

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

## JACKSON HOLE FLOOD PROTECTION PROJECT OPERATION AND MAINTENANCE SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

# WETLAND REPORT



ADMINISTRATIVE RECORD – DO NOT DESTROY

PROJECT FILE NUMBER: PM-EC-2017-0009

February 2018

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#### 1. Project Name

Jackson Hole Flood Protection Project Operations and Maintenance Supplemental Environmental Assessment (PM-EC-2017-0009)

#### 2. References

- a. Jackson Hole, Wyoming Flood Protection Project Draft O&M Decision Document and EIS (Draft). December 1989
- b. Environmental Impact Statement, Snake-Gros Ventre Rivers Levee Maintenance Project, (Final). April 1990
- c. Corps of Engineers Wetland Delineation Manual, January 1987
- Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0), May 2010

#### 3. Project Location

The Jackson Hole Project (Project) is located near Jackson, Wyoming in Teton County, Wyoming. The Project is located along the levees bordering the Snake and Gros Ventre Rivers between River Miles (RM) 940 and 965 (Moose, Wyoming) on the Snake River and RM 0-2.5 on the Gros Ventre River (Figure 1).

#### 4. Project Description

**Background:** The U.S. Army Corps of Engineers, Walla Walla District (Corps) produced an Environmental Impact Statement (EIS) in 1990 which analyzed the impacts of operation and maintenance (O&M) activities on Corps managed levees as part of the Jackson Hole Project. The 1990 EIS identified nine distinct types of activities or operations that likely would be conducted as part of a routine levee maintenance program. All the O&M activities take place within the levee and access road easements. The nine activities/operations are:

- a. Spring snow removal.
- b. Spring levee patrols.
- c. Emergency actions. Flood-fighting and emergency repairs would be conducted by the Corps, as needed, at the problem/damage sites during the spring peak flows.
- d. Rock quarrying and stockpiling. Riprap and backfill material for the levee core would be transported from an off-site quarry.
- e. Levee rehabilitation. Levee rehabilitation would take place later in the year after flows have decreased.
- f. Debris clearance.



Figure 1- Jackson Hole Project near Jackson, Wyoming

- e. Culvert cleaning.
- f. Live vegetation removal.
- g. Access road maintenance.

The Corps conducted a review of the 1990 EIS in 2016 and determined that it did not adequately address the potential environmental impacts of operation and maintenance activities, including effects on wetland resources. The Corps decided to prepare a supplemental Environmental Assessment (SEA) to analyze the potential environmental effects of O&M activities. Wetlands were identified as a resource in need of such a review.

As part of the SEA effort, the Corps conducted a wetland survey along the 33 miles of Corps managed levees to identify the distribution and amounts of wetland habitat present. The survey was only conducted on the landward side of the levee as water level fluctuations vary considerably on the river side, creating transitory aquatic habitats that can change from year to year or even seasonally.

Wetland habitats along the Corps managed levees in the Jackson Hole area are primarily associated with riparian forests. Riparian forests have been reported to be in sharp decline across many areas of the western United States (Poff and Others, 2012) and these areas provide important habitat for many species of wildlife, birds, reptiles, amphibians, and other organisms.

**Methodology:** The Corps conducted a survey in June 2017 to determine the distribution and amounts of wetland habitats present on the landward side of the levees in the Jackson Hole Project. The survey was conducted by a Corps certified wetland delineator, assisted by a Corps employee experienced in conducting levee inspections at Jackson Hole. GIS layers from the National Wetland Inventory (NWI) were obtained and reviewed, in conjunction with recent aerial imagery, to develop an initial map layer of potential wetlands.

The survey was conducted using a reconnaissance level adaptation of the wetland delineation procedures identified in the 1987 Corps of Engineers Wetland Delineation manual, with updated methodologies in the 2010 Western Mountain, Valleys, and Coast Region (Version 2.0) Supplement. Due to the large extent (33 miles) of the levees, and the unknown scope and specific locations for future O&M activities, the inventory focused on the presence of the three characteristic wetland criteria, 1) vegetation, 2) soils, and 3) hydrology.

