Wetland Delineation Report

Boone Pond Wetland Mitigation
Kittitas County, Washington

August 25, 2016

Boone Pond Project Site - Photo taken July 29, 2015.

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1.0 Introduction

This wetland delineation report was prepared by the Yakama Nation – Yakima/Klickitat Fisheries Project (YKFP) on behalf of the Bonneville Power Administration (BPA) in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual* and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region, Version 2.0 (September 2008)*. YKFP and BPA are proposing to implement the Boone Pond Wetland Mitigation Project as phase two mitigation for the Cle Elum Supplementation and Research Facility (CESRF) to compensate for impacts associated with the Well 3 Wetland. This report will provide baseline data for developing the final design and mitigation plan for project implementation. BPA is the primary funding entity and the lead action agency, and YKFP is managing the design and construction of this project.

The proposed project will involve acquisition of state and privately owned land adjacent to the Upper Yakima River in South Cle Elum in Kittitas County, Washington. The project lies within USGS hydrologic unit 17030001. The project area encompasses 1.0 mile length of the Yakima River approximately 9.3 miles downstream from the confluence with the Cle Elum River at Lat/Long 47°10'44.1"N, 120°53'27.3"W. The legal description of the project location is: Township 20 North, Range 16 East, Section 31, SW ¼. Kittitas County Tax Lots 145035, 365135, 385135, 20473, and 20474. A map of the project location and vicinity is shown in Figure 1.

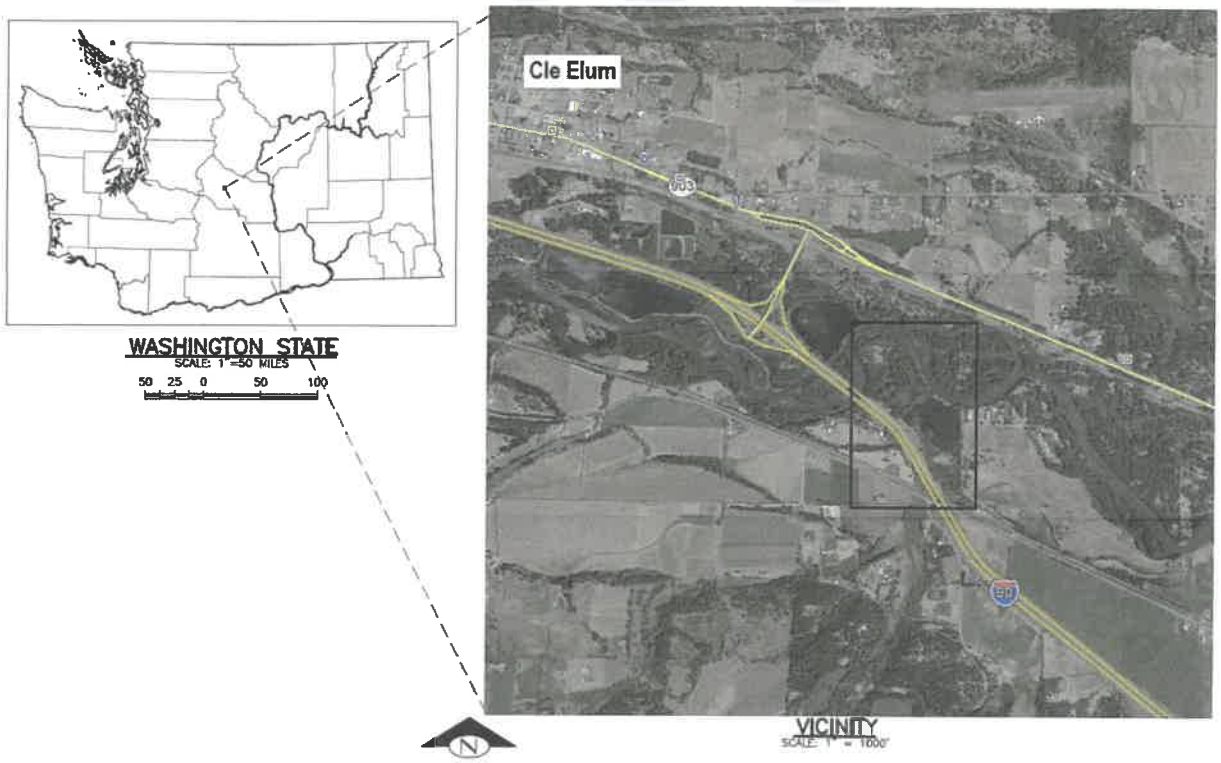

Figure 1. The Boone Pond Wetland Mitigation site abuts the Yakima River, immediately downstream of the Interstate 90 Yakima River Bridge crossing in South Cle Elum.

2.0 Background

Operation of the Cle Elum Supplementation and Research Facility (CESRF), which began in 1997, resulted in groundwater drawdown with concomitant impacts to jurisdictional wetlands. In 2003, mitigation was completed by the Bonneville Power Administration (BPA) along the margins of Tillman Creek to compensate for functional loss of the Well 3 wetland. In 2008, the Tillman Creek mitigation project was determined to be successful by regulatory agencies; however, since the wetland had been permanently impacted, a replacement ratio for acreage is now required to fully mitigate for wetland loss. The delineated Well 3 wetland calculated to be 1.46 acres in size. The mitigation site created at Tillman Creek calculated to be 0.52 acres in size. It was determined by Otak, Inc, that a minimum of 0.94 acres of wetland creation would be required for lost performance of the Well 3 wetland (Sheldon 2008).

In 2011, the Boone Pond Wetland Mitigation Project was identified and presented to regulatory staff at Washington Department of Ecology (DOE) and U.S. Army Corps of Engineers (USACE) (Nicolai 2011). The site received support after teleconference call(s) and field trips as phase two mitigation for the CESRF hatchery operations. The project site is located less than four miles from the wetland impact area in South Cle Elum in Kittitas County, Washington. The proposed phase two mitigation for the CESRF hatchery was then presented to the Budget Operations Group (BOG) to secure funds for purchase of the western parcel owned by Washington State Department of Transportation (WSDOT) and purchase of an easement for the eastern, privately owned parcels (Figure 2), design and permitting for the mitigation project, and construction of the same. Both the state and private landowner are willing participants encouraging this project and cooperative in the development of a conceptual plan.

