



**US Army Corps  
of Engineers** ®  
Walla Walla District  
**BUILDING STRONG** ®

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# **JACKSON HOLE FLOOD PROTECTION PROJECT OPERATIONS AND MAINTENANCE**

**JACKSON, WYOMING**

## **SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT Number 1**

Revision 1

**Project Number PM-EC 2017-0009**

**June 2018**



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- C – SUPPLEMENTAL BIOLOGICAL ASSESSMENT
- D – CULTURAL RESOURCES CORRESPONDENCE

## SECTION 1 - INTRODUCTION

### 1.1 INTRODUCTION

The Walla Walla District of the U.S. Army Corps of Engineers (Corps) is supplementing National Environmental Policy Act (NEPA) documentation for the operation and maintenance (O&M) program for the Federal and non-Federal levees that make up the Jackson Hole Flood Protection Project (JHFPP) along the Snake and Gros Ventre Rivers near the town of Jackson in the northwest corner of Wyoming (Figure 1-1, next page). This Supplemental Environmental Assessment (SEA) evaluates current and proposed O&M actions and associated potential environmental effects that may not have been adequately addressed in the April 1990 *Jackson Hole, Wyoming Flood Protection Project O&M Decision Document and Environmental Impact Statement* (1990 O&M Decision Document/EIS) (DD/EIS, Corps, 1990). The SEA is tiered to and incorporates by reference the DD/EIS. The Corps is proposing to continue to operate and maintain the JHFPP consistent with its authorized purposes, while minimizing adverse effects to the environment.

The Corps prepared this SEA in accordance with Engineer Regulation (ER) 200-2-2, *Procedures for Implementing NEPA*, and the Council on Environmental Quality (CEQ) *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA)*, Title 40 Code of Federal Regulations (CFR), Part 1500-1508. The objectives of the SEA are to evaluate some changes that have occurred in the O&M of the JHFPP over time and potential environmental effects associated with those changes, and to evaluate current O&M practices that were not adequately evaluated in the DD/EIS. If the Corps determines potential effects are relatively minor and would have no significant environmental effects, the Corps would sign a Finding of No Significant Impact (FONSI) and would proceed with the Federal action. If the Corps determines the environmental effects would be significant, the Corps would prepare a supplemental EIS before a decision is reached on how to implement the proposed action. Applicable laws under which these effects will be evaluated include but are not limited to, NEPA, the Endangered Species Act, the Clean Water Act, the Clean Air Act, and the National Historic Preservation Act.

The NEPA is a full disclosure law, providing for public involvement in the NEPA process. All persons and organizations that have a potential interest in this proposed action – including the public, other federal agencies, state and local agencies, Native American tribes, and interested stakeholders – are encouraged to participate in the NEPA process.

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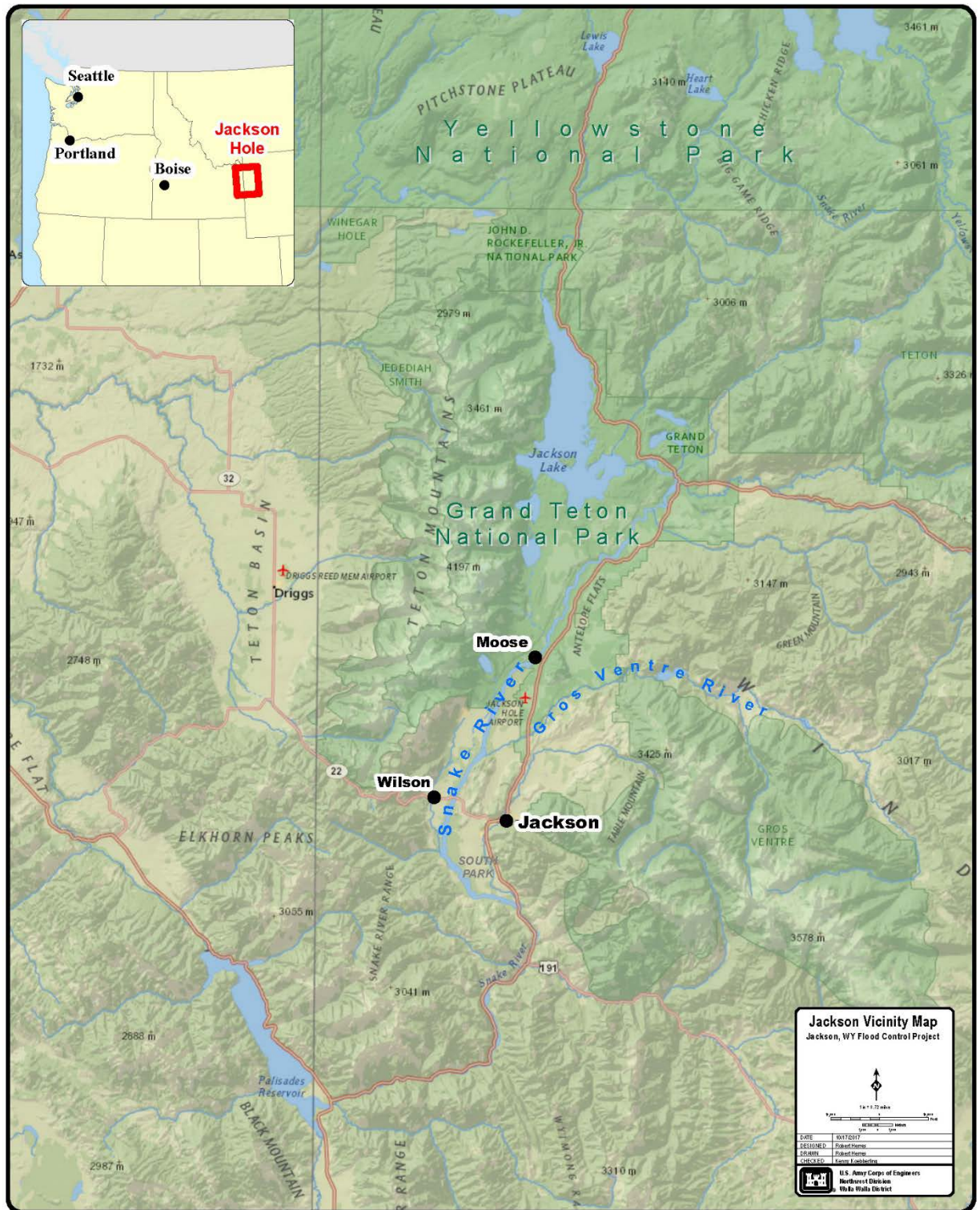


Figure 1-1. Vicinity map of the JHFPP.

## **1.2 BACKGROUND INFORMATION AND AUTHORITY**

### **1.2.1 Background**

Jackson Hole is a large, enclosed valley up to 12 miles wide and extending approximately 60 miles from north to south (USFS 1979). This valley is bordered to the north by the highlands of the Yellowstone plateau and to the west by the Teton Mountains, which rise to elevations of over 13,000 feet. The remaining mountain ranges that enclose the Jackson Hole valley are the Mount Leidy Highlands to the east and the Hoback Mountains and Snake River Range to the south.

The headwaters of the Snake River are in Yellowstone National Park about 80 miles north of Jackson. From the headwaters area the Snake River flows south into Jackson Lake, within Grand Teton National Park (GTNP), and continues south through Jackson Hole before turning west into Idaho. The project area includes about 25 miles of the Snake River from below the town of Moose to the U.S. Highway 26/89/191 bridge in South Park. The Snake River in this reach has a relatively wide, braided channel. The project area also includes the lower three miles of the Gros Ventre River. The Gros Ventre River is a major tributary, entering the Snake River from the east about 10 miles downstream from Moose. The land adjacent to both rivers in this reach is used primarily for ranching and rural residential home sites.

The JHFPP currently consists of 28 levees, 48 access road segments, and five stockpile sites (Table 1-1). The levee system includes about 34 miles of Federal and non-Federal levees located adjacent to both the Snake and Gros Ventre Rivers (Figure 1-2). The levees are located along one or both banks of the rivers and provide a discontinuous system of levees. Seven of the levees (23 linear miles) along the Snake River were formerly known as the “Federal Project” (i.e. Federal levees, Corps-constructed under Congressional authorization). The remaining 21 levees were constructed by Teton County, State, Federal agencies under emergency flood fighting authorization, and individual landowners (i.e. non-Federal levees) and include 8 miles of non-Federal levees (17 levees) along the Snake River and about 3 linear miles (four levees) of non-Federal levees along the Gros Ventre River.

Teton County acquired perpetual easements for all of the Federal levees during construction of the original Federal project, and was granted access to the levees by the most direct or expeditious route across adjoining private property. The levee easement is about 150 feet wide - generally 50 feet wide on the land-side of the levee and 100 feet wide on the water side; both measurements are from the center of the levee crown. Teton County has also acquired easements with appurtenant access for the non-Federal levees, but the easement widths are not uniform. There are also easements across adjacent private and public property to allow maintenance vehicle access to the levees (See Figures 1-3 and 1-4 for maps of the access roads). The Corps performs maintenance as needed to repair damage caused by O&M activities on about 27 miles of access road as part of the JHFPP. All of the O&M activities take place within the levee and access road easements. Figures follow the table on the following pages.

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**Table 1-1. Jackson Hole Flood Protection Project Components**

<b>JACKSON PROJECT COMPONENTS</b>			
<b>COMPONENT</b>	<b>LENGTH (FT)</b>	<b>LENGTH* (MILES)</b>	<b>ANNOTATION</b>
<b>FEDERAL PROJECT LEVEES, LEFT BANK, SNAKE RIVER</b>			
SOLITUDE	23,342	4.42	Private levee extends from downstream end of Federal levee
WALTON	8,021	1.52	Double lane, provides access to Walton Quarry. Heavy pedestrian traffic
MORGAN	18,029	3.41	
<b>FEDERAL PROJECT LEVEES, RIGHT BANK SNAKE RIVER</b>			
JY RANCH	26,688	5.05	Partially within GTNP
JOHN DODGE	21,490	4.07	
BOAT RAMP	4,297	0.81	
PUBLIC	18,184	3.44	Previously open to public vehicular traffic. Heavy public pedestrian traffic
<i>*22.72 miles total of Federal Levees</i>			
<b>NON-FEDERAL LEVEES, LEFT BANK SNAKE RIVER</b>			
95 RANCH #1	1,586	0.30	
95 RANCH #2	923	0.17	
95 RANCH #3	200	0.04	Destroyed in 2009. No longer maintained
95 RANCH #4	870	0.16	
FEDERAL EXTENSION	2,335	0.44	
IMESON #1	5,250	0.99	
IMESON #2	5,075	0.96	
IMESON #3	2,865	0.54	
SPRING CREEK			Abandoned
GAME & FISH #1	1,460	0.28	Also known as Diagonal
GAME & FISH #2	2,130	0.40	
GAME & FISH #3	880	0.17	
GAME & FISH #4	1,555	0.29	
South Park	940	0.18	
<b>NON-FEDERAL LEVEES, RIGHT BANK SNAKE RIVER</b>			
TAYLOR CREEK #1	2,000	0.38	Private levee extends downstream
TAYLOR CREEK #2	3,441	0.65	Private levee extends downstream
TAYLOR CREEK #3	2,200	0.42	County levee extends downstream
SEWELL	1,400	0.27	
EVANS	6,800	1.29	
<b>NON-FEDERAL LEVEES, LEFT BANK, GROS VENTRE RIVER</b>			
LUCAS	6,663	1.26	Both sides of Spring Gulch Road
HANSEN	6,200	1.17	
<b>NON-FEDERAL LEVEES, RIGHT BANK, GROS VENTRE RIVER</b>			
GOLF COURSE	1,582	0.30	
NELSON	3,318	0.63	Private levee extends downstream
<i>*11.25 miles total of Non-Federal Levees</i>			

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<b>JACKSON PROJECT COMPONENTS</b>			
<b>COMPONENT</b>	<b>LENGTH (FT)</b>	<b>LENGTH* (MILES)</b>	<b>ANNOTATION</b>
<b>ACCESS ROADS, LEFT BANK</b>			
Jackson Hole Ranch	4,800	0.91	Hwy 26,89,191 to Middle Meadow
Middle Meadow	1,618	0.31	Jackson Hole Ranch to Fern
Fern	1,165	0.22	Middle Meadow to Private Access
Private Access	1,117	0.21	Fern to 95 Ranch #1
Middle Meadow	1,101	0.21	Fern to Private Access
Private Access	931	0.18	Middle Meadow to 95 Ranch #2
Private Access	750	0.14	Private Access to 95 Ranch #3
Middle Meadow	1,533	0.29	Private Access to Private Access
Private Access	1,668	0.32	Middle Meadow to 94 Ranch #4
Solitude	1,203	0.23	Spring Gulch to Sleeping Indian
Sleeping Indian	5,430	1.03	Solitude Road to Solitude Levee
Zenith Drive	6,100	1.16	Spring Gulch to Private Access
Private Access	3,691	0.70	Zenith Drive to Solitude Levee
Sagebrush Drive	11,252	2.13	Spring Gulch Road to Solitude Levee
Hansen Quarry	6613	1.25	Hansen Quarry to Walton Quarry
Walton Quarry	11,310	2.14	Walton Levee to Walton Quarry (includes loop road)
Marie Dorian Park	786	0.15	State Highway (SH) 22 to Walton Levee
Crane Creek Ranch	2057	0.39	SH22 to Morgan Levee
Harrison Ford	603	0.11	Federal Extension Levee to Imeson #1 Levee
Imeson	3,562	0.67	Imeson #1 Levee to Imeson #2 Levee
Lockhart	7,163	1.36	Imeson #2 Levee to Shootin' Iron Road
Ricks Lane			South Park Loop to Melody Ranch
STP			Melody Ranch to Game & Fish #1 (no trailers)
South Park Feedgrounds	7733	1.46	U.S. Highways 26, 89, 191 to Junction (6,000 pound gross vehicle weight [GVW] limit)
Game & Fish #1 Road	1,227	0.23	Junction to Game & Fish #1 Levee
South Park Feedgrounds	648	0.12	Junction to Game & Fish #2 Levee
South Park Feedgrounds	3,312	0.63	Game & Fish #2 to Game & Fish #3
South Park Feedgrounds	1,101	0.21	Game & Fish #3 to Game & Fish #4
South Park Feedgrounds	1,056	0.20	Game & Fish #4 to Game & Fish #5
South Park Feedgrounds	769	0.15	Game & Fish #5 to Highway 26, 89, 191
<b>ACCESS ROADS, RIGHT BANK</b>			
Lake Creek	5,872	1.11	SH390 to JY
R Lazy S	5,518	1.05	SH390 to JY; 6,000 pound GVW limit
Yodler	6,646	1.26	R Lazy S to JY
Snake River Ranch (North)	10,002	1.89	SH390 to JY
Snake River Ranch (South)	3,590	0.68	Snake River Ranch (North) to John Dodge
John Dodge Rd	140	0.03	SH390 to Thistle

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<b>JACKSON PROJECT COMPONENTS</b>			
<b>COMPONENT</b>	<b>LENGTH (FT)</b>	<b>LENGTH* (MILES)</b>	<b>ANNOTATION</b>
Thistle	1,554	0.29	John Dodge to Stonecrop
Stonecrop	2,695	0.51	Thistle to Private Road
Private Road	839	0.16	Stonecrop to John Dodge Levee
Hunter	1,890	0.36	SH390 to Thistle/Stonecrop
Tucker Ranch	6,788	1.29	SH390 to John Dodge Levee
Linn	2,101	0.40	SH390 to John Dodge Levee
China Connection	363	0.07	John Dodge Levee to Boat Ramp Levee
Boat Ramp Road	1,484	0.28	SH390 to Boat Ramp Levee
Upper Taylor	967	0.18	Fall Creek Road to Taylor Creek #1
Lower Taylor	368	0.07	Fall Creek Road to Taylor Creek #3
Sewell Road	1,155	0.29	Fall Creek Road to Sewell Levee
Evans Road	1,045	0.20	U.S. Highways 26, 89, 191 to Evans Levee
<b>RIPRAP STOCKPILE SITES</b>			
	<b>LATITUDE</b>	<b>LONGITUDE</b>	
Main stockpile	N43° 30' 27"	W110° 49' 49"	Replacement for Walton Quarry site. Being developed by Teton County for use starting in 2018.
Solitude Levee	N43° 35' 43"	W110° 46' 42"	~1,000 CY capacity
WYDOT	N43° 33' 25"	W110° 49' 27"	Max 2,500 CY by agreement
Imeson	N43° 26' 13"	W110° 50' 59"	~2,000 CY capacity
Taylor Creek	N43° 24' 48"	W110° 49' 56"	~5,000 CY capacity. Landowner also has riprap stockpile here

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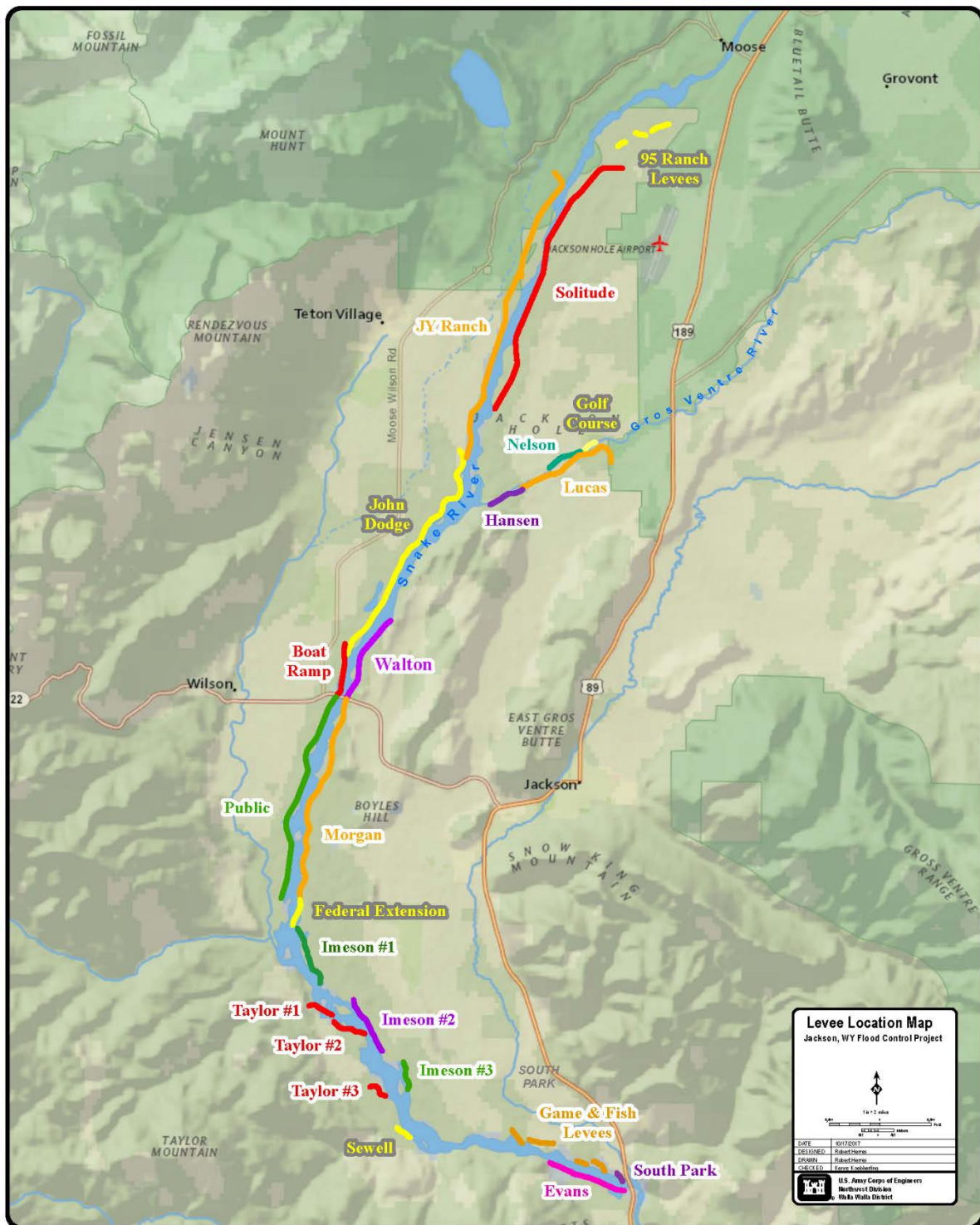


Figure 1-2. Map of JHFP levees (Levees are colored to enhance visibility).

