historic trails as a potential cultural resource within your study area, as several alternate routes of the California NHT crossed the Bear River in the vicinity of Tremonton and Riverside. Another historic route, taken by the 1841 Bidwell-Bartleson Party (the first overland emigrant wagon party to California), followed the Bear River south from present-day Soda Point, Idaho, to the vicinity of today's Corinne, Utah, before turning northwesterly toward the Blue Spring Hills. We bring these to your attention because there exists a possibility that some trail remnants or artifacts from use of those routes could exist in your study area. This office can provide further information about those trails upon request.	Thank you for your comment. We recognize that cultural resources other than those documented with the Utah Division of State History likely exist along the river. Cultural resources inventories/ clearances would be required for any projects or activities that could uncover or disturb such artifacts or resources, in accordance with applicable laws and regulations.
7	Paragraph 1	Deborah Drain and Heather Dove, Great Salt Lake Audubon	BRCMP in general	7.1	Great Salt Lake Audubon (GSLA) appreciates the opportunity to be part of the Bear River Comprehensive Management Plan public process. Overall, GSLA finds the document acceptable with no comments on the technical aspects, such as the logic used for developing the river classifications, classifications of river segments, river use, etc. We also recognize the constraints under which Forestry Fire & State Lands (FFSL) is required to work, and that FFSL authority is limited to sovereign lands, and that most recommendations or project work to be implemented/completed will necessitate partnerships with other public/private entities. Our comments primarily focus on how recommendations in this document will be integrated with recommendations of other plans or documents, such as the Recommended State Water Strategy (July 2017) prepared for the Governor's Office by Envision Utah or how this document will foster partnerships with other entities in management of the Bear River and potential ecosystem conflicts associated with Bear River diversion projects.	Thank you for your comment.
7	Paragraph 2	Deborah Drain and Heather Dove, Great Salt Lake Audubon	Great Salt Lake ecosystem	7.2	The Great Salt Lake (GSL) ecosystem, which includes the Bear River Basin is the most important ecosystem in the Western United States and is a site of global importance for migrating birds as part of the Western Hemispheric Shorebird Network. The GSL ecosystem supports over 7.5 million birds including approximately 300 species, several of which are highly dependent upon the GSL. Not only is the GSL ecosystem hemispherically important, it contributes an estimated $1.32 billion to the economy of Utah through the brine shrimp, minerals extraction, and recreation industries. It also controls our weather (it mitigates both heat and cold and increases precipitation), and impacts human health.	Thank you for your comment.
7	Paragraph 3	Deborah Drain and Heather Dove, Great Salt Lake Audubon	Great Salt Lake ecosystem	7.3	Due to the Bear River's importance to the economy of the GSL and because it supports the most important wetland complex in the Western United States, it is critically important to look at the Bear River in terms of being an integral part of the GSL landscape, not just a river basin. The GSL is highly complex both biologically and geochemically and it's imperative that this system be preserved. Because the Bear River provides 60% of the inflow to the GSL, it is important that the Bear River Basin be managed such that it continues to provide adequate inflow of the highest water quality possible to the GSL.	Language has been added in the "Bird Species" section of Chapter 2 to emphasize the Bear River's importance to birds, Great Salt Lake, and specifically the high-quality avian habitat found in the northeastern arm of Great Salt Lake. In addition, Hydrology Goal 3 recognizes the importance of instream flows. The *Great Salt Lake Management Plan* has been added to the Further Reading box in Chapter 2's Restoration section.

Submission Number	Comment Location	Commenter	Topic	Comment Number	Comment	Disposition/Response to Comment
7	Paragraph 4	Deborah Drain and Heather Dove, Great Salt Lake Audubon	Instream flows, Great Salt Lake ecosystem	7.4	The Bear River Comprehensive Management Plan needs to recognize that Bear River water demands ultimately impact every aspect of Bear River management; they are inseparable, and language should be added as appropriate to clearly state this fact. Additionally, GSLA suggests that language be inserted into the plan that recognizes the importance of the Bear River to the GSL landscape and that the single biggest issue facing the Bear River is maintaining in-stream flow to support the habitat and ecosystems associated directly with the Bear River and ultimately the GSL. We also suggest inserting language that FFSL build partnerships with both public and private entities for maintaining in-stream flow and insert language that stresses cross-agency/division communication within State Government regarding management of the Bear River and its resources in support of the Bear River ecosystems and GSL.	Language has been added in the "Bird Species" section of Chapter 2 to emphasize the Bear River's importance to birds, Great Salt Lake, and specifically the high-quality avian habitat found in the northeastern arm of Great Salt Lake. Hydrology Goal 3 recognizes the importance of instream flows. The objectives for Hydrology Goal 3 support research of flow and releases that would benefit the riverine ecosystem and fluvial processes, and would encourage coordination with DWR to study instream flows that support fisheries and aquatic and wildlife habitat. Additional language has been added to Chapter 1's Bear River Management section regarding collaboration and partnerships with agencies and stakeholders.
8*	n/a	D. Brent Rose	Public trust resources, water rights	8.1	Multiple-Use-Approach – Page 8 *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. FFLS recognizes that protection of navigation, fish and wildlife habitat, aquatic beauty, public recreation, and the impounding, storage, diversion and uses of water under duly authorized and recognized appropriated, decreed, contract and other water rights, 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 Bear River.*	No change will be made.
8*	n/a	D. Brent Rose	Water rights	8.2	Utah Division of Water Rights – Page 8 *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 Bear River, and has the authority to regulate dams to protect public safety. All projects within twice the width of the Bear 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 Cutler Dam. EFSL does not adjudicate water rights in Utah, and nothing in the plan is intended to, nor shall it be construed to revoke, cancel, suspend, limit, modify, regulate or affect or impair any existing appropriated, decreed, contract or other water right duly approved and recognized by the Utah Division of Water Rights which is owned by the holder of a permit issued under the Plan, and/or any right or interest of the Permittee under any such water right, including, without limitation, the right to impound, store, divert and use water as authorized under any such ~~regulate or affect any vested~~ water right. When FFSL requests that 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.*	Language on water rights supplied by the commenter was added to Section 1.3 of the BRCMP.