Wetlands are defined in the 1987 Manual as areas that meet the following three criteria:

a. Support vegetation that occur in areas where inundation or soil saturation is either permanent or of sufficient frequency and duration to influence plant occurrence (hydrophytes).

- b. Contain soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper layers (hydric soils).
- c. Area is inundated or saturated to the surface for at least 5% of the growing season in most years (wetland hydrology).

Due to the presence of the constructed levees, Atypical Situations as defined in the 1987 Manual, were essentially present along the entire scope of the Corps managed levees. The levees have significantly altered the original hydrology and subsurface water flows adjacent to the Snake and Gros Ventre Rivers and their tributaries.

The survey focused only on lands within the easements on the landward side of the levees. The survey assumed that the easement extended approximately 15 feet from the levee toe on the landward side. In some cases the levees had been built in excess of required specifications (overbuilt), but the easement was still assumed to be 15 feet from the levee toe. Exceptions to this general rule occurred in instances where the adjacent landowner had constructed fences less than 15 feet from the levee toe. In those case, the easement was assumed to end at the fence line.

Some of the wetland areas encountered along the levee toes were the result of historic stream channels, tributary streams, and subsurface flows that had been intersected or cut off by the original levee construction. In other instances, new wetland 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. Examination of aerial imagery clearly shows situations where the levee truncated or intersected the original drainage ways (Figures 2 through 4).

The 1990 EIS identified four wetland types associated with Corps managed lands at the Jackson Hole Project:

- a. Palustrine Forest
- b. Palustrine Scrub-shrub
- c. Palustrine Emergent
- d. Aquatic Bed.

Due to the interspersed nature of tree and shrub vegetation along the majority of the palustrine vegetative communities encountered, those wetland types were combined, resulting in the following three wetland/aquatic community types:

a. 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. Common plant species within the levee easements in Jackson Hole include: Rocky Mountain waterlily (*Nuphar polysepalum*), Arrowhead (*Sagittaria cuneata*), duckweed (*Lemna* spp.), etc.

- b. Palustrine Emergent: Wetland areas that support 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. Common plant species within the levee easements in Jackson Hole include cattail (*Typha latifolia*), sedges (*Carex* spp.), rushes (*Juncus* spp.), horsetail (*Equisetum* spp.), asters (*Aster* spp., *Erigeron* spp.), ferns, etc.
- c. Palustrine Forest/Shrub: Wetland areas that support woody vegetation covering 30% or more of the area. This type combines both shrubs (less than 6 meters tall) and trees (greater than 6 meters tall) because of the common interspersion of both vegetative lifeforms within the levee easement. Common plant species within the levee easements in Jackson Hole 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.).

Examples of the wetland types observed are shown in Figures 5 through 16.



Figure 2. Aerial Image showing Truncated Drainage Ways along the Snake River



Figure 3. Aerial Image showing Intersection of Taylor Levee with Historical Wetlands



Figure 4. Aerial Image showing Historical Channel altered by Hansen Levee



Figure 5. Aquatic Pond surrounded by Palustrine Forest/Shrub and Palustrine Emergent (back center)



Figure 6. Palustrine Emergent at Levee Toe



Figure 7. Aquatic Pond at Levee Edge

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Figure 8. Palustrine Forest/Shrub at Levee Slope and Toe



Figure 9. Palustrine Emergent at High Water



Figure 10. Aquatic Pond surrounded by Palustrine Forest/Shrub



Figure 11. Aquatic Pond surrounded by Palustrine Emergent and Palustrine Forest/Shrub



Figure 12. Palustrine Emergent



Figure 13. Palustrine Emergent at Levee Toe



Figure 14. Aquatic Pond and Palustrine Emergent at Levee Toe



Figure 15. Aquatic Pond, Palustrine Forest/Shrub, and Palustrine Emergent at Levee Toe



Figure 16. Aquatic Pond created when Levee Construction altered the Original Channel

#### 5. Wetland Survey Results

Field observations of wetland habitats were recorded on hardcopy maps and later digitized into a GIS geodatabase. Queries of the wetland delineations showed the area of the three wetland types as follows:

Aquatic Ponds	5.46 acres
Palustrine Emergent Wetlands	6.04 acres
Palustrine Forest/Shrub Wetlands	4.16 acres
Total (all wetland types)	15.66 acres