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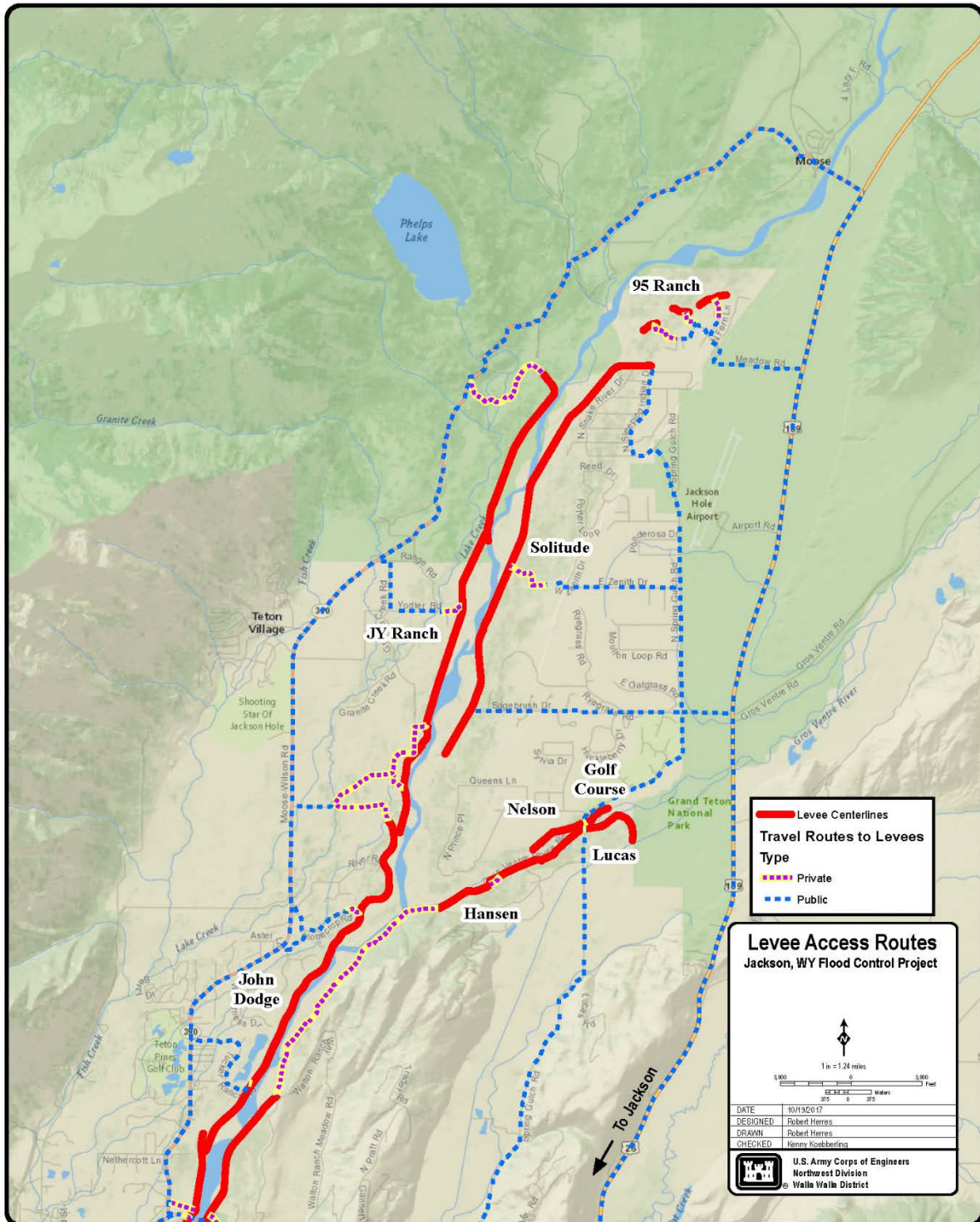
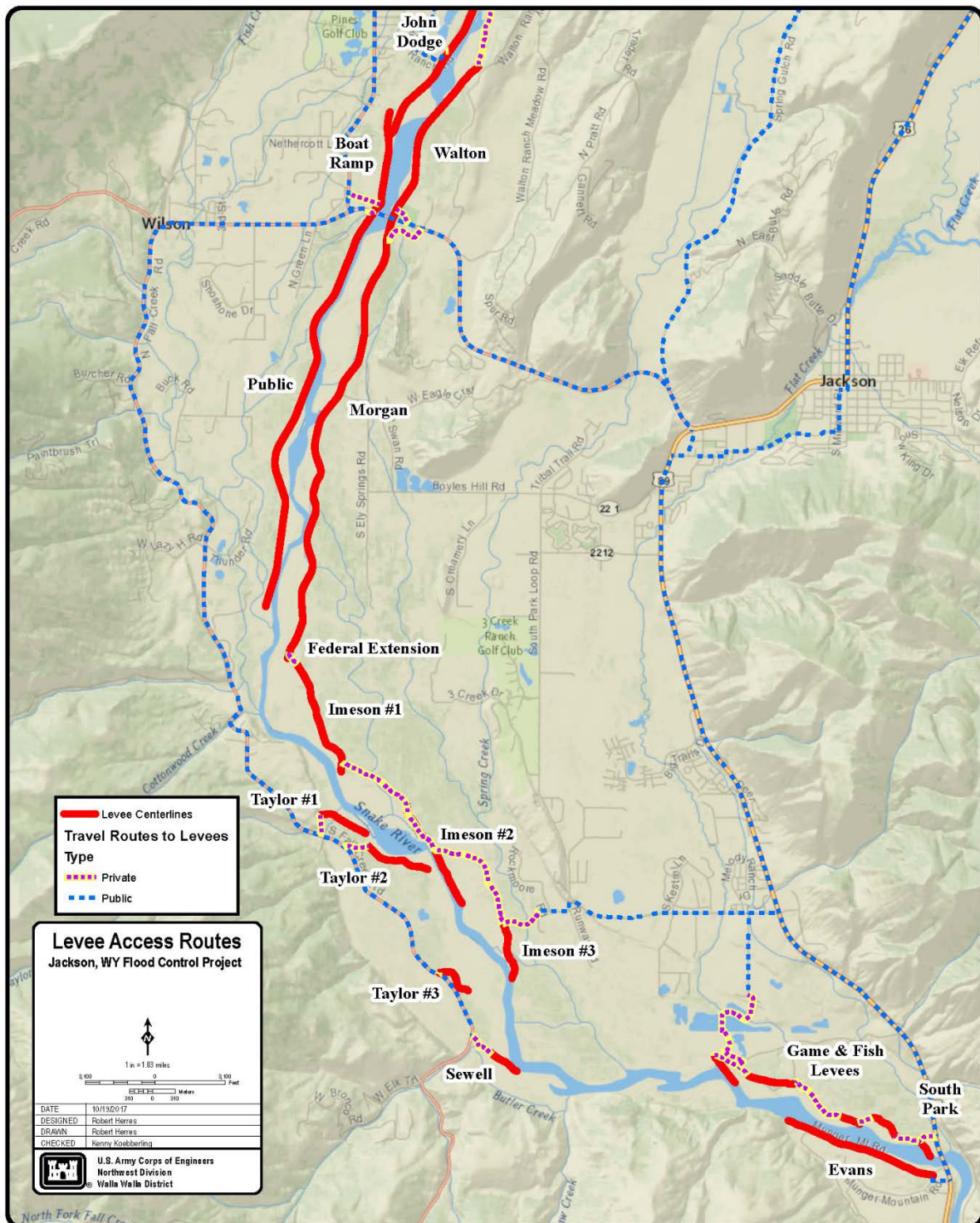


Figure 1-3. Map of JHFPP access roads (Upper half of project).

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**Figure 1-4. Map of JHFPP access roads (Lower half of project).**

Both the Corps and Teton County have obligations that are described in a Local Cooperation Agreement (LCA) dated September 1990. The Corps has the primary

responsibility for O&M of the levee system. Teton County is the non-Federal sponsor for the project and contributes annual funding, performs some O&M activities at the direction of the Corps, and provides real estate-related requirements such as lands, easements, and rights of way.

### **1.2.2 Authority**

Construction of the JHFPP levees was first recommended by the Federal government in a survey report issued in 1947 (Corps 1987a). Construction of an initial system of levees was authorized by Congress in Section 204 of the River and Harbor Act of 1950 (PL 81-516). Following approval of a general design memorandum in 1955, the Corps constructed six levee segments of what was termed the Jackson Hole Flood Protection Project between 1959 and 1964. The Corps subsequently turned over sponsorship and operational responsibility for these levees to Teton County. However, this situation was changed in 1986 by Congressional action taken at the request of local interests. Section 840 of the 1986 Water Resources Development Act (WRDA 86, PL 99-662), dated November 17, 1986, directed the Secretary of the Army to assume the responsibility of the operation and maintenance of the JHFPP. WRDA 86 also requires the non-Federal sponsor (Teton County) to pay the initial \$35,000 in cash or materials for O&M costs expended in any one year (plus inflation), as of the date of enactment of the Act.

In response to this legislation, the Corps initiated engineering, hydraulic, environmental, and economic studies of the levee system to determine an appropriate course of action for implementing the Congressional direction. In compliance with NEPA, the Corps prepared the DD/EIS and signed a Record of Decision (ROD) in July 1990 adopting operation and maintenance responsibility for the JHFPP.

Following the signing of the ROD, the Corps and Teton County signed a LCA on September 4, 1990. The LCA identified the responsibilities of the Corps and Teton County. A Deviation Report attached to the LCA clarified that the WRDA 86 legislation only authorizes the Corps to take on the responsibility of O&M for the JHFPP and does not provide authority to construct additional levees or perform new construction on the existing levees to modify the level of protection.

Section 362 of the Water Resources Development Act of 1996 (PL 104-303), modified Section 840 of WRDA 86 to (1) allow the Local Sponsor to provide in-kind services to fulfill its cost sharing requirement, and (2) allow the Secretary to enter into agreements with the Local Sponsor to perform operation and maintenance of the Project on a cost-reimbursable basis.

## **1.3 PURPOSE AND NEED**

The purpose of the proposed action is to continue to O&M the JHFPP for the authorized purpose of flood risk management, in accordance with Section 840 of WRDA 86:

“The project for Jackson Hole Snake River local protection and levees, Wyoming, authorized by the River and Harbor Act of 1950 (PL 81-516), is modified to provide that the operation and maintenance of the project, and additions and modifications thereto constructed by non-Federal sponsors, shall be the responsibility of the Secretary: Provided, that non-Federal sponsors shall pay the initial \$35,000 in cash or materials of any such cost expended in any one year, plus inflation as of the date of enactment of this Act”.

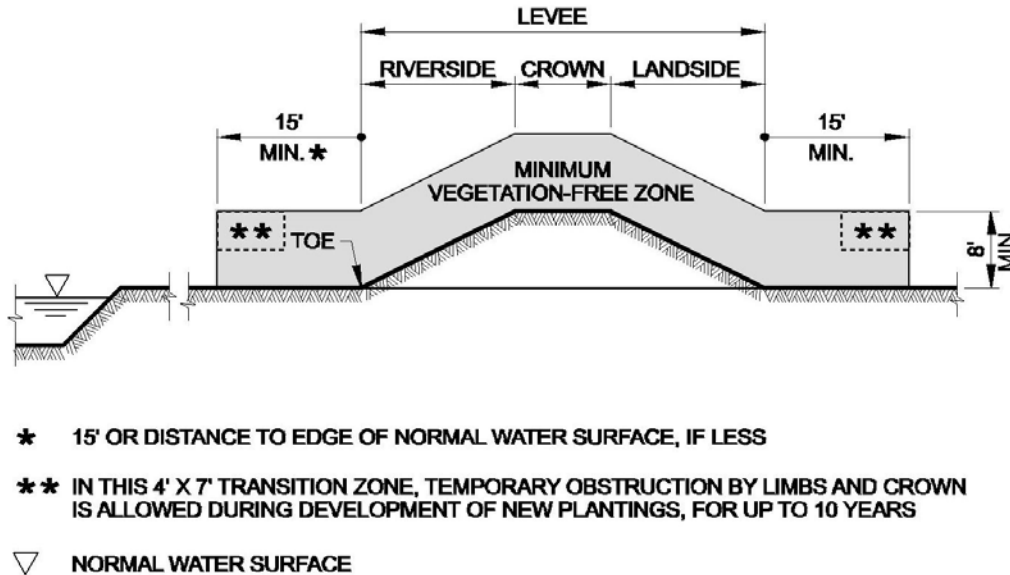
As discussed above in section 1.2.2, WRDA 86 only authorizes the Corps to take on the responsibility of O&M for the JHFPP. It does not provide authority to construct additional levees or perform new construction on the existing levees to modify the level of flood risk management.

The O&M also needs to be consistent with current regulations and policies. In particular, the O&M needs to be consistent with the levee vegetation standard presented in the Corps' Engineering Technical Letter (ETL) 1110-2-583, *Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures*, dated April 30, 2014. This regulation calls for removal of woody vegetation from the levee structure and from a zone 15 feet from the toe on both sides of the levee.

The proposed action is needed for several reasons beyond the overarching need of ongoing flood risk management. Some of the project O&M needs and conditions have changed since the Corps assumed O&M responsibility for the levee system in 1990. Some of these changes are the result of the DD/EIS simply not addressing certain O&M actions (e.g., repair/replacement of culverts). Other changes are because of differing interpretations of levee management requirements. Additionally, some conditions at the project have changed and present new circumstances or information relevant to environmental concerns with O&M of the levee system. The Corps has determined the DD/EIS does not clearly or fully address these changes/new conditions and supplemental NEPA documentation should be prepared. These changes or new conditions are described below:

Corps implementation of guidance on levee vegetation – The Corps' policy is to manage vegetation on its levees as per the standard in ETL 1110-2-583. This standard generally requires the levee prism (the crown or top and the sides down to the toe) be free of woody vegetation, as well as a clear zone 15 feet on each side of the levee extending from the toe outward (Figure 1-5). Although this standard was in effect at the time the DD/EIS was prepared, the requirements for the clear zone were not described in the DD/EIS and the Corps has not been removing woody vegetation from all of the landward side of the levees or the clear zone on either side of the levees. This is because the Corps has limited funding and has had to prioritize the O&M activities. The Corps had determined other O&M activities had a higher priority for providing flood risk reduction than removal of the woody vegetation from the entire landward side of the levees and the clear zones. The Corps is now proposing to comply with the guidelines

and remove this vegetation, unless a vegetation variance from Headquarters-US Army Corps of Engineers (HQ-USACE) can be obtained.



**Figure 1-5. Basic levee cross-section showing zone of no woody vegetation.**

Repair/replacement of aging features - Some features of the levee such as culvert headgates and headwalls and the culverts themselves are now 50 years old and need to be repaired or replaced. Without the repair or replacement, the culverts may not function properly and could adversely affect operation of the levee system and threaten the integrity of the levees. The DD/EIS addressed culvert cleaning, but not culvert repair or replacement.

Reconfiguration or addition of features - Some of the features (turnarounds) need to be reconfigured to accommodate changes in equipment. Some of the existing turnarounds along the levees are not wide enough to accommodate the turning radius of the equipment such as side-dump trucks and dump trucks with pup trailers currently being used to transport riprap and rock fill materials. Vehicular access to the levees is only on designated roads or the crown of the levees. It is not practical for the trucks to back down the levee as it may be several miles to an access road. The Corps is proposing to extend some of the existing turnarounds or construct new turnarounds to allow these vehicles to back into a turnaround area to perform a three-point turn. This may require acquisition and development of additional land under easement and was not addressed in the DD/EIS.

New circumstances or information relevant to environmental concerns – The Corps identified two environmental issues that needed to be addressed:

- Identification of biological resource work windows - Timing of some maintenance activities needs to be responsive to requirements of environmental compliance or protection laws that were not considered in the DD/EIS. This is mostly related to nesting birds. The DD/EIS addressed restrictions and impact avoidance measures associated with bald eagle nesting in the vicinity of the levees when the species was protected under ESA; however, it did not address similar issues with nesting migratory birds, or changes in restriction for bald eagles following delisting of the species under ESA. Bald eagle nesting restrictions are now addressed through the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.
- Need to address effects of O&M actions on wetlands – Some of the O&M actions may have an adverse effect on wetlands and this effect was not adequately addressed in the DD/EIS. The DD/EIS addressed the effect levee construction had on wetlands, but did not adequately address the effects of the O&M actions. Proposed actions such as removal of woody vegetation from the 15-foot clear zone and extension of the turnaround areas have the potential to affect wetlands protected under the Clean Water Act and/or Executive Order 11990.

Addition of measures to protect levee function – The Corps has identified a need to add some structures to protect at least one of the levees. At the John Dodge levee, a gravel bar in the Snake River has been directing river flows towards the levee and undercutting the toe. The Corps recently rehabilitated the levee, but the undercutting has steepened the slope again. The Corps is currently considering two potential options to protect the levee. One option is to re-establish a 2:1 slope on the waterward side of the levee, then construct several rock barbs or weirs along the toe upstream of the damaged area. The rock barbs would encourage the flow to remain in the river channel and reduce water velocities to alleviate undercutting. A second option is to change the slope of the levee to a flatter slope such as 2.5:1 or 3% that would reduce undercutting. These options would not change the level of flood risk management provided by the levees. The need for implementing and maintaining levee protection measures was not addressed in the DD/EIS.

Alternatives must address the purpose and need of the project and meet the following criteria to be considered:

- allow for continued O&M of the JHFPP at the same level of flood risk management as provided by the levee system at the time the Corps assumed O&M under WRDA 86,
- be consistent with WRDA 86 and the LCA (not involve expansion of the existing levee system or construction of new levees),
- comply with applicable Corps regulations and guidance, including ETL 1110-2-583,
- be technically feasible,
- be environmentally acceptable.

## **SECTION 2 - ALTERNATIVES**

### **2.1 INTRODUCTION**

NEPA requires Federal agencies to consider a reasonable range of alternatives during the planning process. Alternatives considered under NEPA must include, at least, the proposed action and the “No Action” Alternative, which provides a baseline from which to compare other alternatives. In the case of an ongoing program, the No Action Alternative is no change from the current management direction or level of management intensity.

The Corps considered four alternatives for the continued O&M of the JHFPP:

- (1) Alternative 1- No Action/ No Change to Current O&M Activities (continued maintenance operations as currently being performed).
- (2) Alternative 2 - Updated O&M Practices (continued O&M with some updating/modification to the work schedule, practices, and maintenance actions).
- (3) Alternative 3 – Modification of Project with Future O&M (O&M similar to Alternative 2 but with reconfiguration, modification, relocation, or addition of levees).
- (4) Alternative 4 - Updated O&M Practices with Variance Allowing for Increased Levee Vegetation (same as Alternative 2 but with a variance to allow some woody vegetation to remain on the landward side of the levees).

Alternative 2 is the proposed action.

### **2.2 ALTERNATIVES**

#### **2.2.1 Alternative 1 – No Action (No Change to Current O&M Activities)**

The No Action/No Change alternative, Alternative 1, represents a continuation of the Corps’ current O&M activities associated with the JHFPP. In the DD/EIS, the Corps identified nine types of O&M activities to be performed under the O&M program. Most of these activities are performed by the Corps and/or its contractors, but some can be performed by Teton County. Under this alternative, the Corps (Corps employees/contractors/Teton County) would continue to perform these activities as described below.

##### **2.2.1.1 Spring snow removal**

Removal of snow in the spring from the access roads and top (driving surface) of the levees is done as needed, about once every three years. This would typically occur between March 15 and March 30, but exact scheduling would be dependent upon prevailing weather conditions. Standard snow removal equipment is used to plow access roads and the tops of the levees. This is usually performed using a road grader.

This activity is needed to provide vehicle access to the levee system for patrols and to allow the levees to dry so that heavy equipment can be accommodated and not damage the levees during flood-fighting activities. This usually takes about a week to perform.

#### **2.2.1.2 Spring levee patrols**

Patrols of the levee system are made during daylight hours for the duration of the flood watch period. Patrols consist of a person driving on the levee crown and looking for signs of damage or failure. The flood watch period begins when water levels rise in the spring and ends when flood flows recede. The frequency of the patrols depends on the river flow. Patrols are made on a daily basis when flows exceed 10,000 cubic feet per second (cfs) and increase to twice daily when flows exceed 15,000 cfs.

#### **2.2.1.3 Emergency actions (Flood-fighting)**

Flood-fighting and emergency repair of the levees are performed as needed at problem/damaged sites during the spring peak flows, usually between May 1 and July 10. These efforts typically involve placement of additional riprap on the levee surface and/or reconstruction of the levee core and riprap. Individual flood fights usually require one-half to two days of activity at each site. Equipment and personnel requirements for this effort at one site can include 8-10 dump trucks, a bulldozer, a track-mounted backhoe or excavator, wheeled vehicles for supervisory personnel, and a commensurate work crew. Repairs may occur at multiple sites during a busy flood season. Emergency repairs at more than one site at a time would require some additional resources, but not necessarily multiple full crews with equipment.

#### **2.2.1.4 Rock and fill material stockpiling**

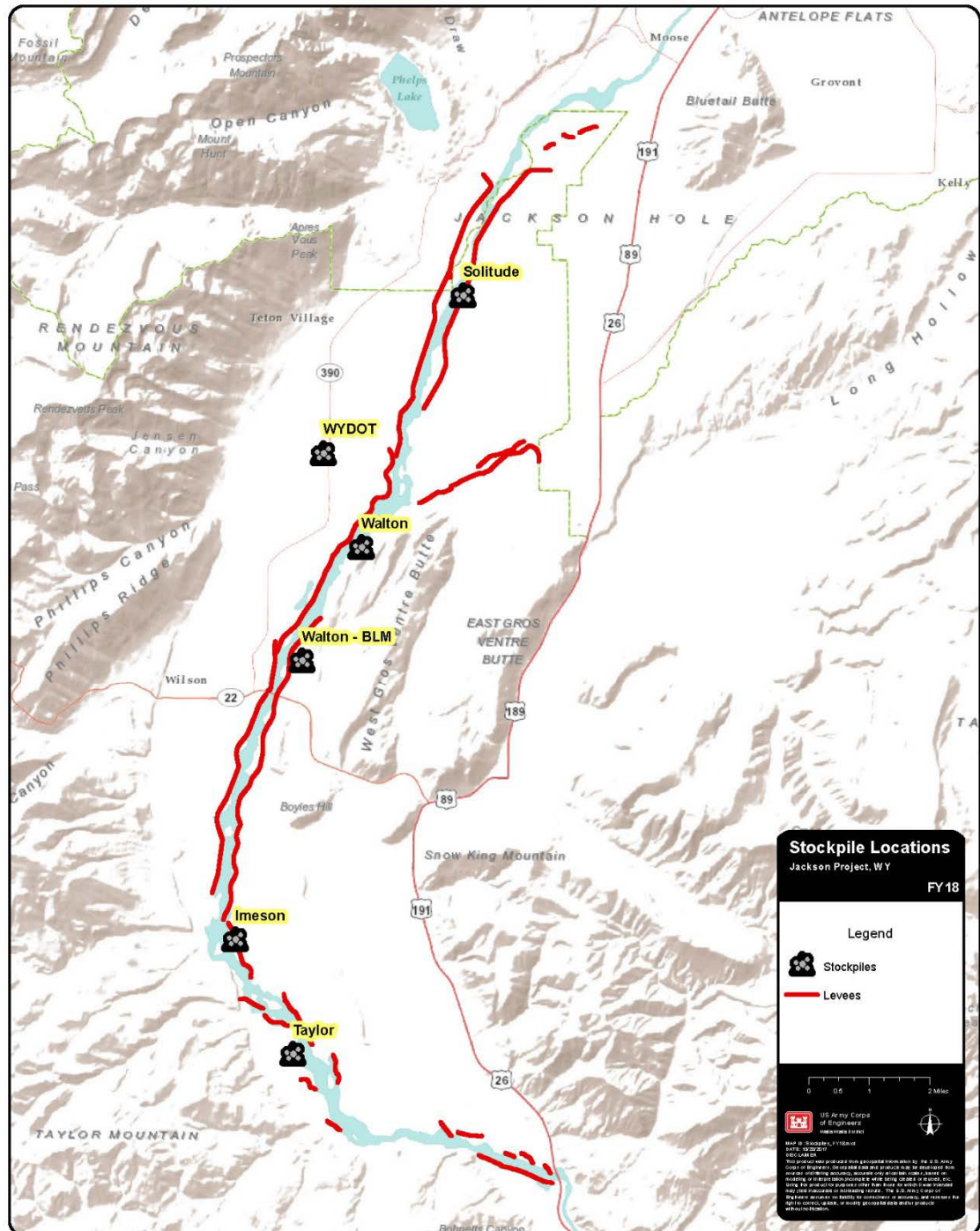
Riprap and backfill material for levee repairs are transported from an off-site commercial quarry to the designated stockpile sites or directly to the repair sites on the levees. Because the local rock is deficient, contractors haul in suitable rock from sources up to 200 miles away. Rock is typically hauled in dump trucks with pup trailers or in side-dump trucks. During rock hauling operations, the Corps may haul about 10 loads per day of large rock (e.g. riprap) and about 20 loads per day of smaller rock (e.g. rockfill). The Corps' levee repair contractor may make about 25 trips per day to haul material from the stockpile sites to the work sites. Hauling operations from the stockpiles typically take place starting about mid-May when emergency repairs begin during spring runoff. Hauling rock from the quarries or rock sources to the stockpile sites typically takes place from mid-August to the end of the regular work season in November or December, depending on the weather.

There are five designated stockpile sites used to store and supply rock and rockfill to the levees (Figure 2-1). Four are adjacent to the levees and one is at the Wyoming Department of Transportation site adjacent to Highway 390 about four miles north of Wilson. Two of the sites are upstream of the Wilson Bridge, two are downstream of the bridge.

The current Walton site is in the planning stages to be moved closer to the Wilson Bridge downstream from its current location. The land under the current site has been sold and Teton County no longer has an easement for use of the site. The county plans to develop a stockpile site to replace the Walton Quarry site after the 2017 construction season. The county has applied for a stockpile facility right-of-way from the Bureau of Land Management for a site on the left bank of the Snake River about two miles downstream of the current site. The site meets the Corps criteria of being a previously disturbed site on the landward side of the levees and near existing road access. The new site should be ready for use in 2018.

Each stockpile site is typically one to two acres of previously disturbed area on the landward side of the levees. Maintenance activities on the sites can include grading, replacing gravel on the driving surfaces, dust control, and weed control.