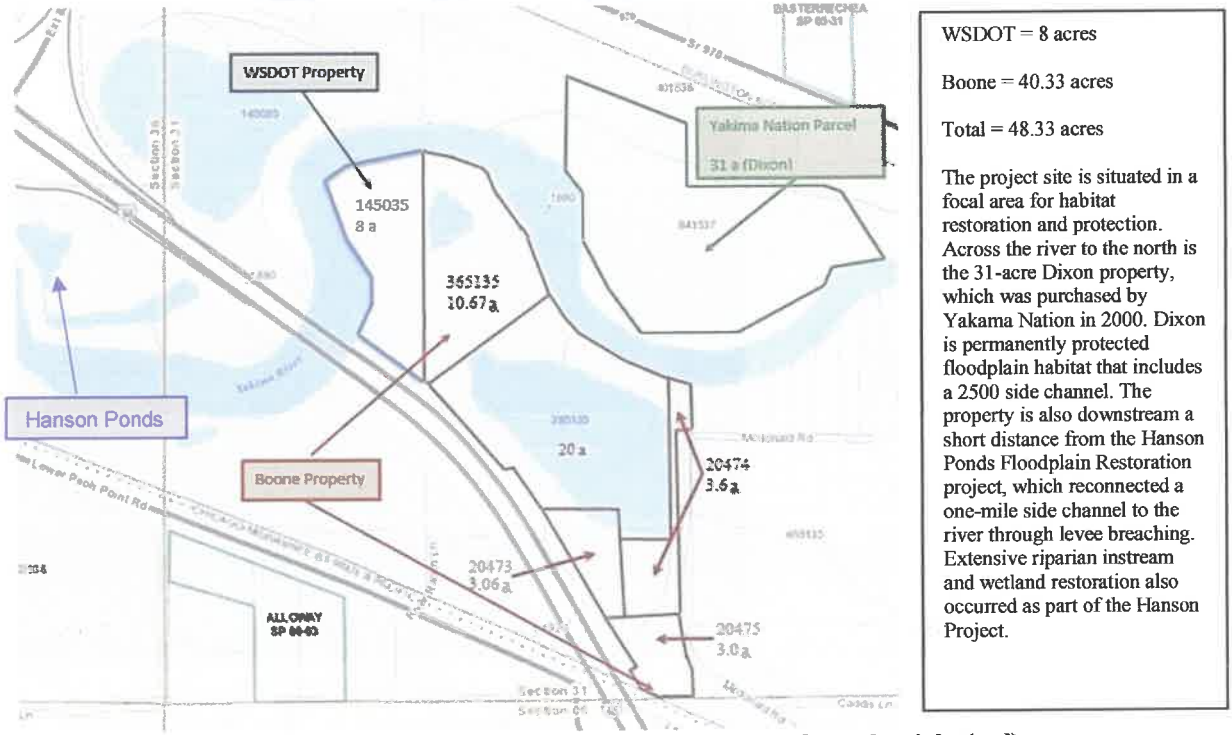

Figure 2. Subject parcels – WSDOT parcel on left (blue), private parcels on the right (red)

The Revised Code of Washington Title 47: Public Highways and Transportation RCW 47.12.063 does not allow surplus of real property to a federally recognized Indian tribe unless located within the reservation boundary. The department may sell to any other state agency, the city or county in which the property is situated, or any other municipal corporation. Although, WSDOT may sell or exchange unused land to the United States under RCW 47.12.080. The private landowner has since expressed interest in selling the private parcels. Kittitas Conservation Trust (KCT) has agreed to hold title of the private and state owned parcels once acquired by BPA for future management of the property. The intake call between YKFP, KCT and BPA was completed April 8, 2016 with the expectation that the title would be transferred to KCT following acquisition. Additional BOG funding may need to be secured if acquisition of the private parcels is pursued since it was not included in the original proposal.

Research conducted by Yakama Nation, Washington Department of Fish and Wildlife, University of Montana and Central Washington University identified this reach as highly productive for salmonid fishes, because it is characterized by broad, alluvial floodplains with active hyporheic zones. With approximately 800,000 acre-feet of irrigation impoundments upstream, streamflow is artificially high throughout the summer in the subject reach. Rearing habitat for juvenile fish is thus compromised, because small fish cannot hold and forage in the high flows. Off-channel fish rearing habitats can be exceptionally important given the regulated flow of the Yakima River. However, the pond's ecological role could be enhanced by creating more shoreline complexity through placement of gravel to create peninsulas, and through placement of woody material.

The Boone Pond Project is located in a focal area for habitat restoration and protection. Across the river to the north is the 31-acre Dixon property, which was purchased by Yakama Nation in 2000. Dixon is permanently protected floodplain habitat that includes a 2500 foot side channel. The properties are downstream a short distance from the Hanson Ponds Floodplain Restoration project, which reconnected a one-mile side channel to the river through levee breaching. Extensive riparian instream and wetland restoration also occurred as part of the Hanson Project. The proposed Boone's Pond project presents an opportunity for mitigation that is geographically strategic, cost-effective and ecologically significant. A map of all mentioned properties is included in Figure 2.

The proposed project will create/enhance riverine and palustrine wetlands to compensate for wetland losses at the hatchery, while providing off-channel rearing habitat in a regulated river system. Wetlands could be created along the margins of the new side channels, within existing Boone's Pond, and within and/or to the east of the existing small pond on WSDOT property (north of Boone's Pond). The existing ponds could be enhanced primarily by adding complexity to the existing shoreline. Spoils from the side channel could be strategically placed along the pond edges to increase edge habitat. Large wood could be placed in the pond, and snags could be placed around the pond edges for terrestrial wildlife. Actual locations for wetland creation will be driven by the types/locations of wetlands that will receive wetland mitigation credit through the DOE credit/debit methodology.

3.0 Site Conditions

The large pond within the project area was created through gravel mining. Upon cessation of mining, the resulting pit filled with water. On the northwest end of the pond there is evidence at many locations of shallow groundwater discharge into the pond. The pond bathymetry is uniform and substrate is primarily clay. Water depth (in feet) and temperature (Fahrenheit) was collected on June 2, 2005 along 7 transects in the large pond by YKFP staff during low to medium flow conditions on the Yakima River (Figure 3) (Newsome 2005). Bathymetry data was used for mapping the wetland boundary in the "results" section of this report.

Figure 3. Water depth (green) and temperature (red). Data collected June 2, 2005.

Field indicators (soil, plant, and topography) present at the project site along with available LiDAR obtained from the Puget Sound LiDAR Consortium was utilized to determine the capability of the site to support hydrophitic vegetation and hydric soils given the current hydrology. The wetland determination was conducted to establish baseline site conditions to inform the planning, design, permitting, implementation, as well as monitoring project success of the proposed phase two wetland mitigation project.

A site visit was conducted August 14, 2015 to observe conditions during artificial high flow before annual flip flop (Figures 4-6). The Bureau of Reclamation begins the annual flip-flop operation in the Yakima Basin by gradually reducing flows out of Cle Elum Reservoir in the Upper Yakima River Basin and increasing flows from Rimrock Reservoir in the Tieton and Naches River Basins beginning the week of August 27. Figure 4 displays stream gage data obtained from the USBR Hydromet stream gauge for the Yakima River at Cle Elum (YUMW) during reported data collection.