Queries showed the area of the lands within the easements on the landward side of the levees to be 185.54 acres, so the percentages of wetlands on the lands on the landward side within the levee easements is as follows:

Aquatic Ponds	2.94%
Palustrine Emergent Wetlands	3.25%
Palustrine Forest/Shrub Wetlands	2.24%

Total (all wetland types) 8.44%

The wetland density and spatial distribution by percent land cover per levee across the levee easements on the landward side is shown in Figure 15. The wetland density was classified as: low (0-5% of the land cover), medium (5-15% of the land cover), or high (greater than 15% of the land cover). Figure 15 shows a highly variable distribution of wetlands across the Jackson Hole Project area. Levee locations with the greatest percentage of wetlands within the easement on the landward side of the levees occur primarily in the southern portion of the Project on the Federal Extension, Taylor #1, Sewell, Evans and South Park levees, with two small levee locations (95 Ranch #4 and Hansen) in the northern portion of the Project.

Table 1 shows the distribution of the wetland types by specific levee locations. The highlighted colors for all wetlands in the table correspond to the wetland density percentages across the specific levee easements as shown in Figure 15. Table 1 also shows the area/percentage breakdowns by each of the three wetland types. Evans levee had the largest area of all wetland types (2.68 acres), while Sewell levee had the highest percentage of area in wetland types (48.24%).

The greatest area of aquatic ponds occur along the Lucas levee (1.09 acres), while the greatest areal percentage of aquatic ponds occur along the Sewell levee (27.55%).

The greatest area of palustrine emergent wetlands occur along the Evans levee (1.28 acres), while the greatest areal percentage of palustrine emergent wetlands occur along the 95 Ranch #4 levee (24.77%).

The greatest area of palustrine forest/shrub wetlands occur along the Evans levee (0.77 acres), while the greatest areal percentage of palustrine forest/shrub occur along the South Park levee (29.51%).

Table 2 shows the number of wetland polygons and average polygon size for all wetland types within the levee easement on the landward side for all levees within the Project. These polygons were identified using GIS and each polygon represents a distinct location on the ground that can be identified as meeting wetland criteria. The survey identified 159 individual wetland polygons in the project area. Palustrine emergent wetlands occurred the most often (70 polygons), followed by palustrine forest/shrub wetlands (48 polygons), and aquatic pools (41 polygons). The average polygon size was 0.10 acre for all wetland types, and was largest for aquatic pools (0.13 acres), while both palustrine emergent and palustrine forest/shrub wetlands averaged 0.09 acres/polygon.