*Jackson Hole Flood Protection Project  
Supplemental Environmental Assessment*

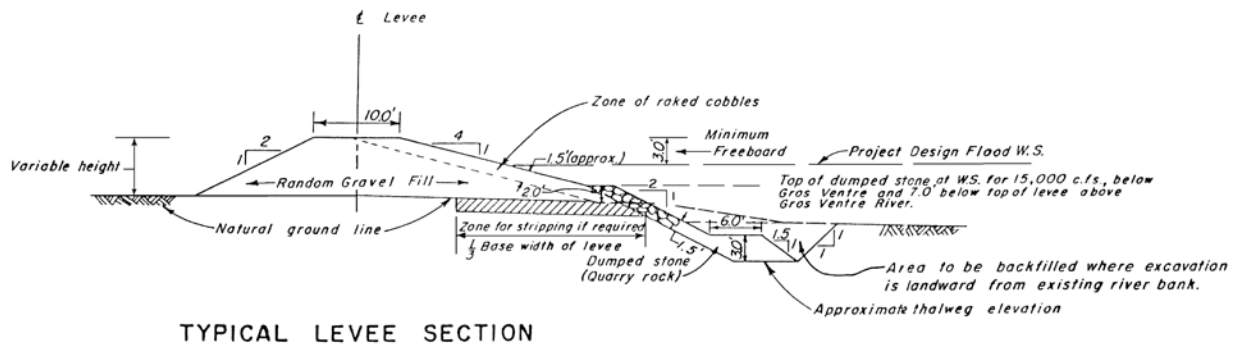


**Figure 2-1. Rock stockpile sites. (Walton will be replaced by Walton-BLM in 2018.)**

### 2.2.1.5 Levee rehabilitation

Levee rehabilitation takes place later in the year (summer/fall) after flows have decreased, usually between August 1 and November or December. Each year the Corps and Teton County perform a levee inspection to identify damaged sites that need rehabilitation. Rehabilitation includes selective reinforcement or reconstruction of levee sections which have been damaged by flooding or appear susceptible to future failure. The intent of the work is to return the levee to the original design (Figure 2-2). The work can include excavating the toe of the levee and replacing rock, replacing levee fill material, and replacing rock armoring on the surface of the levee. The rock materials are placed using an excavator and are not end-dumped into the work location.

The number of sites varies each year depending on the damage from that year's spring runoff. Levee rehabilitation also includes proactive reconstruction of levee segments to the original standard specifications and on the correct alignment. This reconstruction is typically performed on several levees or levee segments per year, depending on need and suitable weather conditions. The Corps rebuilds about four miles of levee per year. This work typically involves several end-dump or side-dump trucks, a bulldozer, and a tracked excavator equipped with a thumb. Depending on the height of the levee, a bench may need to be cut in the existing levee to permit the tracked backhoe to reach down to the bottom of the levee to replace the levee toe.



**Figure 2-2. Typical Levee Design Cross Section.**

The Corps schedules this routine levee rehabilitation work to avoid adversely affecting nesting bald eagles, which are known to nest in large trees near the levees. The Corps typically obtains the locations of active bald eagle nests from the Wyoming Game and Fish Department in late-March and May. When performing levee rehabilitation within the nesting season of February 1 – August 15, the Corps refrains from working within either of two buffer zones until the young have fledged. These buffer zones are 330 feet from the nest when the nest is not visible from the work area or 660 feet from the nest when the nest is visible from the work area. These zones comply with the criteria in the 2007 U.S. Fish and Wildlife Service National Bald Eagle Management Guidelines and the requirements of the Bald and Golden Eagle Protection

Act. These windows may change over time and other windows may be identified or windows could be reduced or deleted as more information on wildlife behavior and needs becomes available.

#### **2.2.1.6 Debris clearance**

High spring flows often deposit snags near the high water line and along levees as flood levels subside. These snags pose a future threat to portions of the levee system through direct impingement or deflection flow damage during future flood stages. To avoid future localized damage to the levees, snags and other debris are removed periodically in the fall. Equipment involved is a tracked backhoe and a dump truck. This material is hauled off-site and disposed of upland using methods such as chipping, composting, landfilling, or burning.

#### **2.2.1.7 Culvert cleaning**

Culvert cleaning is needed to ensure culverts can adequately pass water to protect the levees and access roads. Culverts may need cleaning to remove sediment after a flood event. Every five years the Corps performs cleaning and video inspection of the culverts as required by Corps standards. The most recent cleaning and inspection occurred in 2015. Cleaning can involve using a backhoe to remove sediment and vegetation from the culvert inlet and outlet, “vacuuming out” material inside the culvert, and using high-pressure hydraulic jetting to remove the remaining debris within the culvert. The Corps can then use a video camera or other appropriate method to inspect the interior of the culvert.

If necessary, the Corps removes vegetation within 20 feet of either end of the culvert and for a distance of 10 feet down the flowline. The sediment and vegetative material removed is disposed of upland in a legal manner. If water is flowing through the culverts during the work period, the Corps constructs temporary cofferdams to minimize turbidity. Water from within the cofferdam is pumped to the inland slope of the levee where it percolates into the ground.

There are three types of culverts in the JHFPP:

1) Return flow/drainage culverts – During a flood event, water typically rises on the landward side of the levees due to seepage and rainfall. These culverts are present at strategic locations in the levees to allow that water to flow through the levees and back to the river as the water recedes rather than allowing water pressure to build up and erode the levees from behind. These culverts also allow water to drain from the land side in the event of a levee failure. The project has 14 of these culverts, primarily in the Federal levees. These culverts are the responsibility of the Corps.

2) Irrigation culverts – These culverts are designed to control and pass water for farming or water supply purposes. There are 22 such culverts or systems of culverts in the JHFPP. All of these have lift gates, typically on the river side. Most of these are located to allow permitted diversions of water from the Snake River, but some are

located to allow excess water from the diversions to return to the Snake or Gros Ventre Rivers. The culvert structures through the levees are the responsibility of the Corps while the lift gates are the responsibility of the Corps and/or the water appropriators. There are typically diversion structures constructed or maintained annually by the water appropriator(s) to ensure water can flow to the culvert.

3) Access road culverts – These culverts are placed to ensure access roads do not impound water. There are 29 culverts or systems of such culverts located on the levee access roads of the JHFPP. Maintenance of these culverts is a shared responsibility between the Corps and the landowners. These culverts are not video inspected.

### **2.2.1.8 Vegetation removal**

The Corps performs vegetation control and removal activities on the levees annually as vegetation impairs the Corps' ability to visually inspect the levees and can damage the levees. Vegetation removal can be done as part of other O&M activities such as levee rehabilitation or culvert cleaning, or as a separate action. The Corps' Federal levee standards require the levee crown to be free of vegetation to allow for inspection for damage. The standards also require removal of woody vegetation from the levee surface as the roots can create a pathway for water to seep into the levee (piping), creating a weak spot that can lead to levee failure during a flood event. Large trees on the levee can be toppled by high waters and can create a hole in the levee as the root wad pulls out rock from the levee surface and core.

The Corps uses both mechanical and chemical methods to control vegetation. All access is from the top of the levee. Mechanical methods involve using a backhoe or excavator to pull the woody vegetation, including the roots, from the levee. Larger trees may require pulling some of the fill material away from the base of the tree, then pulling the tree over before pulling it out. Large roots are dug up until the root diameter is no more than ½ inch. The holes are then backfilled with graded fill material or riprap.

Chemical methods to control vegetation involve spraying herbicide on weeds and woody vegetation (trees less than six feet tall and shrubs). The Corps follows its Integrated Pest Management Plan when determining which herbicides to use and how to apply them. Once the woody vegetation has died, it is cut off at the base. The Corps targets shrubs and smaller trees for spraying as the roots are small enough to not pose a threat to the levees and therefore do not need to be removed from the levees. All woody vegetation removed from the levee using either method is hauled off-site for appropriate disposal. The vegetation may be chipped on-site prior to being hauled away for disposal.

Although the Corps' policy under ETL 1100-2-583 generally requires the levee prism be free of woody vegetation as well as a clear zone of 15 feet on each side of the levee extending from the toe outward, the Corps has been unable to comply with this requirement. Because of budgetary constraints, the Corps has been removing woody vegetation from the levee prisms on the waterward side as most critical to levee

function, but the Corps has been removing woody vegetation on the landward side from only within about 10 feet of the levee crown. This is done to provide safe driving conditions on the levees. The Corps has not been removing large trees on the landward side of the levees beyond 10 feet of the crown. The Corps has also not been removing woody vegetation from the 15-foot clear zone on either side of the levees. As stated in Section 1.3, the Corps has not been fully complying with the ETL because of funding levels and prioritization of O&M activities.

The Corps schedules and conducts vegetation removal to avoid adversely affecting nesting migratory birds. The Corps generally refrains from spraying or removing woody vegetation from the levees during the migratory bird nesting season of April 1 - August 1. If the Corps determines it is necessary to start woody vegetation removal earlier than August 1 to complete O&M activities, the Corps performs a bird nest survey several days before vegetation removal is scheduled to begin. If the Corps finds an active bird nest, it establishes a no-work buffer zone around the nest and waits until the nest is no longer being used (either because of nest failure or the nestlings have fledged) before removing the vegetation from within the zone.

The buffer zone is either a 50-foot radius around areas where birds are believed to be nesting but the exact nest site is not determined, or a 15-foot radius around known nest sites. The buffer zone distance for raptor nests (except bald eagles) is 150 feet from the nest. The use of these buffer zones is consistent with the July 2006 *Memorandum of Understanding (MOU) between the U.S. Department of Defense and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds*. Pending guidance from HQ-USACE on the requirements of the Migratory Bird Treaty Act could reduce the size of (or need for) the buffers described above for nesting migratory birds.

#### **2.2.1.9 Access road maintenance**

Access roads are repaired or maintained on an as-needed basis, subject to funding and prioritization of O&M activities. The Corps typically performs maintenance on about 3 miles of road per year. Access roads connecting the public roads to the levee system are periodically plowed, graded, graveled, and repaired to assure equipment and materials can reach the levees without difficulty. This work involves two or three dump trucks, a road grader, and possibly a vibratory roller for compaction.

#### **2.2.2 Alternative 2 – Updated O&M Practices (Proposed Action)**

Under Alternative 2, Updated O&M Practices, the Corps would continue its program of performing O&M of the JHFPP as described under Alternative 1 above, but would update the O&M program to address changes in equipment, comply with applicable maintenance regulations, and incorporate consideration of environmental conditions since the Corps assumed responsibility for the O&M of the levee system. Appendix A identifies the impact minimization measures and best management practices the Corps would follow when performing O&M activities under this alternative.

The sections below describe how the Corps would perform the nine types of O&M activities under Alternative 2.

**2.2.2.1 Spring snow removal**

Spring snow removal under Alternative 2 would be the same as for Alternative 1.

**2.2.2.2 Spring levee patrols**

Spring levee patrols under Alternative 2 would be the same as for Alternative 1.

**2.2.2.3 Emergency actions (Flood-fighting)**

Flood-fighting and emergency repairs under Alternative 2 would be the same as for Alternative 1.

**2.2.2.4 Rock and fill material stockpiling**

Rock and fill material stockpiling activities under Alternative 2 would be the same as for Alternative 1, except that under Alternative 2 hauling material to the stockpiling sites would start as early as mid-July instead of mid-August, and additional stockpile sites may be developed and used. Hauling material to the stockpiling sites in mid-July would allow materials to be on-site at the same time levee repairs and rehabilitation would be starting. This would improve the ability of the Corps to complete repairs before the end of the construction season.

Although the Corps does not have any plans at this time to develop additional stockpile sites, the Corps may decide in the future that additional sites are needed. If the Corps was to develop new sites, they would likely follow criteria similar to that used to establish the current sites. The Corps would look for previously disturbed locations on the landward side of the levees. The sites would need to be several acres in size to allow sufficient room to store rock material and possible debris and to allow large vehicles to maneuver. The sites would need to have sufficient access or potential access to the major highways and the levee system.

If the sites are outside of the existing levee easements, the Corps would request Teton County to acquire the use of the additional land. Site development could include vegetation/tree removal, soil disturbance for site clearing and leveling, and gravel placement on driving surfaces. It may also include establishing an access road to connect to the levee or the highways. Access road development could also include vegetation/tree removal, grading, and gravel placement. If the Corps could not avoid affecting wetlands, the Corps would minimize the wetland disturbance and perform any mitigation required by law or regulation.

Under Alternative 2 the Corps may obtain some of its rockfill (gravel) from the environmental restoration activities the Corps proposed in its *Jackson Hole, Wyoming Environmental Restoration Feasibility Study and Environmental Assessment* (Corps et al. 2000). Some of the restoration features the Corps is proposing would involve

removing gravel from the river, possibly reusing some of the gravel, and using upland disposal for the remainder. For Alternative 2 of this SEA, the Corps is proposing to use some of that excess gravel for O&M activities rather than disposing of it. The Corps would use the O&M stockpile sites to store this excess gravel.

#### **2.2.2.5 Levee rehabilitation**

Levee rehabilitation under Alternative 2 would be the same as for Alternative 1, but with the consideration of modification options such as re-establishing the designed 2:1 slope and adding in-water structures, or flattening the slope of the waterward side of the levees to protect the levees from damage such as erosion or undercutting of the toe. Levee rehabilitation would also employ an earlier start date, as discussed below.

For the first modification option, the Corps would re-establish the designed 2:1 slope of the levee, then add structures to the toe to help maintain that slope. An example of such structures would be one or more rock barbs or weirs along the toe of the levee upstream of the area to be protected. These barbs or weirs would help push the water back towards the center of the river and away from the levee. This would encourage the flow to remain in the river channel and reduce water velocities near the toe of the levee to prevent undercutting. These structures would not change the level of flood risk management provided by the levees.

The structures (rock barbs) could be about 20 to 40 feet long and angled upriver from the levee (Figure 2-3). They would likely be constructed by using an excavator to prepare the river bed and place large rock. Any structure added to protect the levees would need regular maintenance such as replacing rock or restoring the alignment. This maintenance would be performed in a similar manner as the levee rehabilitation. The maintenance would be subject to the same biological work windows as described for Alternative 1.

Flattening the levee slope is a structural option that could involve placing additional rock in the river to extend the toe of the levee further out into the river, then placing additional rip rap on the levee and the extended toe. The additional rock would be placed so the resulting slope is a flatter 2.5:1 2.5:1 or 3% instead of the current design of 2:1. The work may be performed by an excavator stationed on the levee. The Corps may need to trench into the levee to create a work platform for the excavator so it can reach the river bottom. As with the rock structures, the new levee slope would need regular maintenance and would be subject to the same biological work windows as for Alternative 1.



**Figure 2-3. Conceptual drawing of bank barbs. River flow is from top to bottom.**

Under Alternative 2, levee rehabilitation work could start as early as July 1 instead of August 1. This would allow the Corps more time to perform the levee rehabilitation work. If the Corps determined it needed to start work on July 1 that year and the work had the potential to disturb or destroy nests or nestlings of birds protected by the MBTA, the Corps would follow the steps as described in Section 2.2.1.8 Vegetation Removal and in Appendix A. The Corps would perform a nest survey of the work area and leave a buffer zone around any active nests until the birds have fledged or the nests have failed. Pending guidance from HQ-USACE on the requirements of the Migratory Bird Treaty Act could reduce the size of (or need for) the buffers described above for nesting migratory birds. The Corps would also leave an applicable buffer zone around any active bald eagle nests as described in Section 2.2.1.5 Levee Rehabilitation and in Appendix A.

If the Corps determined it was not necessary to start work before August 1 that year, no nest surveys would be needed. This is because data from nesting surveys of the levees conducted by the Corps in 2014-2016 has shown nestlings appear to have fledged as early as July 15 and are definitely out of the nest by August 1. If the Corps performs two more years of nest surveys because it needs to start levee rehabilitation

work needs before August 1 in those years, and those surveys continue to show nestlings have fledged by July 15, the Corps proposes to start work in future years on July 15 without having to conduct additional nesting surveys.

Further, consideration of new in-water structures may trigger a requirement to coordinate with the USFWS under the Fish and Wildlife Coordination Act (FWCA).

#### **2.2.2.6 Debris clearance**

Debris clearance under Alternative 2 would be the same as for Alternative 1.

#### **2.2.2.7 Culvert cleaning**

Culvert cleaning under Alternative 2 would be the same as for Alternative 1, however, under Alternative 2 the Corps would clear woody vegetation from a larger footprint around the culverts and would perform repair, rehabilitation, and replacement of the culverts in addition to the cleaning and inspection. Under this alternative the Corps would clear woody vegetation from an area extending up to 50 feet from the culvert both upstream and downstream, and extending up to 15 feet outward from both the waterward and landward toes of the levee. The intent of clearing this larger footprint is to prevent tree and shrub roots from penetrating the culverts as the 2015 video inspections of the JHFPP culverts revealed that tree roots can penetrate culvert section bands from as far as 50 feet away.

Under this alternative, the Corps would consider actions such as lining the culverts, repairing, or replacing head gates, repairing or replacing headwalls and wingwalls, and replacing culverts. Headwalls and wingwalls are concrete wall-like structures that support and protect the culvert entrance and head gates. Head gates control the entrance or exit of water from the culverts.

The Corps may repair culverts that have not totally failed. One method that may be used is slip lining. This involves inserting a smaller diameter liner “pipe” into the existing corrugated metal pipe culvert using a backhoe, come-a-longs, and chains. Liner piping is commonly made of high density polyethylene (HDPE). The liner pipe would be in sections that are snapped together to form a liner for the entire length of the culvert. As each section of liner pipe is snapped together, a backhoe would push the liner into the culvert until the culvert is completely lined. Once the liner is in place, the ends would be sealed and the space between the liner and the culvert would be backfilled with grout, a thin mortar used for filling spaces.

Slip lining does not require excavation. It works well in areas where conventional trenching would have an unacceptable effect on vehicular movement on the roadway above the culvert. Slip lining is also useful when the culvert is far enough below the levee surface that significant excavation would be required to replace the culvert.

The Corps would also repair or replace the head gates and/or headwalls on the culverts. Some of the head gates are hinged and open or close when water presses

against them (Figure 2-4). Others are opened or closed by manually turning a screw to raise or lower the gate (Figure 2-5). Some gates that are not functioning properly may be repaired by lubricating the hinges. Other gates that are not sealing or cannot be fully opened or closed would likely be replaced. In some cases just the gate would be removed and a new gate installed in its place. For other gates, the concrete headwall would also need to be replaced.

Equipment used to perform these actions could include a backhoe or excavator, dump truck, and cement truck. Replacement of either the head gates or headwalls could require using a backhoe or excavator to lift the old gate and lower the new gate. The same equipment could be used to remove the old concrete wall and clear debris and sediment from the worksite. The dump truck would haul the debris to an appropriate disposal site. Measures such as using sandbags or concrete jersey barriers would be taken to isolate the work area from the river to prevent turbidity from entering the water. Forms for the new concrete headwall would be constructed and concrete would be placed to form the new headwall. This activity would take place in summer or fall when flows in the rivers are low and the temperature is mild.



**Figure 2-4. Flapper-type head gate on drainage culvert.**



**Figure 2-5. Manually operated head gates on an irrigation intake culvert.**

The Corps may also replace culverts that are failing and cannot be repaired. These culverts would usually be replaced following the same alignment, or they may be realigned to improve water passage or to reduce sedimentation. The Corps does not anticipate relocating irrigation culverts as that would require relocating at least part of the associated irrigation ditch.

Culvert replacement could be in-kind or through consolidation of multiple pipes. Drainage culverts in the JHFPP have only one pipe and would likely be replaced with a single pipe. Irrigation culverts in the JHFPP have multiple pipes. Replacing these culverts could include replacement in kind, or replacing multiple smaller pipes with one or two larger pipes. Factors influencing which approach to use include site-specific hydraulic analysis, ability to pass the needed flows, depth of cover over the pipes having adequate bearing capacity, safety concerns, and cost. Culvert replacement would involve excavating through the levee with a backhoe or excavator to uncover and remove the old pipe, preparing the trench, placing the new pipe in the trench, and backfilling the trench with graded fill material and riprap. A new headwall would be constructed and new head gates installed. As with culvert cleaning, measures would be implemented to isolate the work area to prevent turbidity in the rivers.

Culvert repair and replacement would probably take place in late summer or fall when Snake River flows are low and the temperatures are relatively mild.

#### **2.2.2.8 Vegetation removal**

Vegetation removal and disposal under Alternative 2 would be similar to Alternative 1, but would also include removal of vegetation from the entire landward side of the levee prism and the 15-foot clear zone extending outward from the toe on both sides of the levees. If the 15-foot clear zone would extend beyond the easement boundary, the Corps would remove trees and shrubs only to the easement boundary. This woody vegetation removal would be in full compliance with the Corps' levee standard described in ETL 1110-2-583. The Corps anticipates being able to reach all of the affected vegetation with an excavator stationed on the levee. The Corps would remove all woody vegetation from these areas using the same mechanical methods as for Alternative 1. The Corps would backfill the holes on the levee with suitable levee graded fill material and riprap, and may choose to bring in rock or soil to backfill the remaining hole in the clear zone. The Corps may choose to use the bucket of the excavator to push any lifted soil back into the hole when working in the clear zone.

Some of the trees and shrubs in the clear zone may be located in either wetlands regulated under the Clean Water Act (CWA) ["WOTUS (waters of the United States) wetlands"] or wetlands that are not regulated under the CWA ("non-WOTUS wetlands), which are still protected under EO 11990. If the Corps affects the functions and values of either wetland type, or elects to push any lifted soil back into the hole when removing the woody vegetation from wetlands or backfill holes generated from vegetation removal, the Corps would avoid or minimize the potential effects to any wetland and perform mitigation (if required) to offset the effects on WOTUS wetlands (See Appendix A).

Under Alternative 2, vegetation removal work could start as early as July 1 instead of August 1 as described under Alternative 1. This would allow the Corps more time to perform the work if the Corps determined more time was necessary. As described in Section 2.2.2.5 Levee Rehabilitation, if the Corps determined it needed to start vegetation removal before August 1 and the work has the potential to result in take of active migratory bird nests, the Corps would perform a nest survey of the work area and leave a buffer zone around any active nests until the birds have fledged. If the Corps decided it was unnecessary to start work that year before August 1, no nest surveys would be needed as data from nesting surveys of the levees conducted by the Corps in 2014-2016 has shown nestlings appear have fledged as early as July 15 and have definitely left the nest by August 1. If the Corps performs two more years of nest surveys and these surveys show nestlings have fledged by July 15, the Corps proposes to start work as early as July 15 without conducting additional nesting surveys.

If the action could result in take under the BGEPA (disturbance or destruction of an eagle nest, active or not), the Corps would coordinate take avoidance measures with the USFWS, or if the action is unavoidable, then seek appropriate permitting under the Act.

#### **2.2.2.9 Access road maintenance**

Access road maintenance under Alternative 2 would be the same as under Alternative 1, but with expanded or additional turnarounds. These turnarounds could be located on either side of the levee, but would usually be located on the landward side. For expanded turnarounds, the Corps would lengthen the existing turnaround perpendicular to the levee to allow large trucks and trucks with pup trailers to back into a turnaround area to make a three-point turn. For additional turnarounds, the Corps would attempt to locate previously disturbed areas within the easement boundary. If the extension or the additional turnaround would go beyond the easement boundary, the Corps would request Teton County obtain access to the additional land. The Corps would then clear vegetation from the site, bring in fill material as needed, grade the site, and add gravel for a driving surface.

The Corps would avoid wetlands if possible. If wetlands could not be avoided, the Corps would minimize the wetland disturbance and perform appropriate mitigation as required under CWA, EO 11990, or other applicable regulation (Appendix A).