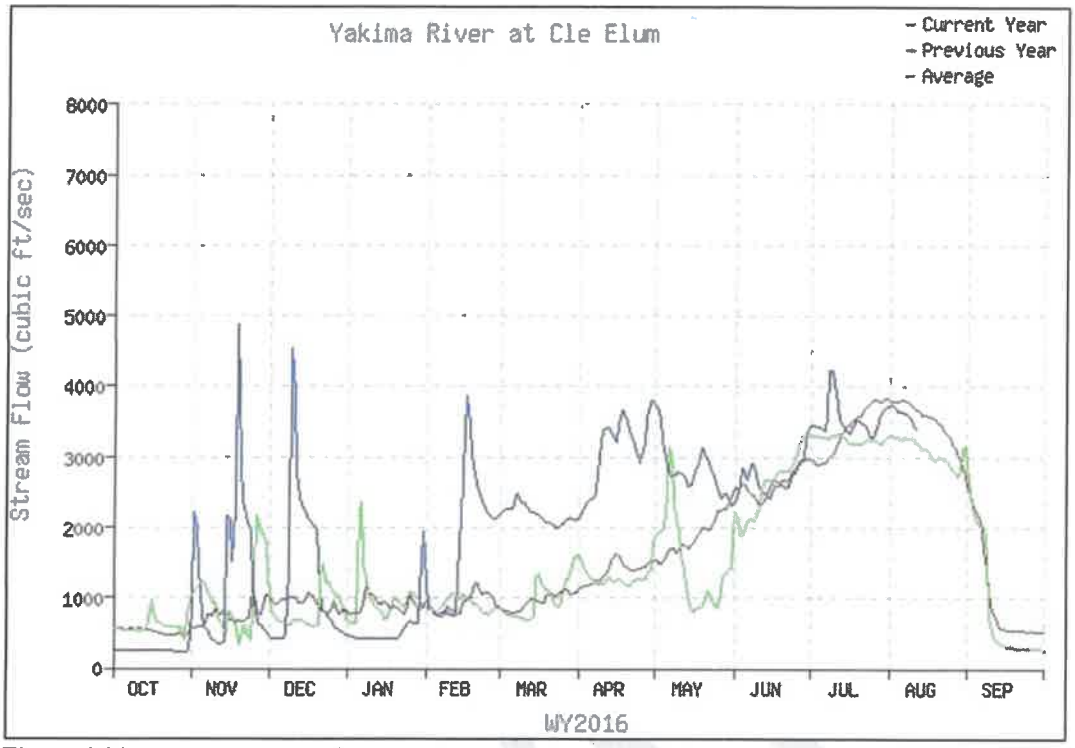

Figure 4. Note above average flow conditions in March/April 2016 as compared to August 2015. Also note annual flip flop in September.

The project site would be considered riverine based on the hydrogeomorphic (HGM) class due to its hydrologic connectivity to the Yakima River (Brinson 1993). Although, surface water is only seasonally connected during artificial high flow. The wetland further identifies as riverine emergent and riverine aquatic bed according to Cowardin's classification system based on vegetation (Cowardin et al. 1977). The vegetation is predominantly common cattail (*Typha latifolia)* and reed canarygrass (*Phalaris arundinaceae*). *Typha latifoia* has a wetland indicator status of Obligate Wetland (OBL). OBL species are species that occur in wetlands (estimated probability >99%). *Phalaris arundinacea* has a wetland indicator status of Facultative Wetland (FACW). FACW are species that usually occur in wetlands (estimated probability 67% -99%) but are occasionally found in non-wetlands.

According to the National Wetland Inventory (2016), the site is identified as a freshwater emergent wetland and freshwater pond. The classification codes assigned to this site are PEMCx and PABHx (Appendix A). PEMCx is an excavated (man-made) palustrine emergent wetland that is seasonally flooded. PABHx is an excavated (man-made) palustrine aquatic bed that is a permanently flooded.

The Web Soil Survey (2016) mapped the majority of the wetland soil as Xerofluvents, 0 to 5 percent slope (Appendix A). The small wetland area south of the large pond was mapped as Patnish-Mippon-Myzel complex, 0 to 3 percent slopes.

Figure 5. Looking NW standing at survey point #1. White arrow indicates absence of water.

Figure 6. Looking SE standing at survey point #1. White arrow indicates absence of water.

4.0 Survey Methodology

The Arid West Region wetland determination data form (DOE 1997) was used to determine hydrophytic vegetation, hydric soils, and wetland hydrology (Appendix B). The Washington State Wetland Rating System for Eastern Washington was used to rate the determined wetland. (Appendix C). Data was collected March 17, 2016, April 22, 2016, April 25, 2016, and June 17, 2016. Refer to Figure 7 for survey point locations.

Determination of Wetland Hydrology
Wetland hydrology was determined by observation of current hydrologic conditions during the time of survey. If hydrologic indicators were met, the location of the survey point would also have to support hydrophytic vegetation and meet the definition of a hydric soil. LiDAR obtained from the Puget Sound LiDAR Consortium was utilized for determining survey locations and mapping the wetland boundary in areas where data was not collected. The mapped boundary was walked in the field and confirmed using LiDAR and field observation of existing hydrophytic vegetation (Figure 8).

Determination of Hydric Soils
Soil pits were dug using procedures outlined in the *Field Guide for Wetland Delineation: 1987 Corps of Engineers Manual.* The pits were used to observe the soil profile to determine the soil substrate, determine color and look for wetland indicators. Soil samples were examined in the field by hand texturing, using guidelines outlined in the *Munsell Soil Color Book* (2009) and *Field Indicators of Hydric Soil in the United States* (2010) for assessing soil features. Results were recorded on the data forms (Appendix B).

Determination of Hydrophytic Vegetation
The presence of hydrophytic vegetation was determined using indicators stated in the *1987 U.S. Army Corps of Engineers Wetland Delineation Manual.* Vegetative percent cover was recorded within a 15 foot radius, as suggested in the protocol, from the center of the soil pit. The primary indicator of hydrophytic vegetation is areas having more than 50 percent of the dominant species being obligate wetland plants (OBL), facultative wetland plants (FACW), or facultative plants (FAC). In addition to utilizing available LiDAR data, the wetland boundary was determined based on visual observation of dominant vegetation in areas where the soil was not analyzed. For example, visual indicators for facultative upland species (FACU) included common snowberry (*Symphoricarpos albus*), Wood's Rose (*Rosa woodsii*), and Ponderosa pine (*Pinus ponderosa*). Visual indicators for hydrophytic vegetation included OBL wetland species and a dominance in FACW; for example, sedges (*Carex* spp.), rushes (*Juncus* spp.), and Sitka alder (*Alnus sinuata*).

Determination of Wetland Boundaries
Wetland boundaries were determined based on the presence of positive indicators of wetland criteria. Soil samples were examined in the wetland and adjacent uplands, particularly in areas difficult to define. In most cases, wetland boundaries could be identified visually using abrupt vegetative community changes between upland and wetland plants. Aquatic bed versus open water was determined based on bathymetric data (Newsome 2005). However, since data was collected during low to medium flow conditions, 3 ft was added to each data point in order to create full pool conditions in the large pond.