Figure 17. Wetland Distribution for the Jackson Hole Flood Protection Project

Levee Name	AII W	etlands*	Aquatic Pond Wetlands		Palustrine Emergent Wetlands		Palustine Forest/Shrub Wetlands	
	(acres)	(percent)	(acres)	(percent)	(acres)	(percent)	(acres)	(percent )
95 Ranch #1	0.00	<mark>0.00%</mark>	0.00	0.00%	0.00	0.00%	0.00	0.00%
95 Ranch #2	0.08	<mark>8.14%</mark>	0.00	0.00%	0.08	8.14%	0.00	0.00%
95 Ranch #4	0.24	24.77%	0.00	0.00%	0.24	24.77%	0.00	0.00%
Solitude	1.00	<mark>3.68%</mark>	0.46	1.71%	0.35	1.30%	0.18	0.68%
Walton	0.71	<mark>6.13%</mark>	0.00	0.00%	0.71	6.13%	0.00	0.00%
Morgan	0.47	<mark>3.54%</mark>	0.00	0.00%	0.19	1.45%	0.28	2.09%
Federal	0.47	<mark>18.85%</mark>	0.16	6.52%	0.31	12.34%	0.00	0.00%
Extension								
Imeson #1	0.81	<mark>13.17%</mark>	0.54	8.87%	0.26	4.30%	0.00	0.00%
Imeson #2	0.25	<mark>3.64%</mark>	0.00	0.00%	0.25	3.64%	0.00	0.00%
Imeson #3	0.19	<mark>7.35%</mark>	0.07	2.63%	0.08	2.63%	0.05	1.81%
Game & Fish	0.19	8.58%	0.00	0.00%	0.19	8.58%	0.00	0.00%
#1								
Game & Fish #2	0.00	<mark>0.00%</mark>	0.00	0.00%	0.00	0.00%	0.00	0.00%
Game & Fish #3	0.06	<mark>6.08%</mark>	0.00	0.00%	0.06	6.08%	0.00	0.00%
Game & Fish #4	0.13	<mark>6.57%</mark>	0.00	0.00%	0.13	6.57%	0.00	0.00%
South Park	0.30	29.51%	0.00	0.00%	0.00	0.00%	0.30	29.51%
JY Ranch	0.46	<mark>2.50</mark> %	0.06	0.34%	0.26	1.40%	0.14	0.77%
John Dodge	1.39	<mark>6.48%</mark>	0.76	3.52%	0.02	0.07%	0.62	2.89%
Boat Ramp	0.70	13.33%	0.27	5.12%	0.04	0.80%	0.39	7.41%
Public	0.14	<mark>1.01%</mark>	0.00	0.00%	0.11	0.79%	0.03	0.22%
Taylor 1	0.51	<mark>19.56%</mark>	0.15	5.77%	0.09	3.48%	0.27	10.31%
Taylor 2	0.03	<mark>0.95%</mark>	0.00	0.00%	0.03	0.95%	0.00	0.00%
Taylor 3	0.27	<mark>8.34%</mark>	0.00	0.00%	0.05	1.70%	0.21	6.64%
Sewell	1.22	<mark>48.24%</mark>	0.70	27.55%	0.06	2.46%	0.46	18.24%
Evans	2.68	23.09%	0.63	5.47%	1.28	11.00%	0.77	6.62%
Golf Course-	0.54	9.85%	0.04	0.79%	0.30	5.43%	0.20	3.63%
Nelson								
Lucas	1.68	14.78%	1.09	9.60%	0.33	2.89%	0.26	2.28%
Hansen	1.13	29.21%	0.51	13.11%	0.63	16.10%	0.00	0.00%
Total Area	15.66	8.44%	5.46	2.94%	6.04	3.25%	4.16	2.24%

Table 1. Wetland Area (acres) and Density (percent) by Levee Location

\*Yellow highlighting is 0-5% wetland density, green is 5-15% wetland density, and blue is greater than 15% wetland density.

Levee Name All Wetlands		Aquatic Pond Wetlands		Palustrine Emergent Wetlands		Palustine Forest/Shrub Wetlands		
	Number	Ave Size (acres)	Number	Ave Size (acres)	Number	Ave Size (acres)	Number	Ave Size (acres)
95 Ranch #1	0	N/A	0	N/A	0	N/A	0	N/A
95 Ranch #2	1	0.08	0	N/A	1	0.08	0	N/A
95 Ranch #4	1	0.24	0	N/A	1	0.24	0	N/A
Solitude	12	0.08	5	0.09	4	0.09	3	0.06
Walton	5	0.14	0	N/A	5	0.14	0	N/A
Morgan	8	0.06	0	N/A	4	0.05	4	0.07
Federal Extension	6	0.08	1	0.16	5	0.06	0	N/A
Imeson #1	9	0.09	3	0.18	6	0.04	0	N/A
Imeson #2	3	0.08	0	N/A	3	0.08	0	N/A
Imeson #3	4	0.05	2	0.03	1	0.08	1	0.05
Game & Fish #1	2	0.09	0	N/A	2	0.09	0	N/A
Game & Fish #2	0	N/A	0	N/A	0	N/A	0	N/A
Game & Fish #3	1	0.06	0	N/A	1	0.06	0	N/A
Game & Fish #4	1	0.13	0	N/A	1	0.13	0	N/A
South Park	4	0.08	0	N/A	0	N/A	4	0.08
JY Ranch	16	0.03	3	0.02	9	0.03	4	0.04
John Dodge	14	0.10	7	0.11	2	0.01	5	0.12
Boat Ramp	9	0.08	3	0.09	2	0.02	4	0.10
Public	7	0.02	0	N/A	5	0.02	2	0.02
Taylor 1	7	0.07	3	0.05	1	0.09	3	0.09
Taylor 2	1	0.03	0	N/A	1	0.03	0	N/A
Taylor 3	3	0.09	0	N/A	1	0.05	2	0.11
Sewell	5	0.24	2	0.35	1	0.06	2	0.23
Evans	14	0.19	5	0.13	5	0.26	4	0.19
Golf Course- Nelson	8	0.07	2	0.02	2	0.15	4	0.05
Lucas	13	0.13	3	0.36	4	0.08	6	0.04
Hansen	5	0.23	2	0.25	3	0.21	0	N/A
Total Area	159	0.10	41	0.13	70	0.09	48	0.09