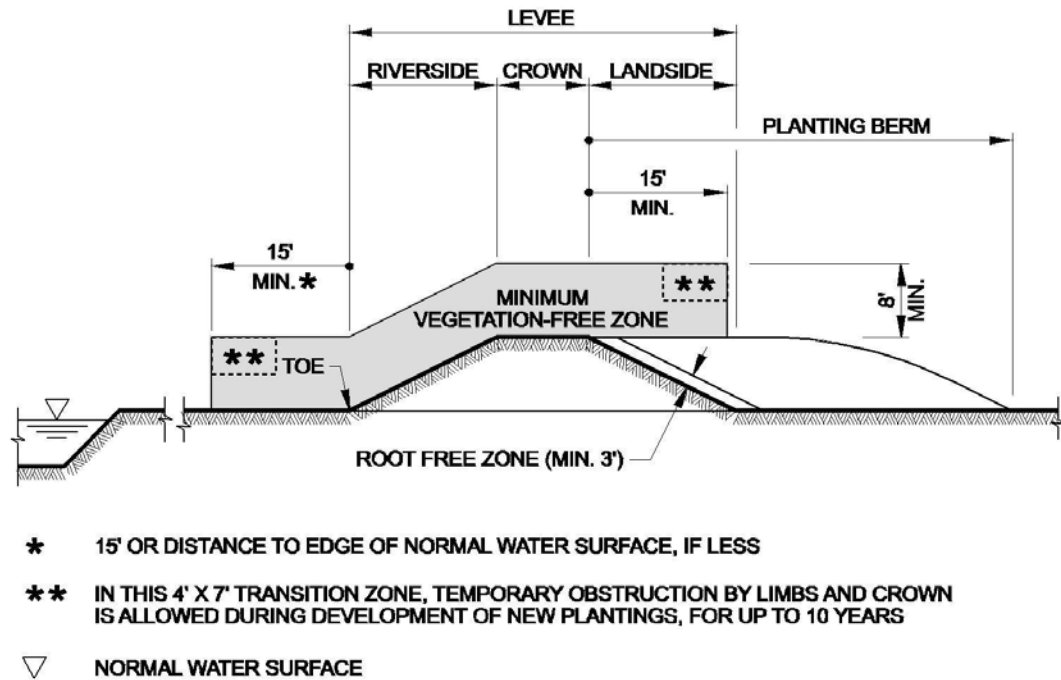
#### **2.2.3 Alternative 3 - Modification of Project with Future O&M (O&M similar to Alternative 2 but with reconfiguration, modification, relocation, or addition of levees).**

Under Alternative 3, Modification of the Project, the Corps would reconfigure the JHFPP levees. As part of this alternative, the Corps would increase or decrease the height, width, and/or length of one or more of the existing levees to change the level of flood risk management. The Corps would also construct setback levees to replace one or more of the existing levees. The use of setback levees would allow the rivers to have access to more of the historic floodplain. The Corps may also construct additional levees to improve or expand flood risk management in the Jackson Hole area. Under this alternative, these reconfiguration and construction actions may be considered if the Corps determines the need, benefits, and costs are justified. Future O&M of the modified project would be similar to O&M described under Alternative 2 once reconstructed.

#### **2.2.4 Alternative 4 - Updated O&M Practices with Variance Allowing for Increased Levee Vegetation (same as Alternative 2 but with a variance to allow some woody vegetation to remain on levees)**

Under Alternative 4, the Corps would update the O&M program of the JHFPP as described for Alternative 2 except for the O&M activity of Vegetation Removal. Under Alternative 4 the Corps would request a vegetation variance to allow existing woody vegetation to remain on levees, mostly in the 15-foot clear zone on the landward side of the levees, particularly if the levees have been overbuilt. This is very similar to Alternative 2, except that in considering a variance, the Corps would seek to retain some existing vegetation instead of replanting once the O&M is in compliance with the ETL. In general this would be less intrusive and less aesthetically impactful. Levees

are considered overbuilt when extra rock and/or soil has been placed over the levee prism (Figure 2-6).



**Figure 2-6. Levee section with planting berm.**

ETL 1110-2-583 allows use of this overbuilt area as a planting berm for herbaceous and woody vegetation as long as the roots do not penetrate a zone at least three feet deep over the levee surface. In certain instances, to preserve, protect, and enhance natural resources, and/or protect the right(s) of Native Americans, pursuant to treaty and statute, a variance may be granted. The Walla Walla District is in the process of evaluating whether HQ-USACE would approve a levee vegetation variance (under the ETL) that would allow vegetation in the 15-foot clear zone on the landward side of the levees to remain.

The removal of a narrow band of this woody vegetation from the levee clear zone would result in a minor reduction in the amount of this habitat that currently exists in the area, but indirectly contribute to the overall reduction of an increasingly rare and critically important habitat type. The loss of this vegetation could be offset by other actions in the area. For example, the Corps is currently working with Teton County and the Teton Conservation District to develop a path forward for implementing an ecosystem restoration plan for the upper Snake River near Jackson, Wyoming, but such actions are not reasonably certain to occur at this time. The underlying landowners of several levees in the JHFPP already manage their property to protect and preserve the existing vegetation, and meeting the ETL standard may directly conflict with the local land management objectives.

The ETL requires levees to be fully consistent with the requirements of the ETL before a variance can be considered, however circumstances may warrant special consideration here in that the riparian values are important both biologically and aesthetically. The levees already have large woody vegetation on them, so they do not currently meet the requirements in the ETL for vegetation. The existing vegetation is mature and likely has roots that may already have penetrated the root free zone. However, some areas may be overbuilt and suitable to meet the intent of a variance. The ETL does not allow a variance to be a substitute for poor maintenance practices, but does include full consideration of protection and preservation of natural resource values.

Under this alternative, the Corps would not spray or remove woody vegetation from the landward side clear zone as long as the roots did not grow into the root free zone on the top of the levee surface. Vegetation with invasive roots would be removed.

## **2.3 SCREENING OF ALTERNATIVES**

The Corps identified screening criteria to determine which alternative to consider further. These criteria are:

- Must allow for continued O&M of the JHFPP at the same level of flood risk management (FRM) as provided by the levee system at the time the Corps assumed O&M, under WRDA 86
- Must be consistent with WRDA 86 and the LCA (not involve expansion of the existing levee system or construction of new levees)
- Must comply with applicable Corps regulations and guidance, including ETL 1110-2-583
- Must be technically feasible
- Must be environmentally acceptable

Table 2-1 lists the screening criteria and indicates if the four alternatives met the criteria. Discussions of how the alternatives meet the screening criteria are provided below the table.

**Table 2-1. Screening of Alternatives**

<b>Screening Criteria</b>	<b>Alt 1. No Action/No Change</b>	<b>Alt 2. Updated O&amp;M</b>	<b>Alt 3. Modify Project, Future O&amp;M</b>	<b>Alt 4. Updated O&amp;M, Levee Vegetation - Variance</b>
Allows continued O&M under WRDA 86	Yes*	Yes	Yes	Yes

*Jackson Hole Flood Protection Project  
Supplemental Environmental Assessment*

Is consistent with WRDA 86 and the LCA (no new construction of levees)	Yes	Yes	No	Yes
Complies with regulations/guidance	No	Yes	No	Yes (if variance approved)
Technically feasible	Yes	Yes	Yes	Yes
Environmentally acceptable	Yes	Yes	Yes	Yes
Retain for further evaluation	Yes	Yes	No	Yes (locally preferred)

\*Yes means screening criteria met, No means screening criteria not met

Three alternatives were carried forward for further consideration – Alternatives 1, 2, and 4. Alternative 1, the No Action/No Change Alternative, does not fully meet the purpose and need as it does not comply with the levee vegetation removal actions of ETL 1110-2-583, but was carried forward as required by NEPA to set the baseline from which to compare all other alternatives. Alternative 2 meets all of the criteria and was carried forward for further analysis. Alternative 4 would not meet the requirements of a vegetation management under ETL 1110-2-583, unless a vegetation variance was approved. The ETL states a vegetation variance must meet the following criteria:

- The variance must be shown to be necessary, and the only feasible means, to (1) preserve, protect, and enhance natural resources, and/or (2) protect the right(s) of Native Americans, pursuant to treaty and statute.
- The variance must retain (1) safety, structural integrity, and functionality, and (2) accessibility for maintenance, inspection, monitoring, and flood fighting. The term “retain” assumes a pre-variance condition that is fully consistent with the requirements in the ETL.

This alternative meets the screening criteria, if a vegetation variance is approved. As stated above, the Walla Walla District is in the process of evaluating whether HQ-USACE would approve a levee vegetation variance (under the ETL) that would allow vegetation in the 15-foot clear zone on the landward side of the levees to remain. The vegetation variance request, however, will need to document and confirm that the variance is the only feasible means to preserve, protect, and enhance natural

resources, particularly highly reduced wetland (riparian) habitat that supports an important diversity of migratory birds protected under MBTA, and bald eagle nesting protected by the BGEPA. The tree and shrub species that make up the woody vegetation on the levees and within the clear zone are found throughout the Jackson Hole area, but most similar habitats in the Snake River and surrounding basins are significantly reduced, thereby emphasizing the significant value of the remnant functional values in the Jackson area.

The ETL requires levees to be fully consistent with the requirements of the ETL before a variance can be considered, however circumstances may warrant special consideration from HQ-USACE here in that the riparian values present in the zone to be cleared to meet the ETL are important both biologically and aesthetically. The levees already have large woody vegetation (native riparian trees) on them, so they do not currently meet the requirements in the ETL for vegetation. The existing vegetation is mature and likely has roots that may already have penetrated the root free zone. However, some areas may be overbuilt and suitable to meet the intent of a variance. The ETL does not allow a variance to be a substitute for poor maintenance practices, but does include full consideration of protection and preservation of natural resource values.

The Corps, after consideration of potential environmental effects (Section 3); compliance with other applicable environmental laws/regulations (Section 4), and any required coordination, consultation, and public involvement (Section 5) has, subject to additional public comment on this EA, identified Alternative 2, Updated O&M Practices, as its preferred alternative.

Alternative 3 was not carried forward for further consideration as it did not meet the first two screening criteria: maintaining the same level of flood risk management, and not involving expansion of the levee system or construction of new levees. Both of these criteria are derived from the language in WRDA 86, the August 3, 1990 Record of Decision (1990 ROD) for the DD/EIS, and the LCA. Because the Corps assumed O&M responsibilities of the JHFPP pursuant to a specific statute, WRDA 86, the Corps uses the statutory objectives of that statute to guide the development and screening of alternatives. The WRDA 86, with the associated ROD and LCA, only directed the Corps to assume O&M responsibilities of the existing JHFPP, not modify the levees or construct new levees.

Alternative 3 includes provisions to raise or lower the levees, which would not maintain the same level of flood risk management as the levees provided when the Corps assumed O&M responsibilities. The alternative also includes constructing additional levees, which would change (increase) the level of flood risk management and would involve new construction, and thereby violate the screening criteria. Constructing new levees to replace existing levees could maintain the same level of flood risk management, but would violate the criteria for no new construction. New levees are also outside of the scope of this SEA, which is addressing O&M, not changing the way the JHFPP provides flood risk management.

## **SECTION 3 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS**

### **3.1 INTRODUCTION**

This section describes the environmental resource areas the Corps determined are relevant to the three alternatives being considered and evaluates the effects of the alternatives on those resources. The Corps considered, but did not identify, any potential effects to geology and soils or hazardous/toxic materials.

Specific existing resources within the project area were described in detail in the DD/EIS. The following description of the affected environment supplements corresponding text from the original DD/EIS as necessary. In general, material from the DD/EIS concerning resources near the levee system is only summarized or referenced. Some additional material has been provided as needed.

The Corps considered the potential environmental effects of each of the nine types of O&M activities under Alternative 1 (No Action/No Change), Alternative 2 (Updated O&M - Proposed Action) and Alternative 4 (Updated O&M with Vegetation Variance): spring snow removal, spring levee patrols, emergency flood-fighting actions, rock and fill material stockpiling, levee rehabilitation, debris clearance, culvert cleaning, vegetation removal, and access road maintenance.

### **3.2 WATER QUALITY**

#### **3.2.1 Affected Environment**

Water resources potentially affected by the proposed actions include the Snake and Gros Ventre Rivers, spring creeks, and other tributary streams within the leveed reach of the river system as well as several irrigation ditches. Water quality in the Snake River and its tributaries is generally good most of the year. Water temperature in the Snake River at Moose remains cold with summertime temperatures ranging from 55-65 degrees F and fall temperatures dropping into the mid 40's (USGS 2017). Dissolved oxygen levels range from about 7-11 mg/l with higher levels during the colder months and lower levels during the summer months. The pH levels ranges from about 7.9 to 8.8. As discussed in the DD/EIS, turbidity is generally the greatest water quality concern. Turbidity is highest during spring runoff and decreases as flows decrease in the summer. Background turbidity readings taken by the Corps during levee rehabilitation work in August 2017 ranged from 1.89 to 3.97 nephelometric turbidity units (NTU's).

The main stem of the Snake River upstream of Wilson Bridge and any surface water located within the Grand Teton National Park boundary are designated as Class 1, Outstanding Waters by the state of Wyoming. The existing water quality is protected in these waters regardless of the uses supported by the water and no further water quality degradation by point source discharges other than from dams is allowed. The Snake River downstream of Wilson Bridge and the Gros Ventre River outside of the

National Park are designated as Class 2AB. These waters are designated as cold water game fisheries and are known to support game fish populations or spawning and nursery areas at least seasonally. These waters are presumed to have sufficient water quality and quantity to support drinking water supplies and are protected for that use. They are also protected for nongame fisheries, fish consumption, and aquatic life other than fish, recreation, wildlife, industry, agriculture, and scenic value uses.

A query using the EPA's NEPAAssist website on September 11, 2017 (EPA 2017a) did not identify any stream segment listed as impaired or threatened under Section 303(d) of the Clean Water Act for the Jackson Hole area. However, the 2014 Integrated Report from Wyoming DEQ (WDEQ 2016) identified an 11.1 mile reach of Flat Creek, a tributary of the Snake River, as impaired from the confluence with the Snake River upstream to the confluence with Cache Creek at Jackson. The report indicated the impairment is habitat alteration caused by stormwater. Flat Creek enters the Snake River just downstream of the JHFPP and does not affect water quality in the leveed portion of the river.

### **3.2.2 Environmental Effects**

#### **3.2.2.1 Alternative 1 – No Action/No Change**

##### ***Spring snow removal***

Spring snow removal is not likely to have an effect on water quality in the Snake and Gros Ventre Rivers, spring creeks, tributary streams, or wetlands. The access roads and the top of the levees are surfaced with gravel with few fines. Plowing snow from the access roads or the top of the levees may push some of the gravel from the driving surface onto the sides of the roads or levees, but there would be little or no fines carried away as the snow melts.

##### ***Spring levee patrols***

Driving the levees in the spring would not be expected to affect water quality. Vehicles would remain on the existing access roads or the driving surface on the top of the levees and would not be driving through flowing streams.

##### ***Emergency actions (flood fighting)***

Emergency actions (flood fighting) could have an adverse effect on water quality, although the effects would be expected to be insignificant. The emergency placement of rockfill and riprap could create turbidity if the work is occurring on the water side of the levees and below the river level or in wetlands. Because this work would likely be taking place during high flows, the amount of turbidity would not be much greater than that already in the rivers. Any turbidity in the river from the emergency actions would be short-lived as the higher river flows would cause the turbidity to rapidly dissipate. Any turbidity in wetlands would be short-term as emergency actions usually last only for one-

half to two days and the turbidity would settle out soon after the emergency actions were completed.

### ***Rock and fill material stockpiling***

Stockpiling rock and fill material would have no effect or a short-term, insignificant effect on water quality. Trucks delivering the materials would remain on existing roads and the levee crowns and would not drive through any flowing rivers or streams. The material would be placed on the stockpile areas, which are on the landward side of the levees, or on the levees themselves. None of the material would be stockpiled in the rivers or streams. Few fines would be mobilized during a storm event as the Corps requires the rock to be generally clean of fines and requires the rockfill to be a sand/gravel mix that is free of organic matter and soils. Any material temporarily stockpiled on the levees would be placed relatively quickly, reducing the opportunity for storm water runoff. The Corps would follow the storm water pollution prevention plan (SWPPP) prepared for that levee repair action and use appropriate best management practices such as silt fences if material is stockpiled on the levee and a storm is expected.

### ***Levee rehabilitation***

Levee rehabilitation action may have a short-term insignificant effect on water quality. Work on the lower portion of the levee cross-section can include excavation at the toe of the levees to re-establish the toe and the armoring. Part of this work could take place in the river, which could create turbidity. The turbidity would be minimized by not allowing equipment to drive into the river, side channels, or wetlands – only the excavator bucket would be allowed in the water. Turbidity would also be minimized by placing all rock and rockfill with the excavator and not allowing any dumping of material into the water. Any turbidity would be expected to quickly dissipate or settle out. The Corps would also obtain a turbidity waiver from Wyoming Department of Environmental Quality (WDEQ), if required, and perform any necessary turbidity monitoring.

The most recent turbidity monitoring performed by the Corps during the start of the 2017 levee rehabilitation activities had readings of up to 1-2 NTU's over background, which is below the 10 NTU's over background limit stated in the Clean Water Act Section 401 water quality certification issued to the Corps by WDEQ. On one day the readings were 9-11 NTU's over background, however, the Corps had obtained a waiver from WDEQ to allow this temporary increase. The readings returned less than 1 NTU over background the following day.

### ***Debris clearance***

Debris clearing may have a minor and insignificant effect on water quality if the snags or other debris are partially buried in sediment. Removal of this debris may cause a small temporary turbidity plume that would quickly dissipate. The potential for causing turbidity would be small as debris clearance is usually performed in the fall after water levels have receded and the work area would likely be dry.

### ***Culvert cleaning***

Culvert cleaning has the potential to have a minor, short-term effect on water quality by creating turbidity. Culverts can contain accumulated material such as cobbles, sand, and dirt and many culverts have water flowing through them during the cleaning process. Agitation of the accumulated material can result in elevated turbidity in the water in the culvert.

The Corps has been reducing the potential for releasing turbidity into the rivers or streams by implementing turbidity control measures such as constructing temporary cofferdams around the ends of the culvert to contain the turbid water. The Corps then pumps the impounded water to the land side of the levee and allows the water to percolate into the ground. The Corps also performs turbidity monitoring during the cleaning process to ensure state water quality standards are being met. The amount of turbidity entering the water from this action in the future is expected to have an insignificant effect on water quality.

### ***Vegetation removal***

In recent years the Corps has focused primarily on vegetation removal on the levee prism. This vegetation removal has the potential to adversely affect water quality, although the effect would be temporary and insignificant. Mechanical removal of rooted woody vegetation from the levees within the levee prism and along the toe of the levees could create temporary turbidity plumes if the roots are below the water line. A small turbidity plume may be created by pulling out the vegetation, especially if some of the rock around the base of the vegetation has to be pulled back first or the Corps has to dig out the larger roots. These plumes would be expected to dissipate quickly. There may also be a small turbidity plume if the Corps has to backfill the hole left by the roots. This plume would be minimized by the placement of rockfill with few fines. Any turbidity plume would be small and dissipate quickly.

Mechanical removal of woody vegetation from the levee prism would not directly affect water quality, but could create turbidity through storm water runoff. The potential for creating turbidity would be low as the levee materials are coarse and have few fines. The Corps would minimize the potential for storm water runoff by following the applicable SWPPP and implementing measures to prevent storm water runoff.

Chemical vegetation control has the potential to adversely affect water quality when the Corps is spraying adjacent to water as the herbicides could possibly enter the water through drift. If any herbicides did enter the water, the effect would be insignificant as it would be short-lived. The Corps would minimize or avoid any adverse effects on water quality by following its Integrated Pest Management Plan, utilizing appropriate best management practices, using acceptable chemicals, following the manufacturers' directions, and complying with applicable Federal, state, and local laws and requirements. The Corps is currently complying with the requirements of the General Permit for Minor Pesticide Discharges issued by WDEQ. This permit is for

compliance with the Clean Water Act Section 402 National Pollutant Discharge Elimination System (NPDES).

### ***Access road maintenance***

The effects of access road maintenance were addressed in the Jackson Hole Flood Protection, Levee Access Improvements Draft Environmental Assessment (Corps 1994) and were determined to be insignificant. In that document the Corps stated the primary water quality effect would be the potential for increased suspended sediment and turbidity. The increases would most likely be brief and would be confined to a relatively short reach of stream below the source. The surfacing of the dirt roads with gravel has also reduced the potential for any long-term sediment contribution.

#### **3.2.2.2 Alternative 2 – Updated O&M Practices (Proposed Action)**

The effects of spring snow removal, spring levee patrols, emergency flood-fighting actions, and debris clearance under Alternative 2 would have the same effects on water quality under Alternative 1.

### ***Rock and fill material stockpiling***

The effects of rock and fill material stockpiling under Alternative 2 would be the same as for Alternative 1 – there would be no effect or a short-term, insignificant effect on water quality as none of the material would be stockpiled in the rivers, streams, or wetlands. The Corps would also follow any applicable SWPPP and would implement measures to control storm water runoff from stockpiles on the levees.

The construction of additional stockpile sites under Alternative 2 would have no effect on water quality in the rivers as the sites would be located on the landward side of the levees. However, there may be an insignificant effect on water quality in wetlands if wetlands could not be avoided. Construction activities such as vegetation removal, soil disturbance, and placement of fill would likely result in increased turbidity in any affected wetlands. The increase in turbidity would be short-term and the Corps would implement measures to control the amount and spread of the turbid water.

### ***Levee rehabilitation***

Rehabilitation of the existing levees under Alternative 2 would have the same effects on water quality as under Alternative 1. However, adding in-water structures to protect the levees could affect water quality. The construction activities would likely involve excavation, backfilling, and placement of rock in the river bed, which would increase turbidity. Any maintenance activities that involve river bed excavation and/or backfilling or rock placement would also likely create turbidity. Operation of construction and maintenance equipment would also have the potential to affect water quality if any fuel or lubricant leaked into the water. The Corps would implement measures to minimize and/or contain any turbidity or contaminants during construction and O&M activities (see Appendix A).

### ***Culvert cleaning***

Culvert cleaning under Alternative 2 would have the same insignificant effect on water quality as Alternative 1. However, the culvert repair, rehabilitation, and replacement activities under Alternative 2 would present additional avenues for affecting water quality. Any activities that include excavation of the levee or riverbed would likely create turbidity. Operation of construction equipment would also have the potential to affect water quality if any fuel or lubricant leaked into the water. As with levee rehabilitation, the Corps would implement measures to minimize and/or contain any turbidity or contaminants during repair or replacement of the culverts (see Appendix A).

### ***Vegetation removal***

Vegetation removal under Alternative 2 would have the same kind of insignificant effects on water quality as under Alternative 1 as the Corps would continue to use the same mechanical and chemical control methods. However, mechanical vegetation removal under Alternative 2 would affect a larger area than under Alternative 1 as woody vegetation would be removed from the 15 foot clear zones on either side of the levees in addition to the levee prism. The Corps would follow the impact avoidance best management practices listed in Appendix A to minimize any turbidity or chemical drift. The Corps would also follow any applicable SWPPP and the most recent Integrated Pest Management Plan to minimize any effects on water quality, as well as obtaining and complying with any required permits.

### ***Access road maintenance***

Access road maintenance under Alternative 2 would have the same insignificant effect on water quality as Alternative 1. However, Alternative 2 includes the construction of additional turnaround areas, which have the potential for storm water runoff from grading and filling actions during construction. Locating any new turnarounds on the landward side of the levee would minimize the chance for storm water runoff to enter the rivers. The Corps would also use erosion control measures to prevent storm water from entering surface water. The Corps would avoid wetlands when siting the turnarounds and implement measures in any applicable SWPPP to prevent storm water runoff from entering any wetlands.

#### **3.2.2.3      Alternative 4 – Updated O&M Practices (Variance-Locally Preferred)**

Spring snow removal, spring levee patrols, emergency flood-fighting actions, rock and fill material stockpiling, levee rehabilitation, debris clearance, culvert cleaning, and access road maintenance under Alternative 4 would have similar effects on water quality under Alternative 2.

### ***Vegetation removal***

Vegetation removal under Alternative 4 would have less of an effect on water quality than under Alternative 2 as the Corps would continue to use the same

mechanical and chemical control methods, but would leave more vegetation in place on the landward side of the levee, as determined by the details of the variance, if approved. The Corps would follow the impact avoidance best management practices listed in Appendix A to minimize any turbidity or chemical drift. The Corps would also follow any applicable SWPPP and the most recent Integrated Pest Management Plan to minimize any effects on water quality, as well as obtaining and complying with any required permits.