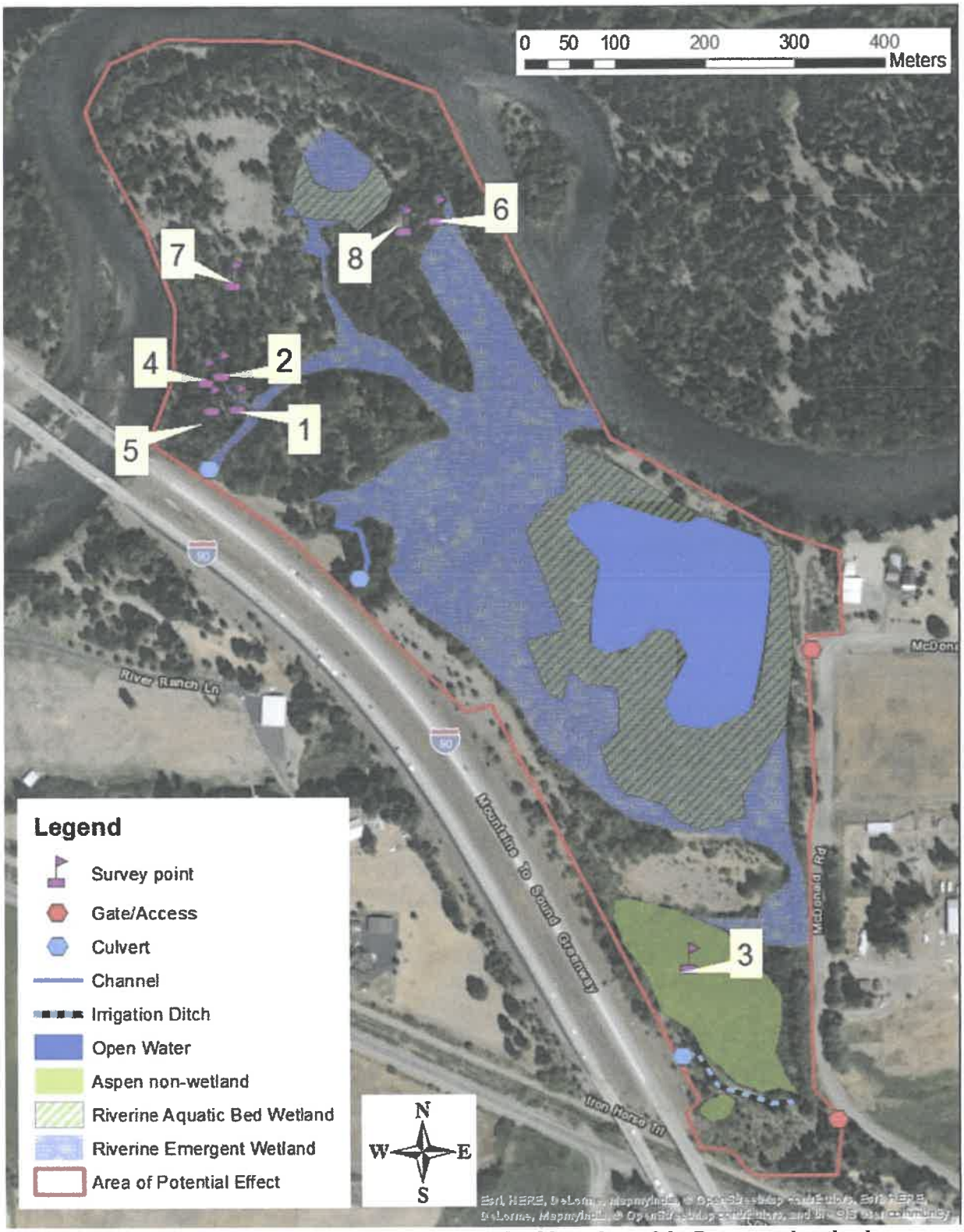

Figure 7. Survey point locations within the delineated wetland boundary of the Boone pond wetland mitigation project.

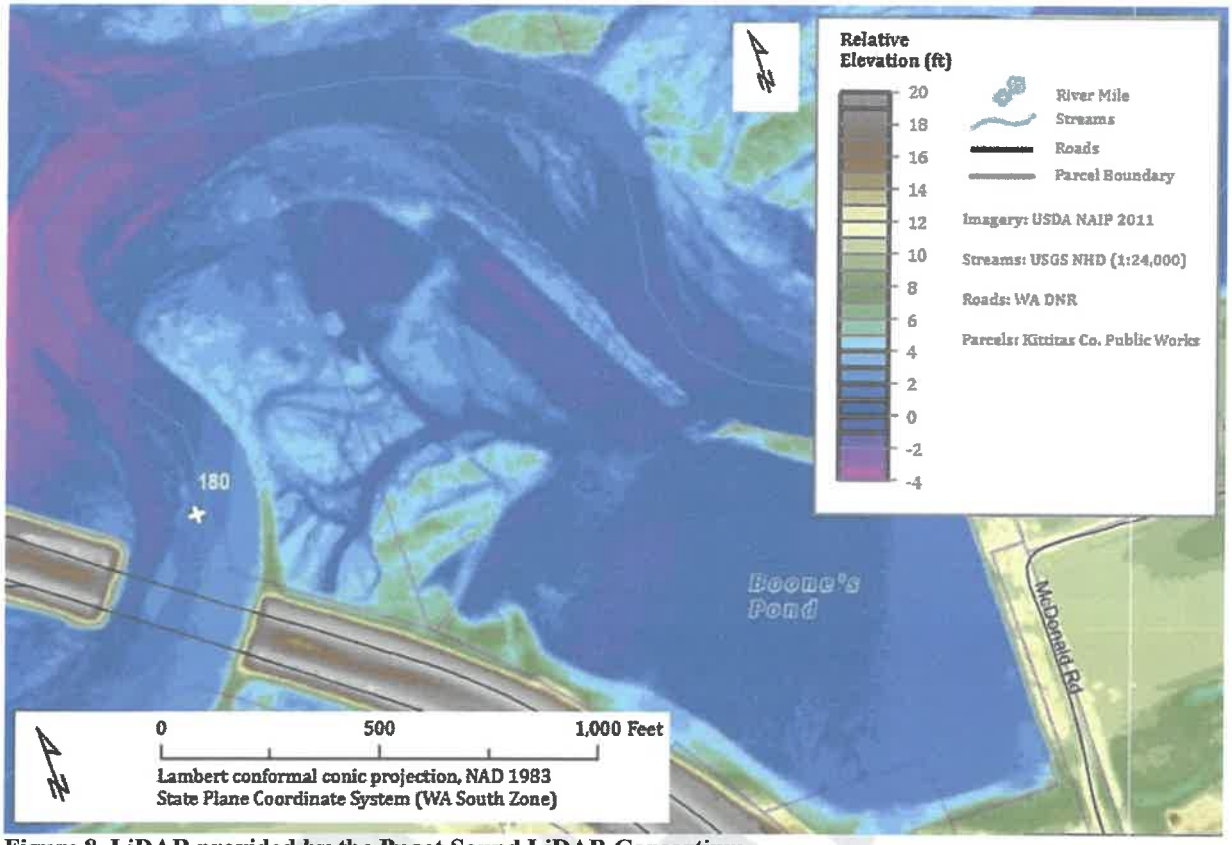

Figure 8. LiDAR provided by the Puget Sound LiDAR Consortium

5.0 Results

The determined wetland is approximately 17 acres within the area of potential Effect (APE), which includes ~ 5 acres of riverine aquatic bed and ~12 acres of riverine emergent wetland (Figure 7). According to the Washington State Wetland Rating System for Eastern Washington, the determined wetland received a score of 21, which places it into a Category II based on wetland functions. The wetland also received a Category I rating based on special characteristics due to the presence of an aspen stand located within 100 meters of the mapped wetland boundary. Data was collected within the aspen stand to confirm non-wetland status. The wetland received a dual rating as a Category I/II. See Appendix C for rating form.

Hydrology

There were several wetland hydrology indicators observed at the site. Primary indicators observed included: surface water (A1), high water table (A2), and saturation (A3). Hydrologic indicators were met in each wetland/upland paired plot at survey points #1, #2 and #6. The wetland boundary was determined based on positive indicators for all wetland criteria including hydric soils and hydrophytic vegetation. An elevation map using LiDAR was also used in the field to confirm the wetland boundary along topographic breaks and changes in the vegetation community. See Appendix B for datasheets.

Hydric Soils

Eight determination plots (survey points) were established in the area of proposed excavation to examine upland and wetland soil characteristics (Appendix B). The soils were examined by digging soil pits which allowed a full view of the soil profile approximately 12-20" deep. Hydric soil indicators were observed in soil pits #1, #2, and #6. Paired upland pits #4, #5 and #8 were documented as upland soils. Soil pit #3 was located within an aspen stand less than 100 meters of the mapped wetland boundary. Survey results concluded that the aspen stand is non-wetland containing upland soils. Soil pit #7 along Channel C (Figure 12) contained upland soils. See Appendix B for datasheets.

Soil pit #1 and #5 are located along Channel A proposed for excavation (Figures 12 and 13). Soil pit #1 met the Redox Dark Surface (F6) hydric soil indicator (Figure 9). The soil consisted of two layers, the first layer, 0-4 inches, was the organic layer. The second layer, 2-19 inches, had a sandy clay loam texture and 10YR 2/2 color. This color covered about 95% of the soil matrix. This layer also had concentration type redoximorphic features in the matrix with 10YR 4/6 color. Soil pit #5 contained upland soil characteristics (Figure 9).