 Table 2. Wetland Areas by Number of Polygons and Polygon Size

It is important to note that 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 GIS wetland survey layer maintained in the Corps Walla Walla District GIS library contains detailed information and metadata related to the surveyed wetlands. The

appendix to this report contains detailed hardcopy maps showing the locations of surveyed wetlands within the levee easements on the landward side.

Soils along the landward side of the levees were dominated by coarse sandy to gravelly and cobbly materials, usually resulting from flood events depositing these coarse materials in the floodplain. Fine silty materials were more commonly found in the aquatic pond wetlands and in backwater sloughs and marshes where the fine sediments would settle out.

Records of plant species observed along landward side of the levees, both in wetlands and adjacent upland sites, were made during the site visit. Identifications were verified using Shaw (1974), Shaw (1992), and Vizgirda (2007). Table 3 shows the species observed and their wetland indicator status. Wetland indicator status categories are as follows:

- a. Obligate (OBL) plants occur almost always (99%+ of the time) under natural conditions in wetlands,
- b. Facultative Wetland (FACW) plants usually occur in wetlands (67-99% of the time), but are occasionally found in non-wetlands,
- c. Facultative (FAC) plants are equally likely (34-66% of the time) to occur in wetland and non-wetlands,
- d. Facultative Upland (FACU) plants usually (1-33% of the time) occur in non-wetlands, but are occasionally found in wetlands,
- e. Upland (UPL) plants almost never occur in wetlands (< 1% of the time).
- f. No Rating (NR): these plants were not reported in the wetland plant list and are assumed to not be wetland indicator plants.

To be considered a wetland indicator plant (hydrophyte), the plant's wetland indicator status must be OBL, FAW, or FAC.

Scientific Name	Common Name	Wetland Indicator Status <sup>1</sup>					
Trees							
Abies lasiocarpa	Subalpine fir	FACU					
Juniperus scopulorum	Rocky Mountain juniper	NR					
Picea engelmannii	Engelmann spruce	FAC					
Picea pungens	Blue spruce	FAC					
Pinus contorta	Lodgepole pine	FAC					
Pinus flexilis	Limber pine	NR					
Populus angustifolia	Narrowleaf cottonwood	FACW					
Populus balsamifera	Balsam poplar	FAC					
Populus tremuloides	Quaking aspen	FACU					
Populus trichocarpa	Black cottonwood	FAC					
Pseudotsuga menziesii	Douglas-fir	FACU					
Shrubs							
Acer glabrum	Rocky mountain maple	FACU					