### **3.3 AIR QUALITY**

#### **3.3.1 Affected Environment**

Air quality in Jackson Hole is generally good. As stated in the DD/EIS, this can be attributed to the relatively low population density and the lack of large industrial point sources. A search using the Environmental Protection Agency (EPA) internet-based NEPAAssist tool did not identify any part of the Jackson Hole valley as being a nonattainment area for National Ambient Air Quality Standards (EPA 2017).

#### **3.3.2 Environmental Effects**

##### **3.3.2.1 Alternative 1 – No Action/No Change**

All O&M activities would be expected to have a minor and insignificant effect on air quality in the area. The use of motorized equipment powered by fossil fuels would cause a temporary and localized reduction in air quality from the equipment emissions, but these emissions are not expected to exceed EPA's de minimis threshold levels. Debris and woody vegetation removal have the potential for adversely affecting air quality if the material is burned. However, the debris disposal method being used now is usually chipping rather than burning. If burning was performed, it would need to comply with any state or local permits or restrictions and be done in a location where any smoke would not affect residences or be incompatible land uses.

##### **3.3.2.2 Alternative 2 – Updated O&M Practices (Proposed Action)**

Alternative 2 would have similar insignificant effects on air quality as Alternative 1. None of the updates to the O&M activities would result in a change in the types of or amount of pollutants released into the air.

##### **3.3.2.3 Alternative 4 – Updated O&M Practices (Variance-Locally Preferred)**

Alternative 4 would have similar insignificant effects on air quality as Alternative 2. None of the updates to the O&M activities would result in a change in the types of or amount of pollutants released into the air and with retention of some vegetation, the effects of clearing would be slightly less than Alternatives 1 and 2.

### **3.4 CHANNEL MORPHOLOGY**

#### **3.4.1 Affected Environment**

As stated in the DD/EIS, the major rivers and tributaries of the Jackson Hole floodplain have cut braided channels through glacial outwash plains (Kroger, 1967; USFWS 1988). Braided channels result from a combination of high sediment loads, relatively steep channel gradients, and noncohesive banks. Channel braiding in the Snake River and lower Gros Ventre River is characterized by multiple channel separated by bars (islands). Braided channels are subject to frequent avulsion (channel switching) and later channel migration. These channels are very prone to flooding because of their relatively shallow depth when compared to their width, and because of their characteristically unstable or noncohesive banks. Rapid shifting in the course of the main river channel by avulsion is frequently observed during flooding of the upper Snake River and Gros Ventre River, and is a major source of bank erosion and levee failure (Corps 1987b).

The levee system of the JHFPP was established to minimize flooding, confine lateral channel migration, and prevent bank, channel, and floodplain erosion. A levee alignment design incorporating sweeping curves was adopted to minimize impingement and bank erosion. The levees confine flood waters to a narrow but relatively deep cross-sectional area and improve movement of sediment load.

Levee impingement and consequent levee erosion in the Snake and Gros Ventre Rivers are primarily caused by high velocity lateral currents in secondary channels, and can be caused by high velocities caused by debris adjacent to levees. Levee impingement cannot be avoided at lower and intermediate flows due to channel braiding and avulsion (Corps, no date). Levee damage occurs when the toe is undermined by high velocity currents, and through erosion at impingement locations. Most levee damage in the Snake and Gros Ventre Rivers occurs during peak flow recession when debris and gravel bar formation clogs the main channel, resulting in channel avulsion.

The levees are set close together to reduce channel aggradation. However, localized aggradation (deposition of sediment by a river or stream) and degradation (scouring or erosion of a riverbed) of the river channel have occurred during periods of avulsion, when gravels are deposited in the main channel of the river (Haible 1976). Local scour and fill was observed adjacent to woody debris deposited after a major flood in 1986. While degradation tends to increase channel capacity overall, woody debris concentrations have constricted channel capacity at some locations along both the Snake and Gros Ventre Rivers in the past.

Development of the JHFPP has encouraged the development of a single river channel, though presently observed degradation and channel incision (narrow erosion of the river channel) may also be attributed to decreased delivery of bedload to the river. Formation of a single channel and consequent channel incision has led to concentration of flood energy, and the improved conveyance of bed materials through the channel. The levee system, however, has confined the active floodplain considerably, thereby

restricting the total area of riparian vegetation found along the river. Existing levees, while providing benefits in terms of flood protection and prevention of land loss due to channel migration, also encourage a less-than-natural floodplain in this reach of the Snake River.

### **3.4.2 Alternative 1 – No Action/No Change**

Alternative 1 would have no or minor, insignificant effects on channel morphology. Spring snow removal, spring levee patrols; rock and fill material stockpiling; and access road maintenance would have no effect on channel morphology. Emergency actions (flood fighting), levee rehabilitation, debris removal, culvert cleaning, and vegetation removal may cause localized inputs of sediment into the Snake and Gros Ventre Rivers, but these sediments would have very insignificant effects on channel morphology. These maintenance activities would be applied on a very localized basis, and would have minor effects on channel morphology.

Emergency actions (flood fighting) and repairs and levee rehabilitation would be expected to increase sediment inputs into the river for a short time period. However, water velocities occurring during flood fights would not allow this sediment to deposit locally in the river.

Debris clearance, which would typically occur in the fall, would constitute a minor disturbance to levees and floodway areas. Limited erosion would be expected to occur around debris clearance areas. Jams and logs that are partially embedded in the substrate are not easily dislodged in floods, and therefore result in local buildup of sediment and steering of flows to either side. Removal of woody debris would alter local flow patterns and bar stability.

Culvert cleaning would allow for movement of bedload and sediments from tributaries into the main river channel. The influence of this sediment on channel pattern is not known due to lack of sediment transport analysis of the main river channel. However, this activity would affect only minor flows, such as irrigation drainage, and therefore would not likely have any noticeable effect within the main channel.

### **3.4.3 Alternative 2 – Updated O&M Practices (Proposed Action)**

Alternative 2 would have the same effects on channel morphology as Alternative 1. Spring snow removal, spring levee patrols; rock and fill material stockpiling; and access road maintenance would have no effect while emergency actions (flood fighting), levee rehabilitation, debris removal, and culvert cleaning would have minor, insignificant effects. The larger footprint of levee rehabilitation, culvert cleaning, and vegetation removal may result in a larger amount of sediment entering the river, but the effects on channel morphology would be local and minor. Adding rock barbs as part of levee rehabilitation would also have a localized effect, but would not significantly change the channel morphology of the Snake River.

### 3.4.4 Alternative 4 – Updated O&M Practices (Variance-Locally Preferred)

Alternative 4 would have the same effects on channel morphology as Alternative 2.

## 3.5 FISH/AQUATIC RESOURCES

### 3.5.1 Affected Environment

#### ***Fish***

The Snake and Gros Ventre Rivers in the Jackson Hole area provide high quality habitat for cold water fish species. As stated in Section 3.2.1 above, the main stem of the Snake River upstream of Wilson Bridge and any surface water located within the Grand Teton National Park boundary are designated as Class 1, Outstanding Waters by the state of Wyoming. The Snake River downstream of Wilson Bridge and the Gros Ventre River outside of the National Park are designated as Class 2AB. The system is also designated as cold water game fisheries and is known to support game fish populations or spawning and nursery areas at least seasonally. The Snake River in the Jackson Hole area is a popular recreational fishing destination.

Many game and non-game fish species are present within the levee system. Game species include the Snake River fine-spotted cutthroat trout (*Oncorhynchus clarki behnkei*), rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), and mountain whitefish (*Prosopium williamsoni*). Non-game fish species include suckers (*castostomidae*), chubs (*cyprinidae*), shiners (*Richardsonius balteatus*), dace, and sculpins (*cottidae*). The cutthroat trout is the most high profile species in the rivers. The rivers provide habitat for all life stages of all of these species except for cutthroat trout, which migrate into the tributary spring creeks to spawn.

#### ***Aquatic Invertebrates***

Insects in the Snake River consist of caddisflies, stoneflies, mayflies, and true flies (dipterans). Caddisflies are expected to be the dominant group throughout the area.

#### ***Aquatic Plants and Algae***

Filamentous algae often cover the bottom of the river. Aquatic macrophytes (non-algal plants) are also present in lower abundance.

### **3.5.2 Environmental Effects**

#### **3.5.2.1 Alternative 1 – No Action/No Change**

The O&M activities under Alternative 1 would have minor, insignificant effects on fish, aquatic invertebrates, aquatic plants, or other aquatic resources within the levee system. Those actions that are not associated with water (spring snow removal, spring levee patrols, and access road maintenance) would have no effect on the aquatic environment. Those actions that may require in-water work or experience storm water runoff (emergency flood-fighting actions, rock and fill material stockpiling, levee rehabilitation, debris removal, culvert cleaning, and vegetation removal), would most likely affect aquatic resources primarily in the form of short term turbidity. The turbidity is not expected to have a significant effect on aquatic resources as any plume would dissipate quickly.

Except during emergency flood-fighting actions, the Corps would continue to minimize turbidity through actions such as turbidity monitoring during levee rehabilitation activities or installing coffer dams to contain turbidity during culvert cleaning. Turbidity during emergency flood fighting actions is already high due natural high water erosion. The additional turbidity caused by emergency actions would not be expected to significantly increase turbidity in the water.

Debris clearing and vegetation removal, including that associated with levee rehabilitation or culvert cleaning, would remove woody vegetation from the river or river bank. This could lead to a localized reduction in cover, invertebrate habitat, the availability of invertebrates for forage, and nutrient cycling. The amount of woody debris to be removed would not be sufficient to significantly affect the system.

Removal of vegetation from the levees would also have an insignificant effect on the system. Although the removal of the vegetation may result in the loss of cover or nutrients (leaves or insects falling into the river or wetlands), the amount of woody vegetation to be removed makes up only a small portion of the woody vegetation adjacent to the riverbank and wetlands in this reach of the river. Long segments of many of the levees are far enough away from the river that vegetation removal would not reduce the amount of vegetation near the water.

None of the O&M activities would prevent cutthroat trout from entering spring creeks to spawn.

#### **3.5.2.2 Alternative 2 – Updated O&M Practices (Proposed Action)**

Alternative 2 would have the same insignificant effects on fish and aquatic resources as Alternative 1 with three exceptions. The exceptions would be for levee rehabilitation, culvert cleaning, and vegetation removal.

### ***Levee rehabilitation***

Rock barbs placed in the water could be expected to alter the micro habitat just above and below the barb. Placing the barb at an angle to the levee would reduce the water velocity below the barb and create a pooling effect. Water above the barb would be forced out into the river increasing flow velocity. Some minor scouring could be expected from the increased flows.

Placement of the barbs would include in water work of rock placement that would be expected to increase turbidity during construction. This turbidity could be reduced with the use of turbidity curtains to isolate the site. The turbidity would further be minimized by not allowing equipment to drive into the river, side channels, or wetlands – only the excavator bucket would be allowed in the water. Turbidity would also be minimized by placing all rock, and rock fill with the excavator and not allowing any dumping of material into the water, as well as doing levee rehabilitation during low flow. Any turbidity would be expected to quickly dissipate or settle out.

### ***Culvert cleaning***

Culvert cleaning under Alternative 2 would have the same insignificant effects on fish and aquatic resources as Alternative 1, however, the culvert repair, rehabilitation, and replacement activities under Alternative 2 would present additional avenues for affecting water quality and thereby affecting aquatic life. Removing culverts or significant repair activities that include excavation of the levee or riverbed would likely create turbidity. Operation of construction equipment would also have the potential to affect aquatic life if any fuel or lubricant leaked into the water. As with levee rehabilitation, the Corps would implement measures to minimize and/or contain any turbidity or contaminants during construction or repair of the culverts.

Removing woody vegetation from a larger footprint around the culverts may result in the loss of more cover or nutrients (leaves or insects falling into the river or wetlands) than under Alternative 1, but this loss would be minor as only a narrow band of vegetation would be affected.

### ***Vegetation removal***

Vegetation removal under Alternative 2 would have the same insignificant effect on fish and aquatic resources as Alternative 1. While the footprint within which vegetation removal could occur would be larger under Alternative 2 because vegetation would also be removed from the clear zone, the effects would be the same - a loss of cover and nutrients. As under Alternative 1, the amount of woody vegetation to be removed would make up only a small portion of the woody vegetation adjacent to the riverbank and wetlands in this reach of the river.

#### **3.5.2.3 Alternative 4 – Updated O&M Practices (Variance-Locally Preferred)**

Alternative 4 would have the same insignificant effects on fish and aquatic resources as Alternative 2 with the exception of vegetation removal.

## ***Vegetation removal***

Vegetation removal under Alternative 4 would have less effect than Alternative 2 on fish and aquatic resources, particularly to cover and nutrients.

### **3.6 WETLANDS**

#### **3.6.1 Affected Environment**

The footprint of the JHFPP (the land within the easement along each of the levees) encompasses wetlands on either side of the levees. The 1990 EIS identified significant environmental effects to wetlands resulting from the collective original construction of Federal and non-Federal levees. The Subsequent Record of Decision committed to study (separately) whether or not it was feasible to mitigate for these effects. The Jackson Hole Ecosystem Restoration Study/Project has identified and determined that several areas where ecosystem restoration could feasibly be performed to offset wetland and riparian impacts. To date limited resources have been available to improve conditions at these restoration sites.

Wetlands are generally classified under the National Wetland Classification System, and can also be regulated wetlands under the CWA. Wetlands on the river side of the levees tends to be transitory as the changing water levels and river flows create and remove wetlands frequently as the river channel moves across the floodplain. These wetlands tend to have plant species common to earlier stages of vegetation succession such as grasses and sedges with willow and alder shrubs and some cottonwood trees.

Wetlands on the landward side of the levees are not subject to the effects of a changing river channel and are more stable. In June 2017, the Corps conducted a survey of the levee easement areas on the landward side of the levees in the JFHPP to determine the distribution and amounts of wetland habitats (under the National Classification System) present, which strongly indicates that some of the areas considered impacted from initial levee construction have recovered and regained at least some functions and values of the original wetlands impacted by levee construction.

The survey did not include wetlands on the river side of the levees because the location and amount of wetlands on that side of the levees can vary from year to year or even seasonally, but wetlands do occur there and must be protected for their functions and values as much as those wetlands identified on the landward side. Wetlands not regulated under the CWA may still be protected under Executive Order 11990 and require avoidance and minimization measures. Effects to wetlands regulated under the CWA may also require compensatory mitigation. Results of the survey are summarized below. A report detailing the wetland survey methods and results is found in Appendix B.

The Corps identified three types of wetlands in the survey that may also be regulated wetlands under the CWA (but have not been formally delineated):

1) palustrine forest/shrub: Wetland area that supports woody vegetation covering 30% or more of the area. This type combines both shrubs (less than 20 feet tall) and trees (greater than 20 feet tall) because of the common interspersed of both vegetative lifeforms within the easement. In the JHFPP common species include narrow leaf cottonwood (*Populus angustifolia*), lodgepole pine (*Pinus contorta*), blue spruce (*Picea pungens*), Engelmann spruce (*Picea engelmannii*), thinleaf alder (*Alnus incana*), and a variety of willow species (*Salix* spp.).

2) palustrine emergent: Wetland area that supports herbaceous, rooted plants covering 30% or more of the area. The vegetation is usually dominated by perennial plants for most of the growing season in most years. At the JHFPP common species include cattail (*Typha latifolia*), sedges (*Carex* spp.), rushes (*Juncus* spp.), horsetail (*Equisetum* spp.), asters (*Aster* spp., *Erigeron* spp.), and ferns (*polypodiales*).

3) aquatic ponds: Wetlands and deepwater habitats dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years. At the JHFPP common species include Rocky Mountain waterlily (*Nuphar polysepalum*), arrowhead (*Sagittaria cuneata*), duckweed (*Lemna* spp.), etc.

Table 3-1 shows the number of acres of each wetland type identified in the survey. The amount of land within the easement on the landward side of the levees is estimated to be about 157 acres. About 10 percent of that land is wetland habitat. While wetlands are distributed throughout the JHFPP, most of the wetland acreage identified in the survey is located along levees in the southern part of the project.

Table 3-1 Acres of Wetlands

Wetland Type	Acres
Palustrine emergent	6.06
Palustrine forest/shrub	4.22
Aquatic pond	5.48
<b>TOTAL</b>	<b>15.76</b>

Many of the wetland areas encountered along the landward side of the levees were the result of historic stream channels, tributary streams, drainage ways, and subsurface flows that had been intersected or cut off by the original levee construction. In other instances, new wetlands communities had been created through alteration of the subsurface flows associated with levee construction or the construction of roads across the floodplain. Water flow would

often be ponded along the levee toes, resulting in the development of wetland features.

Most of the wetlands identified within the levee easements are edges or slivers of much larger wetland habitats extending into the easement from adjacent properties. Many of these adjacent areas are part of the much larger historical floodplain and contain large ponds, channels, and wetland communities that are very large.

The survey found the general wetland quality in terms of ecological functions and values is excellent. The wetland plant communities are dominated by native plants with few invasive species. Due to the linear configuration of the wetlands, conditions are typically a reflection of the adjacent areas containing larger wetland communities. Development is fairly minimal in most areas adjacent to the levee easements with the exception of some livestock operations and residential landscaping. The elimination/reduction of flooding across the historic floodplain has resulted in successional advancement in some wetland areas, primarily palustrine forest/shrub.

### **3.6.2 Environmental Effects**

#### **3.6.2.1 Alternative 1 – No Action/No Change**

Under Alternative 1, spring snow removal, spring levee patrols, rock and fill material stockpiling, debris clearing, and access road maintenance would have no effect on wetlands as none of the activities would take place within wetlands.

Emergency actions (flood-fighting), levee rehabilitation, and culvert cleaning have the potential to affect wetlands by creating turbidity, but the effects are not expected to be significant. Soil disturbance, sediment removal, and placement of rockfill and rock material associated with these O&M activities could create turbidity in adjacent wetlands, but the effect would be minor and temporary. The Corps would implement appropriate best management practices (see Appendix A) to avoid or minimize turbidity. The Corps would monitor turbidity levels, if appropriate and required. For culvert cleaning, the Corps would construct a temporary cofferdam around the work area to contain any turbidity.

Emergency actions (flood-fighting) and levee rehabilitation could involve placement of fill material in a portion of an adjacent wetland, but the effects are not expected to be significant. The Corps would avoid affecting wetlands, if possible, when performing these activities. If wetlands could not be avoided, the Corps would minimize the amount of wetland affected to the extent possible and would mitigate for the effect, if required by law or regulation. The Corps would use a functions and values evaluation, if required, to assist with determining what mitigation would be appropriate.

Vegetation removal, either by itself or as part of levee rehabilitation or culvert cleaning, could also affect wetlands, but the effects are not expected to be significant. Pulling woody vegetation out of wetland areas may create short-lived turbidity plumes,

especially if the Corps has to dig out the larger roots. Removing trees or shrubs would reduce some of the vegetative canopy and expose the wetlands to more solar radiation. This would affect a narrow band of wetland adjacent to the levee. Removing woody vegetation from wetlands would set back succession and convert some forest/shrub wetlands to palustrine-emergent wetlands, but the converted wetland would still perform important wetland functions. Because many of the wetlands within the easement are small parts of a larger wetland, the removal of a narrow band of woody vegetation along the levees would not significantly affect the function of the wetland.

### **3.6.2.2 Alternative 2 – Updated O&M Practices (Proposed Action)**

As under Alternative 1, spring snow removal, spring levee patrols, and debris clearing would have no effect on wetlands under Alternative 2. This is because none of the activities would take place within wetlands.

Emergency actions (flood-fighting) and levee rehabilitation under Alternative 2 would have the same insignificant effects on wetlands as under Alternative 1.

Under Alternative 2, rock fill material stockpiling and access road maintenance could have an effect on wetlands if new stockpile sites, access routes to those new sites, or new turnaround areas were proposed to be constructed in wetlands. The Corps would first consider modifying the site plans to avoid affecting wetland areas, if possible. If wetlands could not be avoided, the Corps would minimize the disturbance to or effect on wetlands and, if required, implement mitigation measures. The overall effect on wetlands would be expected to be minor.

Culvert cleaning under Alternative 2 would have the same types of insignificant effects on wetlands as Alternative 1. However, Alternative 2 includes rehabilitation or replacement of culverts, which would be expected to affect a larger footprint of disturbance than the culvert cleaning and inspection and may create more turbidity. As with the cleaning, the Corps would use a cofferdam to isolate the work area and contain the turbidity. Any disturbance would be short-term and would not significantly affect the function of the wetland.

Vegetation removal under Alternative 2 would have the same types of insignificant effects on wetlands as Alternative 1, but they would occur within a larger footprint. Under Alternative 2, the Corps would be removing vegetation from both sides of the levees instead of just on the water side, and from the clear zones on both sides of the levees. As with Alternative 1, the removal of woody vegetation from wetlands would not change the ability of the wetland to function as a wetland and would remove only a small portion of the canopy from the wetland.

### **3.6.2.3 Alternative 4 – Updated O&M Practices (Variance-Locally Preferred)**

As under Alternatives 1 and 2, spring snow removal, spring levee patrols, and debris clearing would have no effect on wetlands under Alternative 4. This is because none of the activities would take place within wetlands.

Alternative 4 would have the same effects on wetlands for emergency actions (flood fighting), rock and fill material stockpiling, levee rehabilitation, culvert cleaning, and access road maintenance as Alternative 2.

Alternative 4 has the potential to have less of an effect on wetlands from vegetation removal than Alternative 2, depending on the location of the vegetation that would be allowed to remain and whether or not that vegetation was adjacent to wetlands.

### **3.7 VEGETATION**

#### **3.7.1 Affected Environment**

Vegetation in the JHFPP footprint is composed of mixed deciduous/coniferous forests and wetlands. Floodplain forest consists of narrowleaf cottonwood and willow, intermixed with Engelmann spruce and blue spruce. Other plants found on and along the levees include: sweetclover (*Melilotus* spp.), smooth brome (*Bromus inermis*), and assorted weed species. Wetlands occur where the water table is high enough to support hydrophytic (water-loving) plants and include three major types: palustrine scrub-shrub (marshy area with trees and shrubs), palustrine emergent (marshy area with herbaceous or soft-stemmed plants), and aquatic pond (wetland or deepwater area with plants that grow on or below the water). The wetland types are discussed in detail above in section 3.5 Wetlands.

#### **3.7.2 Environmental Effects**

##### **3.7.2.1 Alternative 1 – No Action/No Change**

Under Alternative 1, spring snow removal, spring levee patrol, rock fill material stockpiling, levee rehabilitation, debris clearance, and access road maintenance would have no effect on vegetation.

Emergency actions (flood-fighting) under Alternative 1 could have a localized, insignificant effect on vegetation in the immediate vicinity of the flood-fighting activity or the emergency repair of a levee immediately after a flood. Vegetation could be cut down, pulled out, trampled by emergency workers and equipment, or covered by rock.

Culvert cleaning under Alternative 1 could involve removal of small amounts of vegetation blocking the entrance/exit of the culverts. The vegetation would likely be grasses, herbaceous vegetation, or small shrubs. The removal of this vegetation would have a negligible effect on vegetation communities adjacent to the levees.

Vegetation removal, either by itself or as part of levee rehabilitation, under Alternative 1 would affect the type and amount of vegetation found on and along the levees. All woody vegetation would be removed from the water side of the levee prism and from the upper ten feet of the landward side of the levee prism. Only grasses and herbaceous vegetation would be allowed to grow on these surfaces.

Eventually all trees and shrubs would be removed from the levees, leaving only grasses and herbaceous plants. Where the levees are adjacent to the river, the removal of the woody vegetation would eliminate that cover type from the river bank in that stretch of the river. Where the levees are located in upland areas away from the river, the removal of the vegetation would eliminate that cover type from a relatively narrow band within the forested area. Vegetation removal would have a localized effect and would not affect the Jackson Hole area at the population level for the tree and shrub species.