Figure 9. Paired wetland/upland soil pits #1 and #5 along channel A.

Soil pit #2 and #4 are located along Channel B proposed for excavation (Figures 12 and 13). Soil pit #2 met the Redox Dark Surface (F6) hydric soil indicator (Figure 10). The soil consisted of three layers, the first layer, 1-13 inches, had a clay loam texture. The color was 10YR 3/1 which covered 95% of the matrix. This layer also had redoximorphic features, concentrations and pore linings, with 7.5YR 3/4 color. The second layer, 13-17 inches, had a clay loam texture and 10YR 4/1 color. The color covered about 60% of the matrix. This layer also had redoximorphic features, concentrations in the matrix, with 7.5YR 4/6 color. The third layer, 17-24 inches, had a silty clay loam texture and gley 1 4/10Y color. The color covered 85% of the matrix. The layer also had redoximorphic features, concentrations in the matrix, with 7.5YR 5/8 color. Soil pit #4 contained upland soil characteristics (Figure 10).

Figure 10. Paired wetland/upland soil pits #2 and #4 along channel B.

Soil pit #6 and #8 are located east of the small pond (Figure 13). Soil pit #6 met the Hydrogen Sulfide (A4) hydric soil indicator (Figure 11). The soil consisted of three layers, the first layer, 0-4 inches, was the organic layer. The second layer, 4-10 inches, had a silt loam texture and 10YR 2/2 color. This color covered 100% of the soil matrix. The third layer, 10-17 inches, was mostly sand and gravel with a 10YR 3/2 covering only 10% of the soil matrix. Soil pit #8 contained upland soil characteristics (Figure 11).

Figure 11. Paired wetland/upland soil pits #6 and #8 located east of the small pond.

Hydrophytic Vegetation

For each survey point, dominant vegetation was recorded within a 15 foot radius from the center of the soil pit. For soil pit #1 the dominant vegetation was *Phalaris arundinaceae* (FACW) and *Carex utriculata* (OBL). Dominant vegetation for soil pit # 2 include: *Carex aquatilis* (OBL) and *Poa pratensis* (FAC). Soil pit #6 included the following OBL species: *Carex utriculata, Carex stipita, Carex interior*, and *Carex lenticularis*. Based on wetland criteria for soils, hydrology, and vegetation, data points #1, #2, and #6 are all considered to occur in wetlands. See Appendix B for datasheets.

6.0 Mitigation Approach

In 2013, Natural Systems Design (NSD) was selected and contracted for engineering services and prepared a concept (30%) design that proposed floodplain and side channel creation to provide numerous ecosystem benefits and overall habitat "lift" that are intended to complete the compensatory wetland mitigation required for impacts to the Well 3 wetland at the CESRF hatchery site. The concept design features the restoration of three historic side channels off the right bank of the mainstem Yakima River immediately downstream of the I-90 crossing. Restoration actions focus on removing historic fill plugging the side channel inlets to restore

floodplain connection and create wetland complex habitat. The three side channels flow eastward into an existing small pond at the northeast end of the site and into an existing channel that flows from the small pond into the large pond. The rock revetment along the right bank of the mainstem Yakima currently blocks flow into the side channels. The proposed restoration will remove the rock at each side channel inlet. The rock will be reused inside engineered logjams (ELJs) that will deflect flow into the side channels. The ELJs and remaining portions of the revetment will ensure that the mainstem Yakima channel doesn't move into the restoration area. Additional wood placements will be done in the side channel to enhance fish habitat and create adjacent wetland benches where possible (Figure 12).

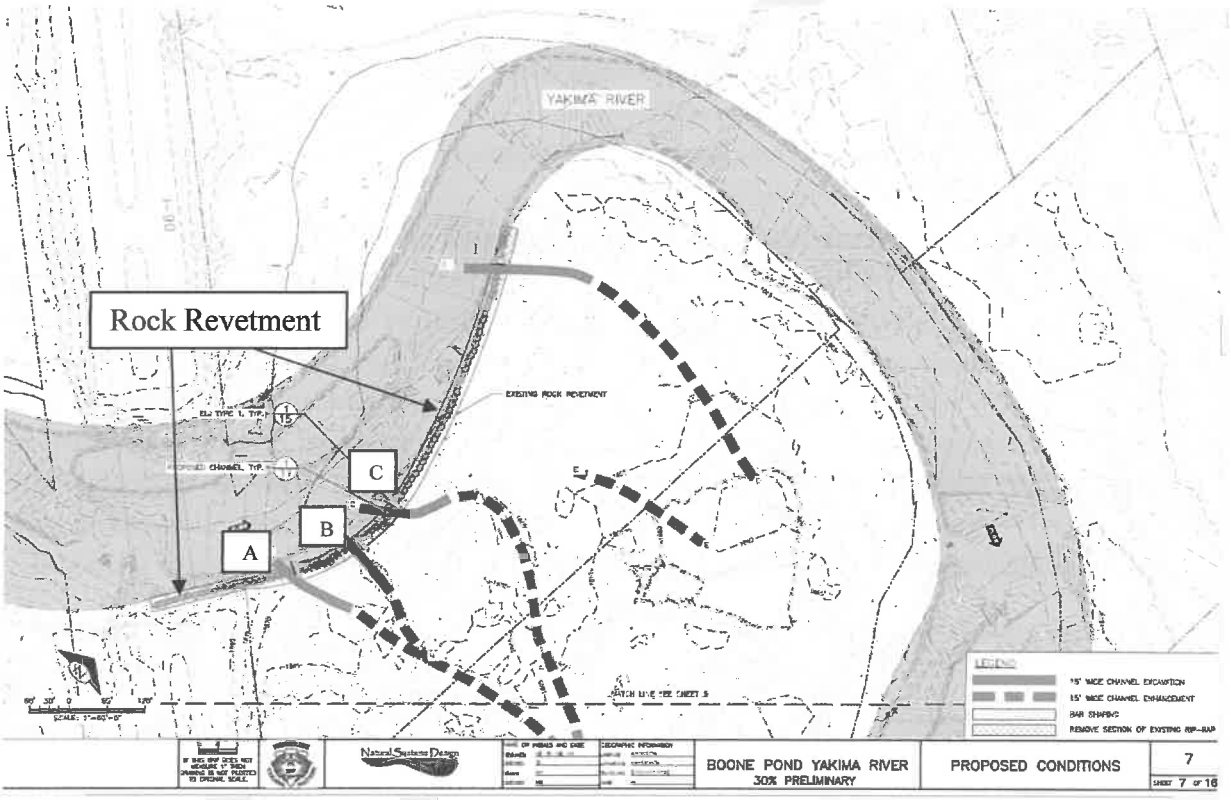

Figure 12. NSD's 30% concept for channel creation to restore floodplain connection and create wetland complex habitat.