Table 3.	Plant List and	Wetland I	Indicator	Status

Scientific Name	Common Name	Wetland Indicator Status <sup>1</sup>			
Alnus incana	Thinleaf alder	FACW			
Amelanchier alnifolia	Western serviceberry	FACU			
Arctostphylos uva-ursi	Bearberry	FACU			
Artemisia cana var. viscidula	Silver sage	FACU			
Artemisia tridentata	Big sagebrush	NR			
Berberis repens	Common Oregon grape	NR			
Cornus stolonifera	Red-osier dogwood	FACW			
Elaeagnus commutata	Silverberry	FAC			
Juniperus communis	Common juniper	UPL			
Lonicera utahensis	Utah honeysuckle	FAC			
Prunus virginiana	Common chokecherry	FACU			
Purshia tridentata	Bitterbrush	NR			
Rhamnus alnifolia	Alder-leaf buckthorn	FACW			
Ribes aureum	Goldern currant	FAC			
Ribes inerme	Whitestem gooseberry	FAC			
Ribes lacustre	Prickly currant	FAC			
Rosa woodsii	Wood's rose	FACU			
Rubus parviflorus	Western thimbleberry	FACU			
Salix exigua	Coyote willow	FACW			
Salix lasiandra	Whiplash willow	FACW			
Shepherdia canadensis	Russet buffaloberry	UPL			
Sorbus scopulina	Cascade mountain ash	FACU			
Spiraea betulifolia	Shinyleaf spiraea	FACU			
Symphoricarpos albus	Common snowberry	FACU			
Forbs					
Achillea millefolium	Common yarrow	FACU			
Amaranthus albus	Tumbleweed	FACU			
Ambrosia artemisifolia	Common ragweed	FACU			
Anaphalis margaritacea	Pearly everlasting	FACU			
Antennaria microphylla	Rosy pussytoes	NR			
Aquilegia flavescens	Yellow columbine	FAC			
Asclepias speciosa	Showy milkweed	FAC			
Aster campestris	Meadow aster	NR			
Aster engelmanni	Engelmann aster	NR			
Bidens cernua	Nodding beggarticks	OBL			
Cicuta maculata	Water hemlock	OBL			
Conium maculatum	Poison hemock	FAC			
Disporum trachycarpum	Fairy bells	NR			
Eriogonum umbellatum	Sulfur buckwheat	NR			
Fragaria vesca	Woods strawberry	FACU			
Geranium richardsonii	Richardson geranium	FAC			
Geranium viscossimum	Sticky geranium	FACU			
Geum macrophyllum	Largeleaf avens	FAC			
Heracleum lanatum	Cow parsnip	FAC			
Hypericum perforatum	Common St. Johnwort	FACU			

Scientific Name	Common Name	Wetland Indicator Status <sup>1</sup>				
Nuphar polysepalum	Rocky Mountain waterlily	OBL				
Polygonum bistortoides	American bistort	FACW				
Sagittaria cuneata	Arrowhead	OBL				
Senecio integerrimus	Western grondsel	FACU				
Sisyrinchium uidahoense	Idaho blue-eyed grass	FACW				
Streptopus amplexifolius	Clasping twisted stalk	FAC				
Tanacetum vulgare	Common tansy	FACU				
Tragopogon dubius	Yellow salsify	NR				
Typha latifolia	Common cattail	OBL				
Viola canadensis	Canada violet	FACU				
Graminoids						
Agropyron cristatum	Crested wheatgrass	NR				
Carex aquatilis	Water sedge	OBL				
Carex lenticularis	Lens sedge	OBL				
Carex nebrascencis	Nebraska sedge	OBL				
Carex rostrata	Beaked sedge	OBL				
Deschampsia caespitosa	Tufted hairgrass	FACW				
Juncus balticus	Wiregrass	FACW				
Juncus bufonis	Toad rush	OBL				
Juncus confusus	Colorado rush	FAC				
Juncus ensifolius	Swordleaf rush	FACW				
Juncus filiformis	Thread rush	FACW				
Phleum pratense	Common Timothy	FAC				
Scirpus sp.	Bulrush	OBL				
Ferns and others						
Equisetum arvense	Field horsetail	FAC				
Pteridium aquilinum	Bracken fern	FACU				

<sup>1</sup> OBL= Obligate wetland plants (99+%), FACW=Facultative wetland plants (67-99%), FAC=Facultative plants (34-66%), FACU=Facultative upland plants (1-33%), UPL=Upland plants (<1%), NR=No rating, not on wetland indicator plant list. Plant species with wetland indicator status highlighted in blue meet wetland indicator criteria.

The plant list in Table 3 above shows all the plant species observed during the wetland survey, but a relatively small number of species dominated each of the three wetland types as described in the following paragraphs.

Aquatic ponds (Figures 5, 7, 10, 11, 14, 15, 16), occupying 2.94% of the Project area, are characterized by shallow pools with relatively low biological diversity. Vegetation was dominated by green filamentous algae, duckweed (*Lemma spp.*), arrowhead (*Sagittaria cuneata*), and Rocky Mountain water lilies in most locations. Amphibians, reptiles, and fish were uncommon in the ponds, likely due to the long winters, short growing season, and cold temperatures during the growing season. Bird life was present but not abundant in the ponds, likely due to the fairly sterile nutrient conditions present.