### **3.7.2.2 Alternative 2 – Updated O&M Practices (Proposed Action)**

As with Alternative 1, spring snow removal, spring levee patrol, rock fill material stockpiling, levee rehabilitation, debris clearance, and access road maintenance under Alternative 2 would have no effect on vegetation. Alternative 2 would also have the same insignificant effects on vegetation as Alternative 1 for emergency flood-fighting actions.

The effects of the other O&M activities on vegetation under Alternative 2 would be greater than under Alternative 1. Culvert cleaning under Alternative 2 would include removal of woody vegetation from a larger footprint around the ends of the culvert, but this would still result in removal of only a small amount of vegetation. Development of additional stockpile sites or turnaround sites may require removal of vegetation, although this would be kept to a minimum. Vegetation removal in compliance with ETL 1100-2-583 would result in the removal of woody vegetation to the full 15 feet clear zone width on both sides of the levees. The removal of this narrow band of vegetation would not significantly decrease the amount of woody vegetation in the Jackson Hole area. This vegetation removal would not be a significant effect, as the vegetation in the local area is robust and not specifically limited by Corps management. However, overall impacts of similar vegetation removal in western states has resulted in a notable decline in available similar habitats. The vegetation may re-establish over time, and would continue to be periodically removed and not be allowed to reach maturity.

### **3.7.2.3 Alternative 4 – Updated O&M Practices (Variance-Locally Preferred)**

As with Alternatives 1 and 2, spring snow removal, spring levee patrol, rock fill material stockpiling, levee rehabilitation, debris clearance, and access road maintenance under Alternative 4 would have no effect on vegetation. Alternative 4 would also have the same insignificant effects on vegetation as Alternatives 1 and 2 for emergency flood-fighting actions and culvert cleaning.

Under Alternative 4, the effects of vegetation removal would be similar to, but reduced from, those of Alternative 2, as key functional, existing riparian habitats would be retained as approved in a variance to the ETL. The degree of effect reduction would depend upon the final approved variance, but any variance would reduce the impacts of vegetation clearing on locally and regionally important habitats that occur along the levees.

## 3.8 WILDLIFE

### 3.8.1 Affected Environment

Various forms of wildlife are generally abundant close to riparian corridors. Many species of mammals, birds, amphibians, and reptiles inhabit riparian corridors during different parts of the year.

#### **Mammals**

The most prominent mammals in the Jackson Hole area are, elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus hemionus*), moose (*Alces americanus*), black bear (*Ursus americanus*), coyote (*Canis latrans*), wolves (*Canis lupus*), mountain lion (*Puma concolor*), and bighorn sheep (*Ovis canadensis*). Bison (*Bison bison*), while associated with the Jackson Hole area most are found north and/or northeast of the project area.

Elk, wolves, moose, and mule deer are the large mammals that would most likely be found in the project area. These species as well as other groups of mammals are discussed below.

Elk: The Jackson Hole area has one of the largest and most known elk populations in North America. The surrounding mountains provide approximately 1,000 square miles of summer range for 15,000 elk. Elk concentrate in the winter, specifically on the National Elk refuge just northeast of Jackson Hole. Elk are in and routinely move through the levee area.

Black Bear: Black bears are found throughout the upper Snake River drainage including the project area. While relatively rare, black bear may be encountered in the project area.

Wolves: While the main wolf populations are primarily in Yellowstone Park, dispersal from the park has led to wolves being encountered throughout the greater Yellowstone ecosystem of which the JHFPP is part. One pack has taken residence and denning at the northern end of the levee system. Pack populations and ranges fluctuate over time. On May 1, 2017, wolves were delisted from the endangered species list.

Moose: The upper Snake River drainage provides year-round habitat for several hundred moose. During the winter, the number of moose may increase significantly in the immediate area as moose from the surrounding uplands migrate into the river bottom area. The Snake River provides crucial winter range as well as year-round habitat for moose (WGFD 1987). Historically winter densities ranged from 4.3 moose per mile to 6 moose per mile. However, wolf predation has lowered moose numbers where ranges for the two species overlap.

Mule Deer: The greater Jackson Hole area provides habitat for mule deer throughout the year. The levee system area provides spring, summer, and fall range for deer.

**Furbearers:** Aquatic furbearers in the area include beaver (*Castor canadensis*), American mink (*Mustela vison*), musk rat (*Ondatra zibethicus*), and river otter (*Lutra canadensis*). Terrestrial furbearers include coyote (*Canis latrans*), badger (*Taxidea taxus*), raccoon (*Procyon lotor*), gray wolf (*Canis lupus*), red fox (*Vulpes vulpes*), black bear, pine marten (*Mustela americana*), short-tailed weasel (*Mustela erminea*), striped skunk (*Mephitis mephitis*), mountain lion, and bobcat (*Lynx rufus*).

**Other Mammals:** Shrews (*Sorex* spp.) and voles (*Microtus* spp.) are common in riparian areas along the Snake River and its tributaries, and would be expected to inhabit the levee system. Various bats are also found in the area. The hoary bat (*Lasiurus cinereus*), the silver-haired bat (*Lasionycteris noctivagans*), and the long-eared myotis (*Myotis evotis*) have been documented in the area.

## **Birds**

The upper Snake River drainage provides habitat for a wide variety of resident and migratory birds, including upland game, waterfowl, raptors, and passerines. Approximately 150 different species have been observed.

**Waterfowl and Waterbirds:** The wetlands, ponds, backwater, and tributary creeks in the Snake River floodplain provide habitat for waterfowl and waterbird for breeding, nesting, brood rearing, fall staging, and wintering. The most prominent include Canada geese (*Branta canadensis*), trumpeter swans (*Cygnus buccinator*), and sand hill cranes (*Grus canadensis*). Other seasonally common waterfowl include: common mergansers (*Mergus merganser*), mallards (*Anas platyrhynchos*), buffleheads (*Bucephala albeola*), and Barrow's goldeneyes (*B. islandica*). Waterbirds include the American white pelican (*Pelecanus erythrorhynchos*), great blue heron (*Ardea herodias*), double-crested cormorant (*Phalacrocorax auritus*), belted kingfisher (*Ceryle alcyon*), and killdeer (*Charadrius vociferous*).

Historically over a thousand dabbling ducks and half that number of diving ducks inhabit the area. The area between Wilson and South Park bridges average nearly 150 ducks per mile. The area is considered crucial nesting and brood rearing habitat.

**Raptors:** Multiple raptors species have been documented in the JHFPP area. Among these are eagles, hawks, ospreys, falcons, and owls. The most commonly observed raptors are the osprey (*Pandion haliaetus*), bald eagle (*Haliaeetus leucocephalus*), red-tailed hawk (*Buteo jamaicensis*), and Swainson's hawk (*B. swainsonii*). Seventeen active bald eagle nests have been documented along the levee system. Osprey and bald eagles are also commonly seen nesting and hunting in the area. The great gray owl (*Strix nebulosa*) can be found nesting behind the landward side of the levees. While rare in most places they can often be seen in the Jackson Hole area.

In their 2018 bald eagle nest survey along the Snake River in Jackson Hole, Wyoming Game and Fish Department identified 17 active nest sites. Six of these were within 660 feet of the levees and one nest was potentially within the 15 foot clear zone on the landward side of one levee.

Other Birds: Many migratory bird species are also found on the levee system. These include the threatened ESA-listed yellow-billed cuckoo (*Coccyzus americanus*, discussed in greater detail in the following section), tree swallow (*Tachycineta bicolor*), yellow-headed blackbird (*Xanthocephalus xanthocephalus*), red-winged black bird (*Agelaius phoeniceus*), common nighthawk (*Chordeiles minor*), and Wilson's warbler (*Wilsonia pusilla*).

### **3.8.2 Environmental Effects**

#### **3.8.2.1 Alternative 1 – No Action/No Change**

With the exception of vegetation removal, none of the O&M activities are expected to affect wildlife at a level that would cause a measurable or long term negative effect. This includes driving equipment on the levees and access roads. The most likely effect of the O&M activities is that wildlife would be disturbed by the activities and temporarily avoid small sections of the levees while work is being accomplished. This avoidance would last for hours or, at most, a few days. However, habitat in the area is not limited and wildlife may move to nearby areas.

Construction, cleaning, and clearing activities with its associated heavy equipment would involve noise and increased human presence on the levees. The degree of disturbance would depend on timing duration, and location. All of the proposed activities would be of relatively short duration.

Wildlife in the area would respond to O&M activities by avoiding the area or habituating to the action. The JHFPP area already has continuous human activity from recreation, hunting, sightseeing, and residential activity associated with homes built adjacent to the levees. Work similar to the proposed actions is already being carried out by home owners on their nearby properties. Some habituation by wildlife is already expected given the daily human activities along and near the levees.

Vegetation removal has the potential to negatively affect birds in the area. Tree and shrub removal could remove nesting and foraging habitat. Nests could be destroyed if they are in the woody vegetation being removed. The Corps would continue to avoid negatively affecting nesting birds by performing O&M activities (vegetation removal, levee rehabilitation, culvert cleaning) outside of the nesting season, if possible. If the Corps determines it needs to perform those activities within the nesting season, the Corps would implement impact minimization and best management practices in Appendix A.

Vegetation removal would change the wildlife habitat on the levees. The current vegetative structure on the levees would be changed from a mix of trees, brush, and grass to grass only. Trees and shrubs would not be allowed to re-establish on the levees or in the levee clear zone. Wildlife associated with trees and shrubs would move off of the levee system to adjacent trees and shrubs.

### **3.8.2.2 Alternative 2 – Updated O&M Practices (Proposed Action)**

O&M activities performed under Alternative 2 would have the same kinds of effects on wildlife as Alternative 1. However, more vegetation would be removed under Alternative 2 than under Alternative 1. These effects would be considered to be insignificant.

Starting rock and fill stockpiling activities in mid-July instead of mid-August would not be expected to have a significant effect on wildlife. Any raptors, including bald eagles, should be done with or near the end of nesting and the young fledged or near fledged by the time the stockpiling activities start. If work is to be done before August 15 within the buffer zone for one or more active bald eagle nests, surveys of the affected nests would be completed by a qualified biologist to ensure that the eagles are done nesting and the young have left the nest.

The development and use of additional rock material stockpile sites and turnaround sites would convert small areas of habitat into hardened cleared areas devoid of vegetation. The effect on wildlife would be insignificant as the footprint of these areas would be very small compared with the overall footprint of the levee system and the surrounding habitat.

Culvert cleaning would involve more woody vegetation removal as a larger area would be cleared at the ends of the culverts. Construction activities associated with culvert replacement may also include removal of vegetation. This vegetation would represent a minor amount of wildlife habitat and would not have a significant effect on wildlife of the JFHPPP.

Vegetation removal, by itself or as part of levee rehabilitation, under Alternative 2 would involve removal of more vegetation than under Alternative 1 as under Alternative 2 the Corps would fully comply with ETL 1100-2-583. The Corps would avoid adversely affecting birds nesting in the woody vegetation by leaving a buffer zone around active nests and waiting until after the nest is no longer being used to remove the vegetation. Eventually the Corps would remove all trees and shrubs from the levees and the 15-foot clear zone on both sides of the levees. This removal would remove the existing habitat for migratory bird species on the levees. However, when compared with the overall amount of habitat found in the area, the habitat on the levees comprises only a small amount of what is available. Vegetation removal would have a localized effect and would not affect the Jackson Hole area at the population level.

Vegetation removal resulting in removal of bald eagle nests would require permitting from the USFWS under the Bald and Golden Eagle Protection Act. Nest removal could have short term effects on the local eagle population, but would not prevent re-nesting or significantly affect the local eagle population.

### **3.8.2.3 Alternative 4 – Updated O&M Practices (Variance-Locally Preferred)**

O&M activities performed under Alternative 4 would have the same kinds of effects on wildlife as Alternatives 1 and 2. However, vegetation removal under

Alternative 4 would result in more vegetation being removed from the landward side of the levees than under Alternative 1, and less than under Alternative 2, assuming a vegetation variance would be allowed. These effects would also be considered less than significant.

Vegetation removal, by itself or as part of levee rehabilitation, under Alternative 4 would have the same effects on specific nesting birds and would use the same buffer zones around active nests as under Alternative 2. However, less woody vegetation would be removed from the landward side of the levee under Alternative 4 than Alternative 2, thereby reducing the effect on nesting birds and their habitat. Alternative 4 has the potential to reduce the effects on bald eagles if the nesting trees used by the eagles are within an area for which the vegetation variance would allow large woody vegetation to remain.

### 3.9 THREATENED AND ENDANGERED SPECIES

#### 3.9.1 Affected Environment

Four species listed under the Endangered Species Act (ESA) may occur in the Jackson Hole area. These include Canada lynx (*Lynx canadensis*), North American wolverine (*Gulo gulo luscus*), yellow-billed cuckoo (*Coccyzus americanus*), and whitebark pine (*Pinus albicaulis*). More detailed information regarding the potential effects to all of these species, and the measures to protect their habitat are presented in the 2017 Biological Assessment (BA) for Jackson Hole Flood Protection Project Operations and Maintenance (Appendix C).

**Canada Lynx:** Canada lynx are listed as Threatened under the ESA. In the United States, lynx inhabit conifer and conifer-hardwood habitats that support their primary prey, snowshoe hares. Historically, these cats ranged from Alaska across Canada and into many of the northern U.S. states. Today, they are found only in Maine, Montana, Washington, Wyoming, Utah, and Colorado. Historically, lynx were observed in every mountain range in Wyoming. The majority of lynx observations presently occur in western Wyoming in the Wyoming and Salt River ranges and north through the Tetons and Absaroka ranges in and around Yellowstone National Park. Numerous records have also come from the west slope of the Wind River Range, with fewer observations in the Bighorn and Uinta mountains.

**Wolverine:** North American wolverines were originally proposed for listing as threatened under the ESA on February 2, 2013. In recent times, wolverines have inhabited the greater Jackson Hole area in small numbers, specifically the Grand Teton National Park, up to at least 2008. Efforts to find animals in areas known to have had animals in the Park has proven difficult with only one male being found. Recent surveys, have encountered animals in the Wind River Range, Absarokas, and the headwaters of the Gros Ventre. However given that the principle wolverine range is at higher elevations, often associated with timber line, the animal is not expected to be in the project area.

**Yellow-Billed Cuckoo:** The Western distinct population segment of the yellow-billed cuckoo was listed as threatened on November 3, 2014 for all states west of the Continental Divide (FR 50 CFR Part 17). Critical habitat was proposed on August 15, 2014 (79 FR 48547 48652) and includes Henry's Fork of Green River, Sweetwater, and Uinta Counties in Wyoming. There is no proposed critical habitat in Jackson Hole for the yellow-billed cuckoo.

In Wyoming, the yellow-billed cuckoo is dependent on large areas of woody, riparian vegetation that combine a dense shrubby understory for nesting and a cottonwood overstory for foraging. Destruction, degradation, and fragmentation of wooded, riparian habitats are continuing threats to yellow-billed cuckoos in Wyoming. Yellow-billed cuckoo habitat in the immediate project area is marginal for feeding, and poor or non-existent for nesting.

The Corps has conducted bird nesting surveys to document bird species occurrences on the levee systems in Jackson Hole within the Snake River and Gros Ventre riparian corridor for the past two years. These general presence/absence surveys have not identified yellow-billed cuckoos nesting in the area.

One cuckoo responded to a cuckoo vocalization call survey in June 2017. However, a full survey protocol employed during the remainder of the 2017 nesting season failed to produce another contact. No cuckoo nesting has ever been confirmed within the project area. The last previous sighting of a cuckoo was a dead bird encountered in the city of Wilson over a decade ago, with the next most recent sighting occurring in 1990. All documented encounters of yellow billed cuckoos have been of solitary birds, with no sightings of pairs or multiple sightings of yellow-billed cuckoos in the same year. There are no documented recordings of yellow-billed cuckoo nests.

Given the lack of yellow-billed cuckoo sightings during surveys and extremely rare historical sightings it is not believed that yellow-billed cuckoo have a nesting population in the area, and those that have been encountered are transients migrating through.

**Whitebark Pine:** Whitebark pine was identified on July 18, 2011 as a Candidate species for ESA listing. Whitebark pine is a tree species, found in subalpine environments, that has been eliminated from much of its range by mountain pine beetle and white pine blister rust. In Wyoming it is a component of subalpine fir communities and dominates the highest peaks and ridges over 6,000 feet. While the project is within the habitat elevation of 6,000 feet, the area is a river bottom not conducive to whitebark pine growth. Whitebark pine has not been found to be present within the Project area.

### 3.9.2 Environmental Effects

#### 3.9.2.1 Alternative 1 – No Action/No Change

The Corps has determine Alternative 1 would have no effect on Canada lynx or their critical habitat, wolverine or whitebark pine (Table 3-2). The Corps has also determined Alternative 1 *May Affect, But Is Not Likely to Adversely Affect* yellow-billed cuckoo. None of these species have resident populations in the project area and their occurrence in the area is rare. There is a low probability that lynx or wolverines might move through the area.

Table 3-2 Effect determinations for threatened and endangered listed species that may occur in the project area

Species	Species Determination	Critical Habitat Determination
Canada lynx	No Effect	No Effect
Wolverine	No Effect	NA
Yellow-billed cuckoo	May Affect But Not Likely to Adversely Affect	NA
Whitebark pine	No Effect	NA

#### 3.9.2.2 Alternative 2 – Updated O&M Practices (Proposed Action)

Alternative 2 would have the same effect to ESA listed species as Alternative 1. To ensure that the project has no effect on ESA species, if wolverines or lynx are encountered, work would stop and personnel would maintain at least a 100 yard distance from the animal according to USFWS guidance.

#### 3.9.2.3 Alternative 4 – Updated O&M Practices (Variance-Locally Preferred)

Alternative 4 would have the same effect to ESA listed species as Alternative 2, and would maintain the same distance from wolverines or lynx as under Alternative 2. Because more riparian vegetation may remain on the landward side of the levees under a variance, Alternative 4 would have less potential effect to yellow-billed cuckoos and their habitat than Alternative 2. .

### 3.10 LAND USE

#### 3.10.1 Affected Environment

As described in the DD/EIS, land use in Teton County reflects the ownership of the land. Much of the land in the area is federally owned and includes Grand Teton National Park managed by the National Park Service, Bridger-Teton National Forest managed by the U.S. Forest Service, the National Elk Refuge managed by the U.S. Fish and Wildlife Service, and small parcels currently managed by the Bureau of Land Management near the Snake River. These lands are used for recreation, forest

management, and wildlife management. Other public lands include land owned or managed by Wyoming Game and Fish Department for wildlife habitat. Land use on privately owned land in the Jackson area is ranching and residential, with residential use increasing as ranching declines.

### **3.10.2 Environmental Effects**

#### **3.10.2.1 Alternative 1 – No Action/No Change**

None of the O&M activities under Alternative 1 would have a direct effect on land use, although they may have an indirect effect. This is because the levees along the Snake and Gros Ventre Rivers have reduced the chance of flooding on lands adjacent to the rivers and may have some influence on the conversion of this land from agricultural/grazing use to residential development. Continued O&M of the levees would ensure the levees continue to reduce the risk of flooding.

#### **3.10.2.2 Alternative 2 – Updated O&M Practices (Proposed Action)**

Alternative 2 would be expected to have similar effects to land use as Alternative 1. However, two of the activities, rock stockpiling and access road maintenance, would have a potential to change the land use on small parcels of land. Developing a new stockpile site or extending a turnaround site would change the underlying land use to a construction material storage area or a road bed. These developments would be expected to have a minor, insignificant effect on land use as the sites would be adjacent to the levees and would change the land use for a few acres at most.

#### **3.10.2.3 Alternative 4 – Updated O&M Practices (Variance-Locally Preferred)**

Alternative 4 would be expected to have the same effects to land use as Alternative 2 for all O&M activities except vegetation removal.

### **3.11 TRANSPORTATION**

#### **3.11.1 Affected Environment**

The Jackson Hole area transportation network is a system of Federal, state, county, and local roads. The major north-south route is U.S. Highway 26-89-189, which enters the valley from the northeast, passes through Jackson, and exits the valley to the south. This highway is east of the Snake River and connects Jackson Hole to Grand Teton National Park and Yellowstone National Park to the north and Idaho to the south. The major east-west route is Wyoming State Highway 22, which starts at Jackson, heads west and crosses the Snake River at the Wilson Bridge, passes through Wilson, then goes over Teton Pass to Idaho. Another major north-south route is Wyoming State Highway 390 which is west of the Snake River and connects State Highway 22 to Moose and Teton Village to the north. There are also numerous paved and gravel roads maintained by Teton County.

The Corps uses the full transportation network when performing the current O&M activities. As stated in Section 2.2.1.4, the Corps may haul about 10 loads per day of rock and about 20 loads per day of graded fill material during rock hauling operations. The Corps' levee repair contractor may make about 25 trips per day to haul material from the stockpile sites to the work sites. The Corps generally uses the highways to haul the rock material from distant quarries to the stockpile sites, and uses the local road network and the levees themselves when hauling material from the stockpile sites to the work areas on the levees. The levees and many of the access roads are not open to vehicular use by the public, therefore Corps use of these access routes does not disrupt the flow of traffic in the area.

During emergency flood fighting actions, the number of vehicle trips to the levees and cycling of empty and loaded trucks increases. This may be noticeable to local residents, but does not significantly disrupt the overall flow of traffic.

### **3.11.2 Environmental Effects**

#### **3.11.2.1 Alternative 1 – No Action/No Change**

Under Alternative 1, none of the O&M activities would have a significant effect on transportation in the Jackson Hole area. The Corps would continue to haul materials over the Federal, state, and local transportation network to support emergency flood-fighting actions and routine levee rehabilitation. There would continue to be increased traffic during emergency actions, but the effect would generally last only a few days and would not disrupt traffic flow in the valley.

#### **3.11.2.2 Alternative 2 – Updated O&M Practices (Proposed Action)**

The effects of the O&M activities on transportation under Alternative 2 would be expected to be similar to those under Alternative 1. There would be no change in use of the transportation network, therefore any effect would be insignificant.

#### **3.11.2.3 Alternative 4 – Updated O&M Practices (Variance-Locally Preferred)**

The effects of the O&M activities on transportation under Alternative 4 would be the same as under Alternative 2. There would be no change in use of the transportation network, therefore any effect would be insignificant.

### **3.12 SOCIOECONOMICS**

#### **3.12.1 Affected Environment**

Teton County has a population of 21,294 according to the 2010 Census (U.S. Bureau of the Census 2017). This is about double the 1986 population of 10,800 reported in the DD/EIS. Jackson continues to be the largest community in the county with a population of 9,577 in 2010. Teton County had an estimated 7,470 households in 2010 compared with an estimated 4,400 households in 1985. The Jackson Hole area continues to attract visitors and new residents. The number of housing units in the

county in 2010 was 12,813, almost double the 6,600 units in 1990 (Corps 1994). The number of occupied units in 2010 was 8,973.

The economy of Teton County continues to depend largely upon recreation and tourism. The 2010 census reflects this as some of the main employment areas continue to be service occupations, sales and office occupations, and management, business, and financial occupations (U.S. Bureau of the Census 2017).

The levees continue to provide flood risk reduction for developed and undeveloped property near the Snake and Gros Ventre Rivers. Much of this developed property is in the town of Wilson and along State Highway 390 between Wilson and Moose. The levees also provide flood risk reduction for public infrastructure including the State Highway 22 bridge over the Snake River at Wilson and several schools, fire stations, and electrical substations. In 2017, the Corps determined the JHFPP provides flood risk reduction for 19,000 acres of property valued at \$1.2 billion dollars.

### **3.12.2 Environmental Effects**

#### **3.12.2.1 Alternative 1 – No Action/No Change**

Alternative 1 would have little effect on socioeconomics in the Jackson Hole area. The O&M activities have been ongoing and represent seasonal employment for a relatively small number of people. By maintaining the levees and thereby reducing the potential for flooding of urban, residential, and ranching areas and public infrastructure, the O&M activities could be considered to have an indirect positive effect on the local economy.