Re-establishment of side channels across this portion of the floodplain will provide flows of 10-20 cfs to the side channels, restoring processes of nutrient cycling, sediment transport and deposition, as well as hyporheic exchange. Riparian forest communities, floodplain wetlands, and structural diversity will all benefit from prolonged hydrologic connection. These off channel habitats and floodplain wetland complexes provide important refuge habitat for threatened and endangered species such as bull trout and steelhead, as well as for chinook salmon, that has been identified in basin plans as a limiting factor. The increased floodplain wetland area will also improve flood storage and it is anticipated that the project would result in a decrease of summer water temperatures in the pond itself by increasing hydrologic exchange and establishing scrub-shrub and forested buffer. Pond edge modifications and island creation within the large pond will increase the structural diversity and complexity of what is currently a very homogeneous gravel

pit pond (depth, side slope, and edge variability). The project will dramatically increase floodplain wetland area and function, improve fish access and habitat within the pond, and increase the availability of and access to high quality refugia within the Upper Yakima River overall. Modifications in the western half of the project area would consist largely of stream channel and floodplain wetland creation and reconnection; changes to Boone's Pond itself would consist of enhancement measures.

According to BPA correspondence, DOE requires 0.94 acres of wetland mitigation for impacts at Well 3 with a target of 1.5 acres of wetland creation. In December 2015, BPA provided an updated concept plan for Boone's Pond based on a field reconnaissance conducted 11/6/15 and targeting the 1.5 acres of wetland creation area required by DOE. This revised concept proposed the following steps:

- Minimize cut/impact to existing wetlands related to the proposed side channel construction.
- Maximize wetland creation (target 1.5 acres) within the proposed constructed side channels to increase wetland function and credit.
- Excavation of new wetland habitats in existing sparsely forested upland floodplain area to increase wetland creation/function and credit.
- Enhancement and rehabilitation of existing wetland habitat within Boone's Pond by increasing riverine hydrology thereby improving hydraulic connectivity between the river and the floodplain wetlands. The proposed placement of excavation spoils from side channel creation into the pond to create 'wetland bars' was not proposed in the BPA concept plan as it was in the NSD 30% concept design. This enhancement option will no longer be proposed. The December 2015 BPA concept plan did propose placement of spoils for wetland enhancement/creation in the pond to the north of Boone's Pond (WSDOT property) as a potential option for meeting the wetland mitigation credit. This opportunity will be explored with DOE if additional wetland mitigation credit is desired.

In a follow-up phone call on 3/21/16 with the YN, BPA, and NSD, the group agreed to the BPA conceptual approach.

The following next steps are proposed for developing a conceptual plan that meets DOE requirements for wetland mitigation and then proceeding with preliminary and final design of the DOE approved concept:

- KCT facilitating the acquisition of WSDOT property by BPA – recent meeting with YN, WSDOT, and KCT established that acquisition contingent on proving that the restoration design will not have adverse impacts on the I-90 bridge immediately upstream of the project site and the I-90 road prism adjacent to the project site. WSDOT reviewed the HEC-RAS data provided by BPA engineer Sean Welch and has stated no concern with the bridge based on the model (Sauriol 2016).
- Kittitas County Department of Public Works requires a floodplain development permit detailing "no net rise" of the floodplain as a result of channel construction, a grading permit

for excavation greater than 100 cubic yards, and a Substantial Shoreline Development permit (an exemption is likely) (Leader 2016).

- NSD will conduct a field survey to improve bathymetric data and the accuracy of the hydraulic model, and will collect data relevant to existing wetland and upland community types to aid in the conceptual design.
- YN and BPA will work with DOE to determine the "wetland formative flow" or the flow event on the Yakima River that is closely related to the formation and persistence of wetland hydrology onsite. This flow will be used to evaluate and predict the proposed wetland creation areas associated with the conceptual plan.
- NSD will prepare an updated conceptual design based on the December 2015 BPA concept and YN's wetland delineation and survey of the wetland boundary for the Boone's Pond restoration site.
- YN with support from NSD will work with DOE to determine whether the proposed conceptual design proposed by BPA will be sufficient for wetland mitigation or if additional wetland creation/enhancement will be necessary.
- YN and BPA to prepare and submit the updated concept to DOE and obtain approval.
- NSD to proceed with development of 60% permit-level and final designs and bid documents.

7.0 Monitoring

Phase one mitigation on Tillman Creek was determined to be successful by regulatory agencies in 2008; however, since the wetland had been permanently impacted, a replacement of 0.94 acres is required to fully mitigate for wetland loss. The delineated Well 3 wetland calculated to be 1.46 acres in size. The mitigation site created at Tillman Creek calculated to be 0.52 acres in size. Tillman Creek included 0.45 acres of palustrine emergent habitat and 0.07 acres of palustrine scrub-shrub habitat. A formal wetland rating was not completed for this site; although, there was specific function analysis completed in the wetland reports for the well 3 wetlands that may help compare functions proposed for the Boone Pond project. DOE suggested relating similar wetland functions to the similar riparian functions to help come up with wetland mitigation credit calculations (Reed 2016a).

The total wetland area delineated at the Boone's Pond site is 17 acres in size. This includes 12 acres of riverine emergent habitat and 5 acres of riverine aquatic bed habitat. The rock revetment along the right bank of the mainstem Yakima River currently blocks flow into the relic side channels flowing eastward toward the wetland complex. Figure 13 shows the channel construction proposed in the 30% concept design to restore floodplain connection in relation to data collection sites of the delineated wetland. The proposed restoration will remove the rock at each side channel inlet and excavate the channel bed material where necessary. Excavation would not occur within the mapped boundary of the wetlands. The proposed project will create/enhance 1.5 acres of riverine and palustrine wetlands to compensate for wetland losses at the hatchery. Boone Pond was rated as a Category II based on wetland functions.

YKFP will be responsible for implementing a successful mitigation project with a target 1.5 acres of wetland creation at the Boone's Pond site to complete compensatory wetland mitigation for lost performance of the Well 3 wetland at the hatchery. Following project implementation, it will be BPA's responsibility to complete reporting requirements to meet conditions outlined in BPA's water right permit for non-consumptive use of groundwater at the facility. The objectives, performance standards, and monitoring requirements for compensatory mitigation projects required to offset unavoidable impacts to waters of the United States will be provided in the final mitigation plan. Performance standards will be based on functional, conditional, or other suitable assessment methods and/or criteria to determine if the site is achieving the desired functional capacity.

The monitoring period will be a minimum 5 years to demonstrate that the compensatory mitigation has met performance standards. There would probably be two to three reports generated (report on site conditions post construction at year 1, brief report at year 3 regarding expected site trajectory, and report at year 5 to assess whether the wetland response to the project has met project goals.