Aquatic ponds were observed in historic channels that had been blocked by levee construction as well as common aquatic habitats present within the floodplains of the Snake and Gros Ventre Rivers. The condition of the aquatic ponds in the Jackson Hole Project appeared to be stable with little evidence of environmental degradation or change. Development of adjacent lands was occurring in some areas, but impacts to easement lands along the levees was minimal.

Palustrine emergent wetlands (Figures 5, 6, 9, 11, 12, 13, 14, 15), occupying 3.25% of the Project Area, are dominated by a variety of sedges, rushes, grasses (several genera), horsetail, asters, ferns (several genera), bulrush (*Scirpus sp.*), and cattails. These areas are very productive and provide habitat for birds, mammals, and amphibians. Palustrine emergent wetlands are very productive and important for habitat values, sediment filtering and storage, and are a vital transition area from deep water habitats to uplands.

The ecological condition of the palustrine emergent wetlands was stable and generally exhibiting excellent wetland functions and values. Development impacts from adjacent lands were minor and protection was generally being maintained on these lands.

Palustrine forest/shrub wetlands (Figures 5, 8, 10, 11, 15), occupying 2.24% of the easement area, are dominated by narrowleaf cottonwood (*Populus angustifolia*) in the overstory, a variety of willows and thinleaf alder (*Alnus incana*) in the shrub layer, and an ground cover of plant species typical of palustrine emergent wetlands. These areas are very productive and provide excellent habitat for birds, mammals, and amphibians. Other species, including black cottonwood (*Populus trichocarpa*), Engelmann spruce, and lodgepole pole (*Pinus contorta*) are common associates in the overstory, alder-leaf buckthorn (*Rhamnus alnifolia*), currants and gooseberries (*Ribes sp.*), red-osier dogwood (*Cornus stolonifera*), and silverberry (*Elaeagnus commutate*) were common shrub species, and a wide variety of additional wetland indicator forbs and graminoids are present as ground cover.

Palustrine forest/shrub wetlands appear to be generally stable, but some successional encroachment by mid to late seral species, including Engelmann and blue spruce was observed. This is likely due to effective fire suppression and the elimination of flooding within the historic floodplain resulting in the development of early seral plant communities.

#### 6. Summary and Conclusions

The survey identified 15.66 acres of wetland habitats on the 185.54 acres of lands within the levee easement on the landward side, or 8.44% of the area. The vast majority of the wetland areas are small portions, or slivers, of larger wetlands extending from adjacent lands into the levee easement.

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, which are common in the adjacent upland plant communities. Approximately 5.46 acres (2.94%) of the Project area is occupied by aquatic ponds, 6.04 acres (3.25%) in palustrine emergent wetlands, and 4.16 acres (2.24%) in palustrine forest/shrub wetlands.

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.

Potential O&M activities are expected to have minimal impacts on wetland habitats in the Project area. Direct levee maintenance activities, such as rehabilitation or flood fighting actions, would generally occur within the levee prism, not on the adjacent wetlands. With the implementation of proper best management practices and impact avoidance or avoidance measures identified in the SEA, any wetland impacts would generally be minimal and of short duration.

Operations and maintenance actions directly affecting vegetation on and/or adjacent to the levees, such as removal of trees and/or shrubs for levee safety and maintenance purposes, would convert some forest/shrub wetlands to palustrine emergent wetlands, which would still perform important wetland functions. The majority of tree/shrub removal for safety and maintenance purposes would occur on the levee slopes, not within the aquatic habitats.

The construction of new access roads or turnarounds or any other actions resulting in the addition of fill materials into existing would have the potential to negatively impact wetlands. If such actions are proposed in any of the wetland locations identified in this survey, appropriate mitigation measures, such as the creation of new wetland areas, should be implemented to compensate for the loss of wetlands.

Other O&M actions such as snow removal, levee patrols, road maintenance, culvert cleaning, rock quarrying, etc. would generally not be conducted in wetland areas, so there should be no negative impacts to wetlands. If actions do extend into adjacent wetland habitats, appropriate mitigation measures would be implemented to compensate for the loss of wetland habitats.

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### APPENDIX

WETLANDS AT JACKSON HOLE PROJECT