#### **3.12.2.2 Alternative 2 – Updated O&M Practices (Proposed Action)**

Alternative 2 would have a similar indirect positive effect as Alternative 1 on socioeconomics in the Jackson Hole area.

#### **3.12.2.3 Alternative 4 – Updated O&M Practices (Variance-Locally Preferred)**

Alternative 4 would have a similar indirect positive effect as Alternatives 1 and 2 on socioeconomics in the Jackson Hole area.

### **3.13 RECREATION**

#### **3.13.1 Affected Environment**

Recreation is a significant component of the tourism-based economy of Teton County. Many people from across the country and the around world come to the area to enjoy the scenery, Grand Teton and Yellowstone National Parks, and the numerous outdoor recreation opportunities available in the area.

The reach of rivers occupied by the JHFPP supports several recreational activities. These include hiking, cross-country skiing along the levees, fishing, non-

motorized boating, photography, and wildlife viewing. Commercial and non-commercial river floating on the Snake River is managed through Teton County's 2015 Final River Management Plan, including the reach through the JHFPP. Much of the levee system is open to public use, although some segments have been fenced by the landowner to prevent public access. Walton and Public levees are open to public use as well as the two miles of levee within Grand Teton National Park. Some of the levees adjacent to residential developments are also used by the public residing in those developments.

The Corps does periodically close levees or levee segments when emergency flood-fighting actions or levee rehabilitation is taking place. The closure is for public safety to prevent harm to the public from construction equipment or vehicles. The Corps (or Teton County) notifies the public of the closure. Once the O&M activity is completed, the Corps re-opens the levee for public use.

Teton County Parks and Recreation Department maintains some recreation facilities adjacent to the JHFPP. One of these is Emily Steven's Park on the east side of the Wilson Bridge. This park includes several miles of hiking on the levee. Another facility is a boat ramp at South Park Landing. The county is also developing plans for improving a boat launch site on the west side of the Snake River on the north side of the Wilson Bridge.

### **3.13.2 Environmental Effects**

#### **3.13.2.1 Alternative 1 – No Action/No Change**

Alternative 1 would have an insignificant effect on recreation in the Jackson Hole area as none of the O&M activities would reduce or change the current recreational use of the river or the levees. The public would continue to be able to access many of the levees for recreational use. The Corps would continue to temporarily close a levee or levee segment to public access when O&M activities that could affect public safety are taking place.

#### **3.13.2.2 Alternative 2 – Updated O&M Practices (Proposed Action)**

Alternative 2 would have similar effects as Alternative 1 on recreation. No significant effects are expected as the current public use would not change.

#### **3.13.2.3 Alternative 4 – Updated O&M Practices (Variance-Locally Preferred)**

Alternative 4 would have similar effects as Alternatives 1 and 2 on recreation. No significant effects are expected as the current public use would not change.

### **3.14 AESTHETICS/VISUAL RESOURCES**

#### **3.14.1 Affected Environment**

Jackson Hole is a rural area known for its spectacular natural scenery, in particular the scenery associated with Grand Teton National Park. The JHFPP and its

associated access roads are located in the middle of this area in the outwash plain of the Snake and Gros Ventre Rivers. The river channels are relatively wide and braided with extensive areas of gravel and sand bars. Remnant channels behind the levee system are common. Riparian vegetation is found along many of the channels and between the levees. Stands of trees, mostly cottonwoods, willow, and alder, are scattered throughout the outwash plain. The vegetation gradually changes from riparian to grassland and sagebrush on high areas within the floodplain and on terraces adjacent to it. Lodgepole pine and Douglas-fir grow on the dry ground on the landward side of the levees.

The levees and access roads of the JHFPP present a non-natural visual element in the largely undeveloped, rural landscape. Vegetation growing on or near the levees, especially trees and shrubs, helps to hide the straight lines and angular rock of the levees. Removal of vegetation from the levee surface and the 15-foot clear zone along the waterward levee toe makes the levees more visible, which may displease some viewers but be of interest to others. Boaters on the river have their view of the floodplain restricted by the levees and any vegetation. Boaters and anyone in the vicinity of the levees may be able to view any construction activities or large vehicles driving on the levees as the Corps performs its O&M activities. Some viewers may feel these activities and vehicles look out of place with the natural setting of the area, while others may find the activities and vehicles to be of interest.

### **3.14.2 Environmental Effects**

#### **3.14.2.1 Alternative 1 – No Action/No Change**

Under Alternative 1, the O&M activities would continue to have potential negative or positive effects on the aesthetics of the area in the vicinity of the levees and the access roads. These effects are not expected to be significant. The movement of vehicles and equipment along the levees and on the access roads would continue to have a short-term, minor adverse effect on aesthetics for those who find the vehicles incompatible with the natural surroundings, or short-term positive effects for those who find the vehicles of interest.

Operation of the equipment when performing emergency flood-fighting actions, levee rehabilitation, or culvert cleaning may also have a short-term, minor adverse or positive effect on aesthetics while the activities are taking place. Removal of the woody vegetation from the levee surface and toe may have a long-term adverse effect on aesthetics as the vegetation would not be allowed to re-establish. This may be displeasing to those preferring to see vegetation along the river bank or levees, but it may resemble river bank areas where the river has washed away the vegetation. However, some may find the exposed levee surface and clear zone to be pleasing.

### **3.14.2.2 Alternative 2 – Updated O&M Practices (Proposed Action)**

Under Alternative 2, the effects of the O&M activities would have similar types of effects on aesthetics as Alternative 1, but would affect a larger portion of the JHFPP project. Developing new stockpile sites or turnaround areas would disturb more land and create more man-made structures in the natural setting, although the footprints would be relatively small. The Corps would increase the amount and footprint of woody vegetation removal by following the policy in ETL 1110-2-583 and removing woody vegetation from the landward side of the levees and the 15-foot clear zone on the landward side. This would remove some of the vegetative screening of the levees from the land side and may be displeasing to some viewers. The effect would be less than significant as the aesthetics of the surrounding area would not be affected.

### **3.14.2.3 Alternative 4 – Updated O&M Practices (Variance-Locally Preferred)**

Under Alternative 4, all of the O&M activities except for vegetation removal would have the same effects as under Alternative 2. Because a variance would allow more vegetation to remain on the landward side of the levees under Alternative 4, this alternative would have a lesser effect on aesthetics than Alternative 2.

## **3.15 CULTURAL RESOURCES**

### **3.15.1 Affected Environment**

Located in the Upper Snake River region of western Wyoming, the Jackson Hole area falls within the Great Basin cultural context (D'Azevedo 1986). The Great Basin has been occupied by human groups for well over 10,000 years before present (BP). In fact, Clovis-era (Paleoindian Period) archaeological finds are well documented along the Upper Snake River Plain of southeastern Idaho (Yohe and Woods 2002).

Before the arrival of Euro-Americans, the Jackson Hole region of western Wyoming would have been occupied by the Eastern Shoshone. Shimkin (1986) documents their inhabitation of the area beginning well before A.D. 1500, and continuing into the latter half of the 19th century when American expansion west forced them into reservations. The Eastern Shoshone were skilled horse men whose primary food source was that of bison (*Bison bison*). Bison comprised nearly half of the Eastern Shoshone's annual food supply. Second to bison, fish were acquired from western streams and creeks that were temporarily dammed using wattle-work and rocks. Fish were then driven into the dam by horse-mounted individuals lashing the surface with poles and collected using a gunny sack.

By the early 19th century, American fur trappers had made their way into Jackson Hole. White presence in the area quickly accelerated in the 1840s when Congress passed the Pre-emption Act entitling citizens to "squat" on public land legally and allowing a first chance to purchase the land for a relatively low price once surveyed (Massey 1992). This, followed by the Homestead Act of 1862, significantly increased American expansion into western Wyoming. Homesteads and ranches quickly overtook the region and conflict between the native inhabitants and white settlers led to the Fort

Bridger Treaty of 1868. Resulting from this treaty was the establishment of the Wind River Reservation (located approximately 75 miles east of Jackson, Wyoming) where the Eastern Shoshone and Northern Arapaho reside today.

On October 21, 1985, the Corps and Wyoming State Historic Preservation Office (SHPO) signed a programmatic agreement (See Appendix D attached 1985 PA) stating annual O&M activities located within the levee system have a no effect to historic properties determination. The levee system is defined by the county easements obtained to maintain the levees. This programmatic agreement has three stipulations. The first requires all yearly O&M work to be confined to the already existing levee system and that all fill material be obtained from existing borrow areas. The second required all work cease in the event cultural resources are encountered. The final stipulation requires the Corps to follow normal Section 106 review, of the National Historic Preservation Act (NHPA), for any new construction or new borrow areas.

### **3.15.2 Environmental Effects**

#### **3.15.2.1 Alternative 1 – No Action/No Change**

O&M activities associated with the No Action alternative would have minimal direct effect on cultural resources. The 1985 programmatic agreement with Wyoming SHPO would still be in effect for all identified O&M activities.

#### **3.15.2.2 Alternative 2 – Updated O&M Practices (Proposed Action)**

Alternative 2 introduces five updated O&M activities determined not covered by the original 1990 EIS:

- A. Vegetation removal from the entire landward side of the levee prism extending an additional 15 feet from the landward toe. If the 15-foot clear zone would extend beyond the levee easement boundary, the Corps would remove woody vegetation between the levee toe and easement boundary.
- B. Repair, rehabilitate, or replace culverts. The original DD/EIS only addressed cleaning and did not cover the replacement.
- C. Extend existing turnarounds adjacent to the levees or construct additional turnarounds able to accommodate larger equipment and machinery. Turnarounds may extend beyond existing easements and would require additional land under new easements.
- D. Construction additional in-water structures to protect levee portions susceptible to impingement erosion or undercutting. The structures would like be constructed within existing easement boundaries.
- E. Provide for developing additional rock and fill material stockpile areas, if needed.

Consultation with Wyoming SHPO has determined the first two updated activities (A and B) are covered under the 1985 programmatic agreement. The latter three (C through E) constitute new construction or new stockpile locations and would require formal Section 106 review.

### **3.15.2.3 Alternative 4 – Updated O&M Practices (Variance-Locally Preferred)**

Under Alternative 4 all of the O&M activities would have similar effects to cultural and historic resources as those anticipated under Alternative 2, but potential effects from vegetation removal are expected to be less than for Alternative 2 as less ground disturbing vegetation clearing would be conducted along the landward side of the levees. Consultation requirements with the Wyoming SHPO would be the same as those under Alternative 2.

## **3.16 CLIMATE CHANGE**

Indications are that average global atmospheric temperatures are trending upward over the previous several decades, and are correlated to increased atmospheric carbon dioxide levels (IPCC 2001). Internal combustion engines emit carbon dioxide (CO<sub>2</sub>) as one byproduct of efficient burning of fuel (gasoline or diesel). International efforts are being directed at reducing carbon release into the atmosphere.

In Wyoming, changes in temperature and precipitation are already occurring (EPA 2017b). Future climate change will likely continue to influence these changes. Average annual temperature in Wyoming is projected to increase by 2-11°F by the end of the century. Precipitation is estimated to decrease slightly in the summer and increase by about 10 percent in the spring and fall and 30 percent in the winter. With warmer winter temperatures, more of the winter precipitation may be in the form of rain instead of snow, which would decrease the amount of snowpack and could cause faster, earlier snowmelt. This could increase the potential for flooding in the Snake and Gros Ventre Rivers in Jackson Hole. Along with rising air temperatures, there would be a corresponding rise in stream temperature.

Reduced precipitation during the summer months would affect vegetation type and quantity, resulting in changes to wildlife habitat, including food sources, cover vegetation, and possibly reproduction areas. Higher temperatures would increase evaporation rates from the rivers, lowering water elevations, and increasing water temperature, affecting aquatic flora and fauna. Along with rising air temperatures, there would be a corresponding rise in stream temperature. Some vegetation throughout the JHFPP would exhibit stress response to higher temperature and less precipitation.

### **3.16.1 Effects of Alternative 1 - No Action/No Change**

The O&M activities under Alternative 1 would have an insignificant effect on climate change. Operation of construction equipment and vehicles and burning of woody debris would emit greenhouse gases (GHG), but the emissions would be temporary and in low quantities. Removal of woody vegetation from the levee surface

would result in fewer plants that remove carbon dioxide, one of the GHG's, from the air. None of these activities would have a measurable or significant effect on GHG's or climate change.

Climate change may affect O&M activities in the future by increasing the potential for higher spring flows that could cause flooding. This could result in an increase in flood fighting and emergency levee repairs as well as levee rehabilitation actions. It may also increase the amount of woody debris that needs to be removed from the levee surfaces after high flows.

### **3.16.2 Effects of Alternative 2 - Updated O&M Practices (Proposed Action)**

Alternative 2 would have similar insignificant effects to climate change as Alternative 1. However, Alternative 2 would increase the amount of woody vegetation removed from the levees as the Corps would follow the guidance of ETL 1110-2-583 and remove woody vegetation from the levees and the 15-foot clear zone on both sides of the levees. This would result in fewer plants removing carbon dioxide from the air, but the effects on GHG's or climate change would be negligible.

Under Alternative 2, climate change would have the same effect on O&M activities as under Alternative 1.

### **3.16.3 Effects of Alternative 4 - Updated O&M Practices (Variance-Locally Preferred)**

Alternative 4 would have similar insignificant effects to climate change as Alternatives 1 and 2, and would be more than Alternative 1, but less than Alternative 2, as less vegetation would be cleared if a variance were approved. The effects on GHG's or climate change would still be negligible.

Under Alternative 4, climate change would have the same effect on O&M activities as under Alternatives 1 and 2.

## **3.17 CUMULATIVE EFFECTS**

Cumulative effects are defined as "the impact on the environment which results from the incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions." Analysis of cumulative effects focuses on issues that are relevant to the decision to be made and are "truly meaningful" (CEQ 1997), (i.e., important issues of national, regional, or local significance). The Corps reviewed scoping comments received for this SEA, other related environmental compliance efforts such as the 1990 EIS, and input from technical staff to determine which resources should be included in this analysis. The Corps considered potential cumulative effects for the affected environment, but identified only one resource in the Jackson Hole area, wetland functions and values, particularly riparian vegetation, along the Snake River, as being relevant to the decision and truly meaningful.

The Corps identified both a temporal and a geographic scope for this cumulative effects analysis. The Corps identified the period of 1956 through 2027 as the temporal scope. The Corps used 1956 as the starting period as this is the year the Corps started constructing the Federal levees in Jackson Hole. It is also the year before the Bureau of Reclamation completed both a larger reservoir at Jackson Lake on the Snake River in Grand Teton National Park upstream of the JHFPP and Palisades Dam on the Snake River downstream of the JHFPP. The Corps used ten years into the future as the end point as by that time the Corps may have completed removing woody vegetation from the landward side of the levee system if Alternative 2 is implemented, or something less than that if Alternative 4 is implemented. The Corps used a geographic scope of the Snake River within Jackson Hole area as it is where most of the riparian habitat changes in the area have been taking place.

### **Past Wetland (Riparian Vegetation) Status**

The 1990 EIS identified wetland (under the Cowardin wetlands classification system) impacts, from construction of the levees, as significant. Since that evaluation, sub-habitats such as palustrine forest scrub/shrub, palustrine emergent, and aquatic pond habitats are somewhat naturally recovered, relatively widespread, and currently providing substantive value to the human environment (see Appendix B).

The Snake River is a high-energy stream that spreads out over the floodplain to dissipate energy. Prior to completion of the new Jackson Lake Dam, Palisades Dam, and the levees at Jackson Hole, flows in the Snake River quickly increased in April and May, then quickly decreased from mid-May to August. These flows were able to move across the entire floodplain, creating and abandoning channels and periodically removing riparian vegetation. This periodic disturbance set back vegetation succession, promoting a willow-alder shrub-swampland plant community (Marston et al. 2005).

The Bureau of Reclamation uses the reservoirs formed after the dams were built to manage flows to meet summer irrigation needs and release water more slowly and over a longer period of time. The peak flow decreased to about half of what it was before the dams were completed (Marston, et al. 2005). This change in flows from Jackson Lake Dam decreased the frequency and magnitude of peak flows, resulting in less disturbance of parts of the Snake River channel. This decrease in disturbance allowed for more areas of vegetation succession in the floodplain, resulting in a change from a willow-alder shrub swampland plant community to a progression of forest communities from cottonwood to mixed cottonwood/blue spruce to blue spruce.

Once the Corps and other entities such as the state, county, other Federal agencies, and private citizens started to build levees, the river no longer had access to the entire floodplain. This resulted in several changes. By constricting the river, the levees allowed river flows to concentrate and remove some of the islands and the riparian habitat growing on them. This set back succession on the remaining islands and river banks. The levees cut off access to side channels, potentially allowing land behind some of the levees to revert to dryland habitat instead of supporting as much riparian vegetation. In other areas behind the levees, the lack of disturbance allowed

vegetation succession to take place and the willow-alder community was replaced with cottonwoods, mixed forest, and blue spruce. Creeks that used to drain into the rivers were blocked by the levees and sometimes created ponds that flooded the existing riparian vegetation, but supported new riparian vegetation around the pond edges.

### **Current Wetland (Riparian Vegetation) Status**

The Snake River in the Jackson Hole area continues to support a large amount of wetlands in the form of riparian vegetation, although the amount between and along the levees has been reduced. Some of this is because confining high flows between the levees causes scouring (Corps 2000). Some of this is also because of vegetation removal performed by the Corps as part of the JHFPP O&M. The Corps removes the woody riparian vegetation from the levee surfaces. This reduces the amount of riparian vegetation growing along the rivers between the levees for much of the 34 miles of the levee system, although the amount is very small compared with the amount of riparian vegetation in the Jackson Hole area. This also does not remove all of the riparian vegetation along the river as there are several stretches of levees that are in upland areas and not located adjacent to the river. Continued residential development in the Jackson Hole area can also reduce the amount of riparian vegetation.

The Snake River between the levees continues to support several successional stages of wetland riparian vegetation. The river continues to set back succession through periodic scouring of islands and land adjacent to the levees. The river can also remain in a particular channel long enough for riparian vegetation along parts of the river bank to mature and reach later stages of succession.

### **Future Wetland (Riparian Vegetation) Status**

Any future environmental effects to wetland under Alternative 1 would be similar to what occurs under current operations and maintenance as described in section 2.2.1.

The Snake River in the Jackson Hole area is expected to continue to support a large amount of riparian vegetation in the future and the Corps' proposed action would not change this. The amount between the levees would continue to be reduced from the pre-project levels. The Corps, Teton County, and Teton Conservation District are currently working to develop a path forward for implementing an ecosystem restoration plan for the upper Snake River near Jackson Hole. This project may include measures that would protect existing islands and riparian habitat and encourage establishment of additional riparian habitat between the levees.

Under Alternative 2 the amount of wetland riparian vegetation growing adjacent to the JHFPP levees would continue to be reduced until the Corps completes removing the vegetation from the levee surfaces and the 15 foot clear zones along both toes of the levees. This removal would set back succession and willows, alders, and cottonwoods may start to re-establish. However, any woody vegetation that re-established along the levees would eventually be removed as part of the levee O&M. Residential development would be expected to continue and may further reduce the

amount of riparian vegetation in the floodplain. Alternative 2 would have the most cumulative impact to wetland functions and values, but that impact would not rise to the level of significance as most direct impacts within the 15 foot clear zone would be avoided, minimized or mitigated for.

Under Alternative 4, the impact to wetland habitats in general, and particularly riparian forests, would be notably reduced and mature overstory and fully functional understory would remain in key areas where levee functional integrity is not at high risk, primarily on the landward side of the levees. This would have a lesser cumulative impact on wetland functions and values than Alternative 2, and would still be subject to avoidance, minimization, and compensatory mitigation where appropriate.

## **SECTION 4 - COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS**

Section 4 identifies the legal, policy, and regulatory requirements that could affect each proposed alternative. The implications for each requirement are discussed with respect to the proposed project. Summaries of compliance and coordination activities for each of the laws, policies, or regulation are also provided.

### **4.1 TREATIES AND NATIVE AMERICAN TRIBES**

Treaties are legally binding contracts between sovereign nations that establish those nations' political and property relations. Treaties between Native American tribes and the United States confirm each nation's rights and privileges. In most of these treaties, the tribes ceded title to vast amounts of land to the United States, but reserved certain lands (reservations) and rights for themselves and their future generations. Like other treaty obligations of the United States, Indian treaties are considered to be "the supreme law of the land," and they are the foundation upon which federal Indian law and the federal Indian trust relationship is based.

Two treaties with Native Americans may be applicable to the JHFPP: the Treaty with the Eastern Band Shoshoni and Bannock (July 3, 1868, 15 Stat. 673) and the Treaty with the Northern Cheyenne and Northern Arapahoe, (May 10, 1868, 15 Stat. 655). The treaty with the Shoshone-Bannock explicitly reserved the right "to hunt in unoccupied lands of the United States so long as game may be found thereon, and so long as peace subsists among the whites and Indians on the borders of the hunting districts." The treaty with the Northern Cheyenne and Northern Arapaho explicitly reserved "the right to roam and hunt while game shall be found in sufficient quantities to justify the chase."

Implementation of the updated O&M for the JHFPP is not expected to have any (or very minimal) effect on the ability of the Tribes to access the levee easement areas for hunting. Land ownership patterns likely have a greater effect on such access and most lands within the JHPPP are privately owned. The easement areas associated with the JHFPP were acquired by Teton County for the specific purpose of constructing and maintaining a flood risk management project. Big game such as elk use the lands within the JHFPP and elk are known to have established trails for crossing the levees, therefore the O&M activities may affect local game movement, and indirectly affect game populations at a minimum level. Any effects to hunting access or game species from the O&M activities would be short-term and relatively minor. Therefore the effects of the JFHPP and the O&M activities on hunting would be minimal and would not substantially diminish treaty resources such as game species.

## **4.2 FEDERAL LAWS**

### **4.2.1 National Environmental Policy Act**

The National Environmental Policy Act (NEPA) requires Federal agencies to use a systematic interdisciplinary approach to evaluate the environmental effects of a proposed Federal action prior to implementing that action. This is usually accomplished through preparation of a statement, either an Environmental Impact Statement (EIS) if the action is a major federal action significantly affecting the human environment, or an Environmental Assessment (EA) if the Federal agency has not yet determined the significance of the effects.

This SEA considers the environmental effects of continuing to implement a programmatic O&M program for the JHFPP. The O&M program is not site-specific, rather it addresses types of activities the Corps would perform to maintain the JHFPP. It also specifies minimization measures and BMP's to be incorporated into any action the Corps takes (See Appendix A). By adhering to these "sideboards," the Corps greatly reduces or eliminates the need for additional environmental compliance for site-specific management actions taken under the O&M program. However, some actions such as construction of rock barbs or additional turnaround areas, may require additional review under other environmental laws such as the Clean Water Act or National Historic Preservation Act, depending on the location, design, and proposed construction methods. Any additional site-specific compliance needed for emergency actions (flood-fighting) may be performed concurrent with or after the emergency event. If the Corps proposes site-specific management actions that have not been adequately addressed in this SEA, the Corps would prepare another supplemental EA solely for those site-specific actions.

The Corps prepared this SEA and will circulate it to other federal and state agencies, affected Tribes, and the public for review and comment. While preparing the SEA, the Corps did not identify any impacts that would significantly affect the quality of the human environment. If no such impacts are identified during the public review process, compliance with NEPA would be achieved upon the signing of a Finding of No Significant Impact (FONSI). However, if significant impacts are identified during the public review, an EIS [or supplemental EIS (SEIS)] would be required. Completion of an SEIS and the signing of a Record of Decision would then achieve compliance with NEPA.