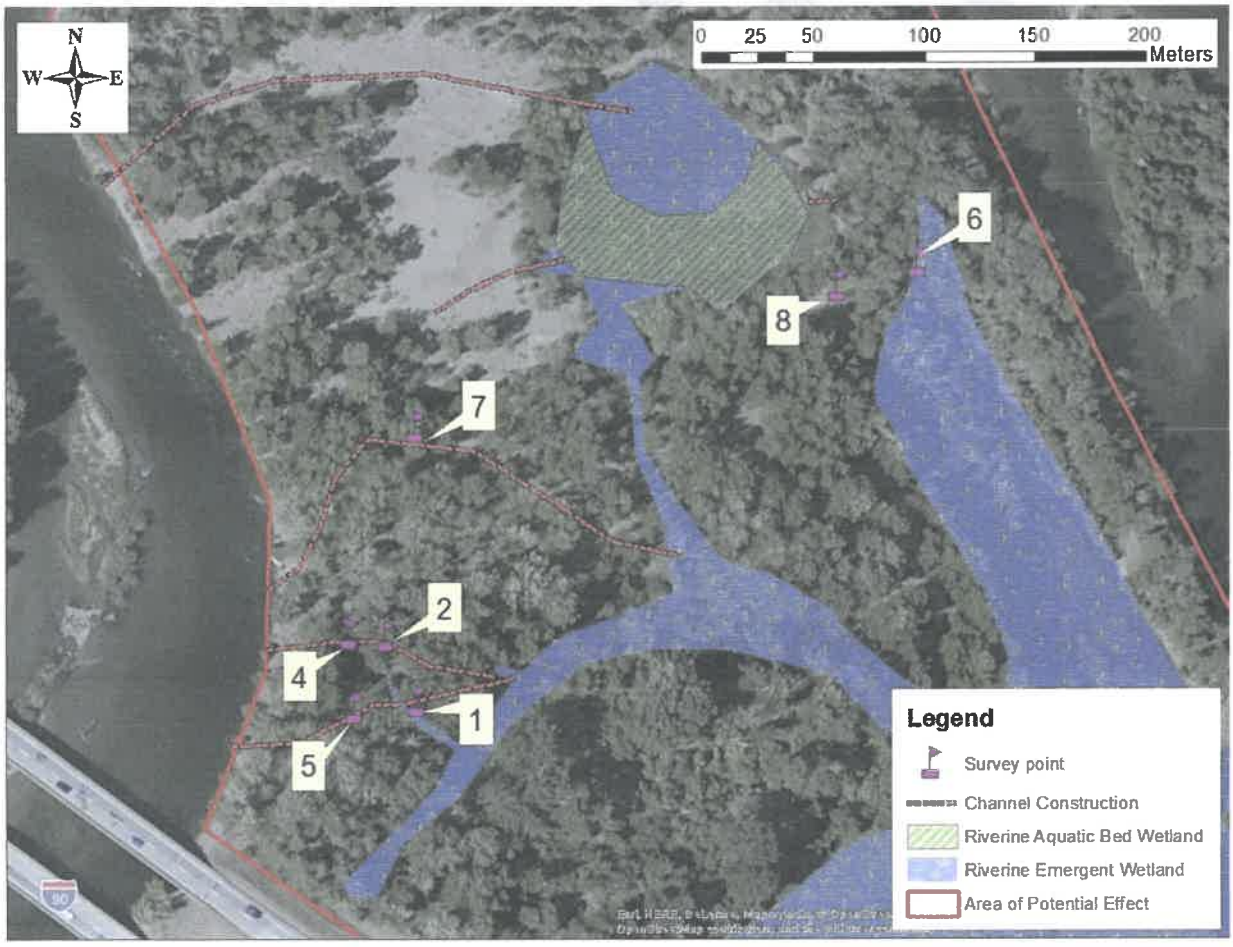

Figure 13. Proposed channel construction within Area of Potential Effect

8.0 Conclusion

The total wetland area delineated and measured is 17 acres in size with 5 acres of riverine aquatic bed habitat and 12 acres of riverine emergent habitat. According to the Washington State Wetland Rating System for Eastern Washington, the determined wetland received a score of 21, which placed it into a Category II based on wetland functions. Category II wetlands are difficult, though not impossible, to replace, and provide high levels of some functions. These wetlands occur more commonly than Category I wetlands, but still need a relatively high level of protection. The wetland also received a Category I rating based on special characteristics due to the presence of an aspen stand (non-wetland) located within 100 meters of the mapped wetland boundary. Therefore, this wetland received a dual rating as a Category I/II. However, mitigation ratios will be solely determined based on functions. This determination was based on the fact that the actual wetland itself is not a forested wetland but that an upland (non-wetland) aspen stand occurs nearby.

Mitigation ratio guidance table 1b in section 6.5.2.1 of DOE publication # 06-06-011 provides guidance for determining appropriate wetland mitigation ratios in Eastern Washington. The DOE permit for the CESRF hatchery (permit no.G4-32504, amended June 15, 2007) in condition 8 states: "Any additional wetland impacts which may be identified and which are considered to have occurred as a result of well field operations will be mitigated in accordance with DOE wetland mitigation guidelines (DOE publication # 06-06-011)." DOE guidance in this document provides for some flexibility in determining mitigation ratio amount based on individual project circumstances.

According to DOE's publication # 06-06-011 recommended ratios for Category II wetlands creation is 3:1. The first number is the amount of acreage needed vs amount of acres impacted. For enhancement (e.g., plantings) only, ratios are 12:1. For projects that encompass both creation (C) and enhancement (E), ratios are 1:1 C and 8:1 E. Note ratios are based on compensatory mitigation constructed concurrent to wetland impacts. If mitigation is constructed well after the impacts the ratios will increase due to temporal loss. Ratios are also based on the assumption that category and hydrogeomorphic (HGM) class or subclass of the compensation wetland and affected wetland are the same. Generally the use of enhancement alone as compensation is discouraged. Using enhancement in combination with the replacement of wetland at a minimum 1:1 through re-establishment or creation is preferred.

DOE's credit-debit tool will be utilized to assess mitigation credits in developing a final mitigation plan for the Boone Pond project looking at flood storage, water quality improvement, and habitat. Otak, Inc. determined a mitigation ratio between 1:1 and 2.5:1 would be acceptable based on a variety of factors (Sheldon 2008). DOE has since stated that the 30% conceptual plan, with a wetland acreage goal of 1.5 acres would be acceptable to meet conditions outlined in BPA's water right permit (Reed 2016b). Upon DOE approval of this report, 1.5 acres will be the target ratio to complete phase two mitigation for lost performance of the Well 3 wetland at the CESRF hatchery.

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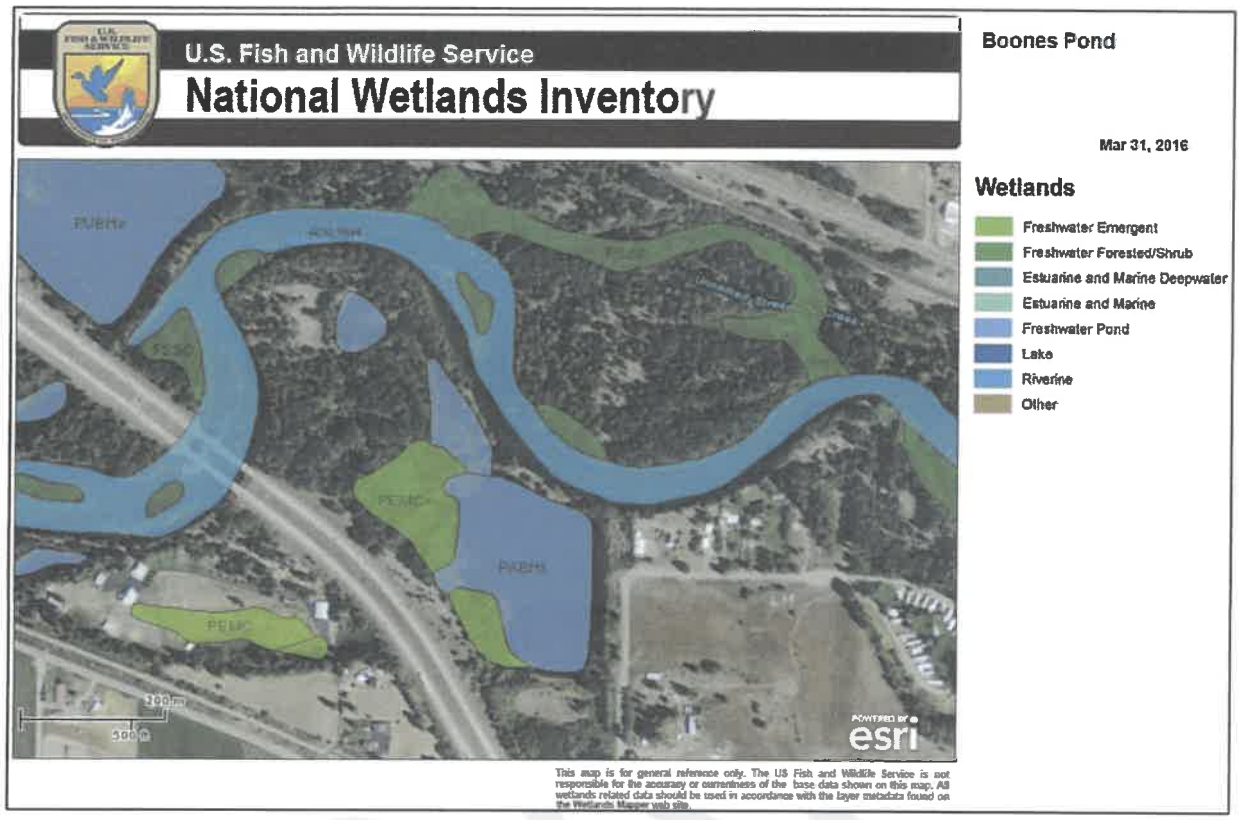
10.0 Appendices