Submission Number	Comment Location	Commenter	Topic	Comment Number	Comment	Disposition/Response to Comment
8*	n/a	D. Brent Rose	Bear River Compact, water rights	8.3	Bear River Commission – Page 10 *The Bear River Commission is a compound of nine gubertnatorial-appointed commissioners and one federal commissioner who carry out the provisions of the Bear River Compact, as follows:* *The major purpose of this Compact is to remove the causes of present and future controversy over the distribution and use of the waters of the Bear River; to provide for efficient use of water for multiple purposes; to permit additional development of the water resources of the Bear River; to promote interstate comity; and to accomplish an equitable apportionment of the waters of the Bear River among the compacting States. (Bear River Commission 2017)* *The compact states consist of Utah, Idaho and Wyoming. Nothing in the Plan is intended to regulate, affect or otherwise impair any rights or interests inuring to the compact states and the holders of individual appropriated, decreed, contract or other water rights duly approved and recognized by the compact states.*	Language on water rights supplied by the commenter was added to Section 1.4 of the BRCMP.
9	n/a	Heidi Hoven	Instream flows	9.1	I would like to see language included in the plan that addresses the need for conservation of in-stream flows (actual water) that supports the natural and recreation resources of Bear River including flows into Great Salt Lake that support its wetlands and wildlife.	Hydrology Goal 3 recognizes the importance of instream flows. The objectives for Hydrology Goal 3 support research of flow and releases that would benefit the riverine ecosystem and fluvial processes, and encourage coordination with DWR to study instream flows that support fisheries and aquatic and wildlife habitat.
10	n/a	Alile Sparks	River use classes	10.1	There used to be a power line that crossed to the north side of the river. The power company could not give us a reason for taking it out. The river banks may need to be stabilized in the future. Also the only way to get the north piece of the property is by boat. Figure 1.7 2 of 20 6 → privately owned change class 5 (would 5 be the right one)	River classification was changed from 6 to 5. FFSL would be happy to discuss the stabilization of riverbanks in this area on an individual basis.

* These comments include italicized excerpts from the draft BRCMP, using red text as suggested insertions and red "strikethrough" text as suggested deletions.

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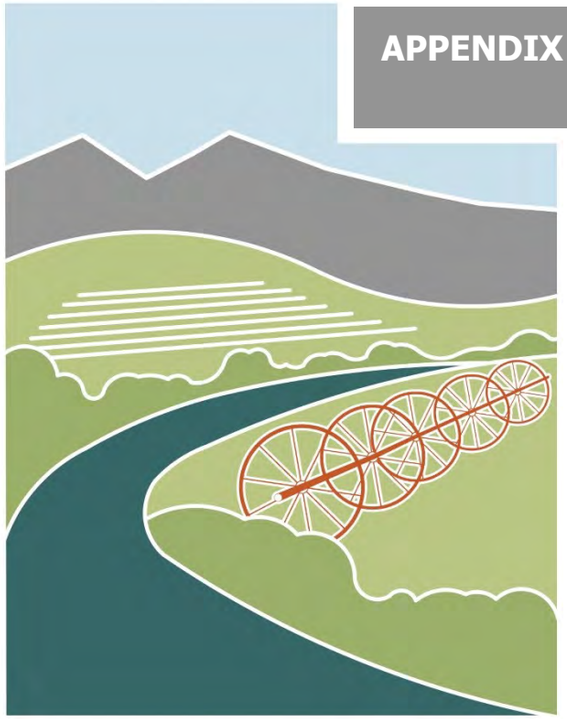
APPENDIX B. LIST OF PREPARERS



APPENDIX B – LIST OF PREPARERS

Table B1. List of Preparers for the Bear River Comprehensive Management Plan

First Name	Last Name	Title
SWCA Environmental Consultants		
Brian	Nicholson	Project manager
Gretchen	Semerad	Deputy project manager
Linda	Burfitt	Technical editor
Alyson	Eddie	Resource specialist
Dave	Epstein	Water quality specialist
Bret	Hansen	Resource specialist
Lindsay	Hart	Graphic designer
Rachel	Johnson	Geographic information system specialist
Stephanie	Lechert	Cultural resource specialist
Lauri	Logan	Graphic designer
Audrey	McCulley	Resource specialist
Anne	Oliver	Architectural historian
Debbi	Smith	Formatter
Allen	Stutz	Geographic information system specialist
CRSA		
J. Kelly	Gillman	Senior principal
Melissa	Fryer	Urban planner and landscape designer
Susie	Petheram	Associate principal, planner
Hansen, Allen & Luce, Inc.		
Greg	Poole	Water resource engineer/principal
ERM		
John	Gangemi	Partner
Other		
Craig	Johnson	Professor Emeritus, Utah State University

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