### **4.2.2 Endangered Species Act**

The Endangered Species Act (ESA) established a national program for the conservation of threatened and endangered fish, wildlife and plants and the habitat upon which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Service, as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their critical habitats. Section 7(c) of the ESA and the Federal regulations on

endangered species coordination (50 CFR §402.12) require that Federal agencies prepare biological assessments of the potential effects of major actions on listed species and their critical habitat.

In compliance with Section 7 of the Endangered Species Act, the Corps prepared a Biological Assessment (BA) in 1990 for the Corps' assumption of responsibility for the O&M of the JHFPP. The Corps prepared a supplemental BA on the proposed action (Alternative 2) in February 2018 to address effects of the updated O&M practices of the JHFPP on ESA-listed species. In the 2018 supplemental BA, the Corps concluded the proposed action would have no effect on Canada lynx or its critical habitat, wolverine, or whitebark pine. The Corps determined the proposed action "may affect but is not likely to adversely affect" yellow-billed cuckoo. A full write up on the findings and reasons behind them can be found in the February 2018 BA (Appendix C). The Corps requested informal consultation with USFWS on March 9, 2018. Should the Corps decide to implement Alternative 4 after obtaining a vegetation waiver, the Federal action would be the same, although the amount of vegetation removed from the levees would be reduced, resulting in less of an effect to listed species.

#### **4.2.3 Bald and Golden Eagle Protection Act of 1940**

Under the Bald and Golden Eagle Protection Act, bald eagle nests may not be destroyed without a permit and active nests have a no-disturbance zone based on recommendations from the USFWS (USFWS 2007). This area is defined as 660 feet if the activity is within nest line of sight or 330 feet if the activity is obscured from view. Noise disturbance should still be assessed when determining impacts from maintenance activities. Machinery and equipment required for this project is not at the intensity nor duration to require additional impact assessment beyond the USFWS recommendations.

Under either Alternative 2 or 4 the Corps would coordinate with the USFWS and the Wyoming Game and Fish Department to determine eagle nesting locations and would continue to do so for future O&M of the JHFPP. When performing O&M activities within the nesting season of February 1 – August 15, the Corps refrains from working within applicable buffer zones until the young have fledged. By implementing the recommendations from the USFWS, disturbance of nesting bald eagles is unlikely to occur. No take of either bald or golden eagles is expected to occur due to the proposed O&M activities. If an eagle nesting tree must be removed, the Corps would apply for a permit under the BGEPA from the USFWS.

#### **4.2.4 Fish and Wildlife Coordination Act of 1958**

The Fish and Wildlife Coordination Act (FWCA) requires consultation with the USFWS and state fish and wildlife agencies to evaluate the impacts to fish and wildlife species where the "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted... or otherwise controlled or modified" by any agency under a Federal permit or license. The FWCA also requires

equal consideration and coordination of wildlife conservation with other water resources development programs.

The Corps' proposed action and locally preferred plan address operation and maintenance of an existing water resources development project. Most of the O&M activities included in the Corps' proposed action under Alternative 2, and Alternative 4 if selected, would not alter or modify stream-flow or a body of water and would not involve activities subject to this Act. The only activity that would be subject to the FWCA is the construction of rock barbs or weirs to protect the toe of the levee. However, the use of barbs or weirs is not definite nor has a specific scope of work and design been developed for them at this time. If the Corps determines these structures are needed in implementing either action alternative, the Corps would consult with USFWS (which would then consult with the Wyoming Game and Fish Department) during the planning process.

#### **4.2.5 Migratory Bird Treaty Act**

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. §§ 703-712, as amended) prohibits the taking of and commerce in migratory birds (live or dead), any parts of migratory birds, their feathers, or nests. Take is defined in the MBTA to include by any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing or transporting any migratory bird, nest, egg, or part thereof.

A wide variety of species listed under the MBTA occur on the Corps managed levees within the proposed action area. To avoid conflicts with MBTA species, the Corps plans to work outside the nesting time frame of April 1 to August 1. If the Corps plans to start vegetation removal or other O&M activities that would disturb nesting birds earlier than August 1, the Corps would perform a bird nest survey several days before the activity is scheduled to begin. If the Corps finds our O&M activity would result in take, a buffer zone will be left around the nest and the Corps would wait until the nestlings have fledged before removing the vegetation or performing the activity, unless we receive updated implementation guidance. Until such guidance is received, the buffer zone would be a 50-foot radius for specific areas where birds are believed to be nesting but the exact nest site is not determined, and a 15-foot radius from known nest sites. The buffer zone distance for raptor nests is 150 feet. These buffer zones are consistent with those in the July 2006 Memorandum of Understanding (MOU) between the U.S. Department of Defense and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds.

The Corps has multiple years of MBTA bird surveys that demonstrates the birds are fledging before July 15 in the project area. If two additional years of survey data show that the birds are fledging before July 15, the Corps would move the standing work start date to July 15 and would not perform additional nesting surveys unless it proposes an earlier start date for a specific action. Implementing either Alternative 2 or 4 would be conducted in compliance with the MBTA.

#### **4.2.6 Clean Air Act of 1970, As Amended**

The Corps' O&M activities associated with the JHFPP would have a de minimus effect on air quality, therefore the proposed actions would be in compliance with the Clean Air Act and the Corps would not need to take further action to achieve compliance.

#### **4.2.7 Clean Water Act**

The Federal Water Pollution Control Act (33 U.S.C. §1251 et seq., as amended) is more commonly referred to as the Clean Water Act. This act is the primary legislative vehicle for Federal water pollution control programs and the basic structure for regulating discharges of pollutants into waters of the United States. The act was established to restore and maintain the chemical, physical, and biological integrity of the Nation's waters and sets goals to eliminate discharges of pollutants into navigable water, protect fish and wildlife, and prohibit the discharge of toxic pollutants in quantities that could adversely affect the environment. The act has been amended numerous times and given a number of titles and codifications.

#### **Section 402**

Section 402 of the Act, the National Pollutant Discharge Elimination System (NPDES) program, pertains to discharge of pollutants. The Corps has identified one pollutant, herbicide that would be discharged near the rivers under the JHFPP O&M practices (under either Alternative 2 or 4) and would therefore be subject to compliance with Section 402. Herbicide spraying would be part of the vegetation removal activity as described above in Section 3.2.2.1. Because the herbicide would be sprayed on vegetation on the levees and potentially enter the water, Wyoming Department of Environmental Quality (WDEQ), the agency administering Section 402 compliance in Wyoming, requires the Corps to comply with the requirements of the General Permit for Minor Pesticide Discharges. This permit is issued by WDEQ under their Wyoming Pollutant Discharge Elimination System (WYPDES) program. The current General Permit went into effect in July 2015 and is scheduled to expire on December 31, 2020. The Corps is complying with this permit for the herbicide spraying the Corps is performing as part of the current O&M activities. The Corps would continue to comply with the current permit requirements and those of applicable successor permits as long as the Corps continues to spray herbicides on the levees and related work areas near the rivers.

Section 402 of the Clean Water Act also regulates ground disturbance that could potentially cause storm water run-off into waters of the U.S. Several of the JHFPP O&M activities, including levee rehabilitation, vegetation removal, and development of new turnarounds or stockpile sites, would involve construction or soil disturbance on the levees or within the easement. If the area of soil disturbance for that activity would be more than an acre and would discharge storm water into surface water, that activity would be subject to the provisions of Section 402. The Corps would comply with the

applicable Section 402 construction general permit (either large or small project) for these activities.

The Corps has filed a Notice of Intent and is complying with WDEQ's Large Construction General Permit to Discharge Storm Water Associated with Large Construction Activity WYR10-0000 for the current O&M activities that involve soil disturbance. The Corps is complying with the Storm Water Pollution Prevention Plan (SWPPP) the Corps prepared in compliance with the permit. The current General Permit went into effect in April 22, 2016 and is scheduled to expire on February 1, 2020. As with the permit for pesticide discharges, the Corps would continue to comply with the current permit requirements and those of applicable successor permits as long as the Corps continues to perform ground-disturbing O&M activities that could result in storm water runoff entering surface water. The Corps would also comply with any SWPPP it prepares in compliance with the permit.

#### **Section 404**

Discharge of dredged or fill material below the line of ordinary high water requires evaluation under Section 404 of the Clean Water Act. Several of the JHFPP O&M activities could involve placement of fill below the ordinary high water line in the Snake or Gros Ventre Rivers or wetlands on either side of the levees. These include emergency repair of levees (flood-fighting), levee rehabilitation, culvert cleaning (including repair, rehabilitation, or replacement), construction of rock barbs, construction of new stockpile sites, construction of new turnarounds, and removal of woody vegetation from wetlands.

Emergency repairs of levees would be exempt from review under Section 404 and levee rehabilitation may be exempt. Section 404(f)(1)(B) of the Act exempts maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures including levees. The levee rehabilitation work would be exempt if the levees are being restored to their original design criteria and footprint, use the same materials, and are not being modified or improved. As currently proposed under Alternatives 2 and 4, levee rehabilitation would meet this requirement.

Levee rehabilitation and culvert cleaning, repair, and replacement would meet the requirements of Nationwide Permit (NWP) 3, Maintenance. This permit is for the repair, rehabilitation, or replacement of any previously authorized, currently serviceable structure. Under this permit, some minor deviations in the structure's configuration, filled area, materials, construction codes, or safety features is allowed. The permit also authorizes removal of accumulated sediment and debris within and in the immediate vicinity of the structure. Any levee rehabilitation actions that cannot meet the exemption requirements would be expected to be able to meet the NWP 3 requirements.

Construction of rock barbs would likely require the Corps to prepare a site-specific evaluation in compliance with Section 404(b)(1) of the Act. This is because the barbs would be new in-water construction that likely involves placement of large

amounts of fill in the river. The Corps would issue a Public Notice in compliance with the Act prior to preparing a 404(b)(1) evaluation.

Construction of new stockpile sites or turnaround areas would be subject to Section 404 review only if the development of these sites would involve in-water placement of fill. The Corps would attempt to avoid wetlands and streams when planning any new sites. If wetlands or streams could not be avoided, the Corps would minimize the amount of fill placed in-water and mitigate the loss of wetlands if required by law or regulation. The placement of fill may meet the requirements of NWP 18, Minor Discharges, if less than 25 cubic yards of fill material would be placed below the ordinary high water mark and less than 1/10-acre of wetland would be filled.

Removing woody vegetation from Section 404 regulated wetlands or the rivers (waters of the United States) within the clear zone would not be subject to Section 404 as long as the Corps does not push the lifted soil back into the hole left by removing the rootball of the tree or shrub. If the Corps does push the soil back into the hole, it would be considered to be placing fill material. This placement of fill may also meet the requirements of NWP 3, Maintenance or NWP 18, Minor Discharges.

### **Section 401**

Section 401 of the Act requires a certification from the applicable permitting agency that the discharge of a pollutant or dredged or fill material meets water quality standards. If a permit under Section 404 is needed for an action, Section 401 water quality certification is also needed. Currently the Corps has two Section 401 water quality certifications from WDEQ: one for culvert cleaning performed in 2015 and one for ongoing levee rehabilitation. Both of these certifications expired in March 2018. The Corps does not plan to renew these certifications as the culvert cleaning was completed in 2015 and the Corps has determined the ongoing levee rehabilitation is exempt from Section 404 and therefore does not require 401 water quality certification.

The Corps has determined that most of the O&M activities do not require Section 401 water quality certification. Levee rehabilitation, culvert cleaning, and vegetation removal are the only activities that routinely involve in-water work and may require 401 water quality certification. Levee rehabilitation would require the certification only if it includes modification to the levee and would take place in Class 1 waters. Culvert cleaning and repair would require certification for work taking place in Class 1 waters. Vegetation removal for either Alternative 2 or 4 would require certification if soil from the roots or other fill material is placed in the holes left from removing woody vegetation. The Corps would also need to apply for a Turbidity Waiver from WDEQ for any work that would require 401 certification and create turbidity.

Table 4-1 identifies the Clean Water Act compliance the Corps has determined would be needed for the JHFPP O&M activities.

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**Table 4-1 Clean Water Act compliance needed for JHFPP O&M activities**

O&M Activity	Section 402	Section 404	Section 401	Annotation
Spring snow removal	NO	NO	NO	No aspect of this activity is subject to Clean Water Act.
Spring levee patrols	NO	NO	NO	No aspect of this activity is subject to Clean Water Act.
Emergency actions (flood-fighting)	NO	NO	NO	Emergency reconstruction is exempt from Section 404 per Section 404(f)(1)(B).  EO 11990 may apply.
Rock & fill material stockpiling	NO for routine operation  MAYBE for new stockpile site development	NO for routine operation  MAYBE for new stockpile site development	NO for routine operation  MAYBE for new stockpile site development	Development of additional stockpile areas would need site-specific compliance if surface water or CWA regulated wetlands would be affected.  EO 11990 may apply.
Levee rehabilitation	NO if less than 1 acre of ground disturbance (includes pulling out rooted woody vegetation or digging out roots)  YES if more than 1 acre of ground disturbance	NO if levee is not modified  YES if levee is modified [Nationwide Permit (NWP) 3 Maintenance]	NO if levee is not modified  YES if levee is modified and work is in Class 1 waters (Snake River above Wilson Bridge)  NO – if levee is modified and work is not in Class 1 waters	Maintenance is exempt from Section 404 per Section 404(f)(1)(B) if no change in design, footprint, or materials  Request Turbidity Waiver from WDEQ if Section 401 water quality certification is needed.  EO 11990 may apply.
Debris clearance	NO	NO	NO	Removal of material is not subject to Clean Water Act.  EO 11990 may apply.
Culvert cleaning, repair, rehabilitation, replacement	NO for routine maintenance  MAYBE for repair, replacement that extends past the levee footprint or changes culvert configuration	YES - NWP 3 Maintenance	YES – if working in Class 1 waters (Snake River above Wilson Bridge)  NO – if not working in Class 1 waters	Request Turbidity Waiver from WDEQ if Section 401 water quality certification is needed.  Additional site-specific compliance needed if culvert repair/replacement extends beyond the original footprint of the levee or changes the configuration of the culvert.  EO 11990 may also apply.
Vegetation removal – herbicide spraying	YES	NO	NO	Comply with WYPDES General Permit for Minor Pesticide Discharges.  EO 11990 may apply.

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Vegetation removal – cutting and removal	NO for cutting vegetation  MAYBE for pulling out rooted woody vegetation or digging out roots	NO for work on levee prism  NO for work below ordinary high water or in wetlands if not backfilling rootball holes  YES for work below ordinary high water or in wetlands if backfilling rootball holes (NWP 3 Maintenance and/or NWP 18 Minor discharges)	NO if not backfilling rootball holes  YES if backfilling rootball holes in Class 1 waters  NO if backfilling rootball holes and not working in Class 1 waters	Backfilling rootball holes may meet the requirement of NWP 18 Minor Discharges. WDEQ has issued 401 certification for this NWP for work outside of Class 1 waters.  Request Turbidity Waiver from WDEQ.  EO 11990 may apply.
Access road maintenance	NO for routine maintenance  MAYBE for new turnaround construction	NO for routine maintenance  MAYBE for new turnaround construction	NO for routine maintenance  MAYBE for new turnaround construction	Development of additional turnarounds would need site-specific compliance if surface water or regulated wetlands would be affected.  EO 11990 may apply.

#### **4.2.8 National Historic Preservation Act**

The National Historic Preservation Act (NHPA) of 1966, as amended, directs federal agencies to consider potential effects from the federal undertaking on cultural properties under their jurisdiction. Implementing regulations, 36 Code of Federal Regulations (CFR) Part 800, require an agency to consult with the State Historic Preservation Officer (SHPO), Tribes, and interested parties to ensure historic properties are adequately identified, evaluated, and considered in planning for proposed undertakings.

The Corps has determined the proposed updated O&M activities included in Alternatives 2 and 4 are undertakings, as described in Section 106 of the NHPA. However, two (snow removal and levee patrols) of the five identified O&M activity updates are covered within the existing programmatic agreement with Wyoming SHPO and the remaining three ( Emergency response measures, stockpiles, and levee rehabilitation) would require individual formal Section 106 review when said actions are going through the planning stages (see Wyoming SHPO Concurrence letter in Appendix D).

#### **4.2.9 Native American Graves Protection and Repatriation Act**

The Native American Graves Protection and Repatriation Act of 1990 (NAGPRA), 25 U.S.C Section 3001 et seq., and its implementing regulation, 43 C.F.R Part 10, provides the process for museums and Federal agencies to return certain Native American cultural items—human remains, funerary objects, sacred objects, or objects of cultural patrimony—to lineal descendants or culturally affiliated Indian tribes (or Native Hawaiian organizations). NAGPRA includes provisions for unclaimed and culturally unidentifiable Native American cultural items, intentional and inadvertent discovery of Native American cultural items on Federal and Tribal lands, and penalties for non-compliance and illegal trafficking of said materials.

In the event of an inadvertent discovery of human remains, funerary objects, sacred objects, or objects of cultural patrimony, the Corps would implement the protocols outlined by the most recent Corps guidance. These protocols would ensure materials are handled in a consistent manner that best protects and preserves the remains and/or objects; preserves the chain of custody from the initial collection through subsequent transfer, temporary storage, examination, analyses, and final curation or repatriation; and complies with legal requirements regarding disposition of human remains from unmarked burial sites.

#### **4.2.10 Rivers and Harbors Act of 1899**

Neither the Snake River nor the Gros Ventre River is a jurisdictional waterway under Section 10 of the Rivers and Harbors Act.

#### **4.2.11 Wild and Scenic Rivers Act of 1974**

The JHFPP does not include any river segments listed in the inventory of wild and scenic rivers. However, the Snake River immediately upstream of the Moose Bridge and the Gros Ventre along the southern boundary of Grand Teton National Park are designated as Scenic under the Act. Downstream of the JHFPP starting at the confluence of the Hoback River with the Snake, the Snake is designated as Recreational. The continued O&M of the JHFPP would not affect the designation of any of these river segments.

### **4.3 EXECUTIVE ORDERS**

#### **4.3.1 Executive Order 11988, Floodplain Management**

Executive Order 11988 outlines the responsibilities of federal agencies in the role of floodplain management. Each agency must evaluate the potential effects of actions on floodplains and avoid undertaking actions that directly or indirectly induce development in the floodplain or adversely affect natural floodplain values.

The Corps' proposed action under Alternative 2 or under Alternative 4 would involve actions within the floodplain as the purpose of the action is to continue to operate and maintain the JHFPP, an existing project constructed in the floodplain in the

1950's, 1960's, and 1970's to provide flood risk management for property affected by periodic flooding. The O&M activities would maintain designed levels of flood damage reduction provided by the JHFPP and would not further alter the floodplain.

#### **4.3.2 Executive Order 11990, Protection of Wetlands**

Executive Order 11990 directs federal agencies to provide leadership in minimizing the destruction, loss, or degradation of wetlands. Section 2 of this order states that, in furtherance of the NEPA, agencies shall avoid undertaking or assisting in new construction located in wetlands unless there is no practicable alternative, and shall minimize their impacts.

The Corps would avoid effects to wetlands as much as possible. Under either Alternative 2 or 4 any new construction such as additional turnarounds or new stockpile sites would be sited to avoid or minimize effects to wetlands, if possible. Alternative 2 may affect wetland functions and values by removing functional wetland vegetation. Alternative 4 would avoid much of these effects. If wetlands cannot be avoided, the Corps would minimize any effects to wetlands in accordance with the EO.

#### **4.3.3 Executive Order 12898, Environmental Justice, February 11, 1994**

Executive Order 12898 requires federal agencies to consider and address environmental justice by identifying and assessing whether agency actions may have disproportionately high and adverse human health or environmental effects on minority or low-income populations. Disproportionately high and adverse effects are those effects that are predominantly borne by minority and/or low income populations and are appreciably more severe or greater in magnitude than the effects on nonminority or non-low income populations.

The proposed federal action under both Alternatives 2 and 4 is the O&M of an existing flood risk management project. None of the O&M activities would adversely or disproportionately affect minority, low income populations, or children.

#### **4.3.4 Executive Order 13112, Invasive Species, February 3, 1999**

Executive Order 13112 requires federal agencies to take steps to prevent the introduction and spread of invasive species and to control and eradicate invasive species that have established.

The proposed action under either Alternatives 2 or 4 would involve lands with invasive species populations. In accordance with the Order, the Corps would take appropriate actions to prevent the spread of invasive species, and provide for the restoration of native species. These actions could include continuing to spray weeds as part of its vegetation removal activities and continuing to use rock and graded fill material with few fines or organic material.

#### **4.3.5 Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, November 6, 2000**

Executive Order 13175 requires federal agencies to consult with Indian tribal governments when considering policies that would affect tribal communities. The Corps invited Government to Government consultation with the Shoshone-Bannock Tribe and the Northern Cheyenne and Northern Arapahoe Tribe on the proposed updated O&M practices in a letter dated March 8, 2018, but has not received a request to consult to date.

#### **4.3.6 Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, January 10, 2001**

Executive Order 13186 directs federal agencies that take actions that affect migratory birds to develop a Memorandum of Understanding (MOU) and to work with the USFWS and other federal agencies to promote the conservation of migratory bird populations.

The proposed action may affect migratory bird species or their habitat subject to this Order. The Corps' O&M activities would be performed in a manner consistent with the July 2006 Memorandum of Understanding (MOU) between the U.S. Department of Defense and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds. The USFWS and other applicable agencies have been consulted and applicable compliance measures have been included in Appendix A, Impact Minimization Measures.

## **SECTION 5 - COORDINATION, CONSULTATION, AND PUBLIC INVOLVEMENT**

### **5.1 AGENCY CONSULTATION**

The Corps has requested information from and has discussed aspects of this proposed action with representatives from the Environmental Protection Agency, U.S. Fish and Wildlife Service, Wyoming Department of Environmental Quality, Wyoming Game and Fish Department, and the Wyoming State Historic Preservation Office. The Corps is also requesting informal consultation with the U.S. Fish and Wildlife Service under the Endangered Species Act.

### **5.2 PUBLIC INVOLVEMENT**

A public scoping period for the preparation of this Supplemental EA was held from April 20, 2017 until May 19, 2017. The Corps received one comment during this period. The EPA provided the Corps recommendations to develop an EA that describes the project's impacts to wetlands and avoids significant impacts to wetlands.

This EA available through the Walla Walla District Corps of Engineers website at [www.nww.usace.army.mil/Missions/Environmental-Compliance](http://www.nww.usace.army.mil/Missions/Environmental-Compliance) for review and comment. The distribution list includes the following:

#### Federal Agencies

Federal Emergency Management Agency  
Federal Highway Administration  
U.S. Bureau of Reclamation  
U.S. Department of the Interior  
U.S. Environmental Protection Agency  
U.S. Fish and Wildlife Service  
U.S. Forest Service  
U.S. Geologic Survey  
U.S. National Park Service - Grand Teton National Park

#### Wyoming State Agencies

Wyoming Department of Environmental Quality  
Wyoming Department of Transportation  
Wyoming Game and Fish Department  
Wyoming State Historic and Preservation Officer

#### Local Governments

Council of Historic Preservation  
Environmental Quality Council  
Jackson Hole Chamber of Commerce  
Jackson Hole Land Trust  
Jackson Parks and Recreation  
Teton Conservation District

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Teton County  
Town of Jackson

Tribes

Northern Cheyenne and Northern Arapaho  
Shoshone-Bannock

Local Groups

Alder Environmental, LLC.  
Biota Research and Consulting, Inc.  
Ducks Unlimited  
Greater Yellowstone Coalition  
Jackson Hole Conservation Alliance  
National Parks and Conservation Association  
Snake River Fund  
The Nature Conservancy  
The Sierra Club  
Trout Unlimited  
Wyoming Outdoor Council, LLC.

Other

Office of Congresswoman Liz Cheney  
Office of Senator John Barrasso  
Snake River Ranch

This SEA is also being made available [March 9 to April 9, 2018] to the public and local, state, and federal agencies for a 30-day review and comment period.

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