Appendix A



Description for code **PEMCx** :

P System **PALUSTRINE**: The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 ppt. Wetlands lacking such vegetation are also included if they exhibit all of the following characteristics: 1. are less than 8 hectares (20 acres); 2. do not have an active wave-formed or bedrock shoreline feature; 3. have at low water a depth less than 2 meters (6.6 feet) in the deepest part of the basin; 4. have a salinity due to ocean-derived salts of less than 0.5 ppt.

Subsystem :

EM Class **EMERGENT**: Characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants.

Subclass :

Modifier(s):

C WATER REGIME **Seasonally Flooded**: Surface water is present for extended periods especially early in the growing season, but is absent by the

end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface.

x SPECIAL MODIFIER **Excavated**: Lies within a basin or channel that have been dug, gouged, blasted or suctioned through artificial means by man.

Description for code **PABHx** :

P System **PALUSTRINE**: The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 ppt. Wetlands lacking such vegetation are also included if they exhibit all of the following characteristics: 1. are less than 8 hectares (20 acres); 2. do not have an active wave-formed or bedrock shoreline feature; 3. have at low water a depth less than 2 meters (6.6 feet) in the deepest part of the basin; 4. have a salinity due to ocean-derived salts of less than 0.5 ppt.

Subsystem :

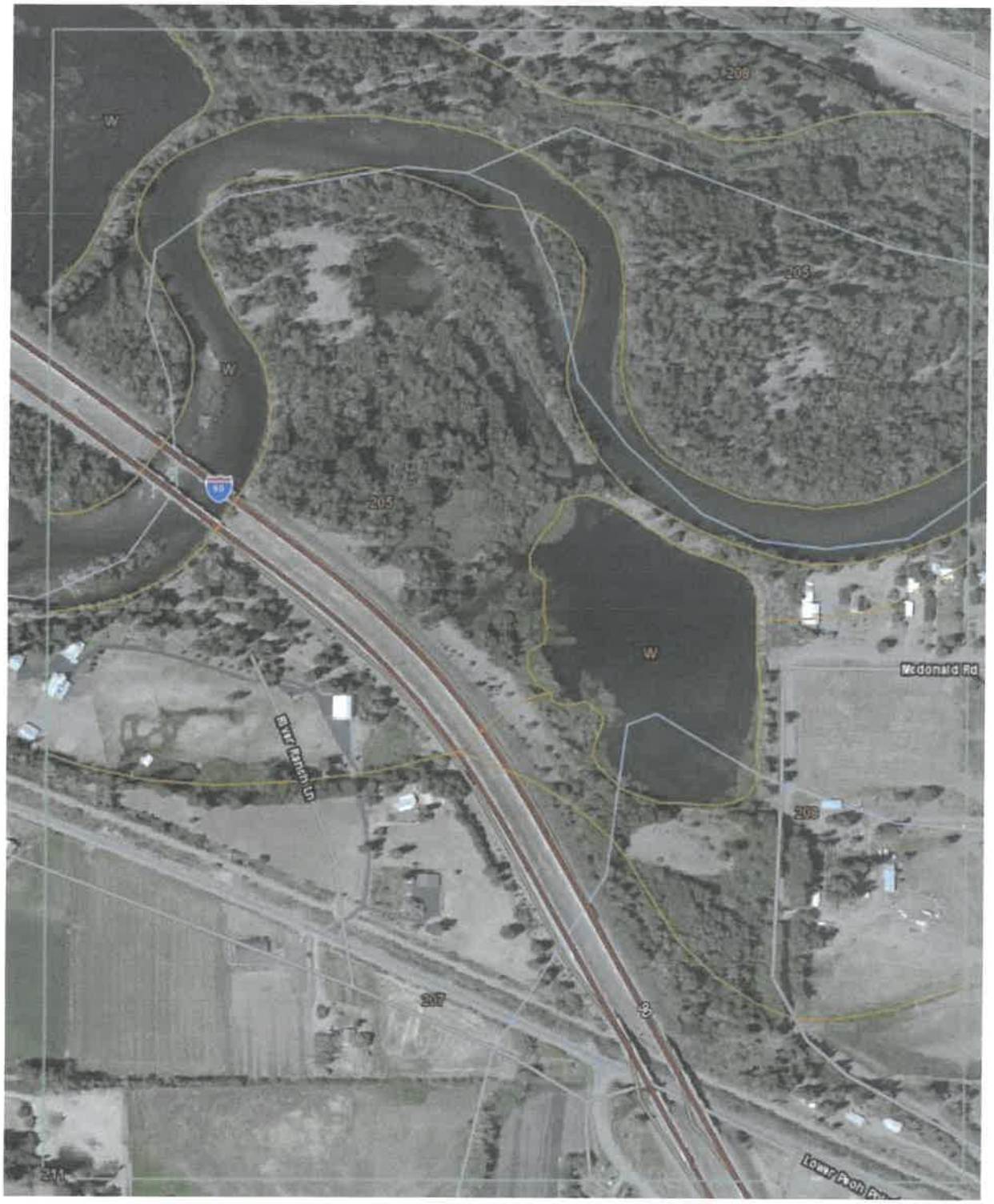
AB Class **AQUATIC BED**: Includes wetlands and deepwater habitats dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years.

Subclass :

Modifier(s):

H WATER REGIME **Permanently Flooded**: Water covers the land surface throughout the year in all years.

x SPECIAL MODIFIER **Excavated**: Lies within a basin or channel that have been dug, gouged, blasted or suctioned through artificial means by man.


208
W
205
W
205
W
Mcdonald Rd
Barry Ranch Ln
209
207
Lower Fish

Map Unit Legend

Kittitas County Area, Washington (WA637)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
164	Nard ashy loam, 25 to 45 percent slopes	7.3	0.4%
203	Teanaway ashy loam, 3 to 10 percent slopes	7.7	0.5%
205	Xerofluvents, 0 to 5 percent slopes	516.8	31.0%
207	Quicksell loam, 0 to 5 percent slopes	259.5	15.5%
208	Patnish-Mippon-Myzel complex, 0 to 3 percent slopes	488.4	29.3%
211	Teanaway ashy loam, 0 to 3 percent slopes	269.5	16.1%
W	Water	120.1	7.2%
Totals for Area of Interest		**1,669.2**	**100.0%**

Appendix B

Appendix C