REVEGETATION AND WETLANDS MANAGEMENT PLAN

ENLOE HYDROELECTRIC PROJECT
(FERC PROJECT NO. 12569)

FEBRUARY 2012

(REVISED JULY 2012)

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 PURPOSE AND INTENT

This Revegetation and Wetlands Management Plan (RWMP) was prepared by the Okanogan Public Utility District No. 1 (District) in support of the 401 Water Quality Certification Application for the Enloe Hydroelectric Project (FERC Project No. 12569). As noted in Section 3.7 of the February 17, 2012 draft Section 401 certification, state authority to protect wetlands is found in WAC 173-201A-260(3)(i), which provides that the primary means for protecting water quality in wetlands is through implementing the antidegradation procedures described in Part III of that chapter of Washington's water quality standards. Consistent with those antidegradation procedures, this RWMP describes the District's plan to implement the Protection, Mitigation and Enhancement (PM&E) measures that were identified for riparian vegetation in Exhibit E of the FLA and also were discussed in the Vegetation Mitigation and Monitoring Plan (VMMP) filed with FERC in conjunction with the Final License Application (FLA) on August 22, 2008. The RWMP also includes an expanded discussion of potential wetland impacts resulting from Project construction and operation, and related mitigation.The District anticipates that the VMMP will be appended to the FERC license when that license is granted.

The purpose of this revised RWMP is to include a more complete description of project impacts to wetlands and to propose mitigation for regulated wetlands. This revision is principally in response to Washington State Department of Ecology (Ecology) comments on the February 2012 and June 2012 versions. In addition, the impact assessment has been updated using new Light Detection and Ranging (LIDAR) data gathered October 14, 2011.

The PM&Es for riparian vegetation are unchanged from the previous version. Only minor edits and format changes have occurred to Section 2: Riparian Vegetation. The wetlands discussion is now included in Section 3: Wetlands. References have been updated in Section 4.

1.2 PROJECT DESCRIPTION

The District proposes to restore hydropower generation at Enloe Dam on the Similkameen River. The previous power plant ceased operation in 1958. The present application proposes relocating the site for hydropower development to the opposite (east) bank of the river. The proposed site is nearer to the dam and offers environmental and constructability advantages. In addition to constructing a new powerhouse, the District intends to retrofit crest gates to increase the hydraulic head available for power generation, install two small piers to the spillway crest, excavate a new headrace channel and decommission the old intake canal by backfilling with concrete, create a new penstock intake, two above-ground penstocks and a tailrace. In addition, a section of the old Oroville-Tonasket Irrigation District (OTID) Ditch Road

would be abandoned and restored to a natural riparian state. A new road would be constructed over an abandoned irrigation canal as the main access road. New recreational facilities are proposed including upgrading a boat ramp, parking area, picnic sites and camping areas.

1.3 PROJECT BOUNDARY / PROJECT AREA

The Enloe Hydroelectric Project is situated in a narrow portion of the Similkameen River Valley, about 3.5 miles northwest of the City of Oroville, Washington. The Project boundary is generally defined by the 1055-foot-elevation contour and encompasses an approximately 2-mile reach of the Similkameen River, including approximately 36 acres of upland area along both river banks (Figure 1). The Project boundary extends one-quarter (0.25) mile downstream from Enloe Dam to include Similkameen Falls and the site of the proposed powerhouse, tailrace, and associated facilities. Most of the land within the Project boundary is publicly owned and managed by BLM (i.e., lands above the current ordinary high water mark) or Washington Department of Natural Resources (DNR) (i.e., river bed and banks up to current high water mark). The term Project Area used in the RWMP refers to the land and water areas encompassed by Project boundary.

1.4 PROJECT OPERATION

The existing spillway crest on the dam has provision for 5-foot-high flashboards which were used during previous hydropower generation at the dam (1923 to 1958). The District proposes to restore this functionality by retrofitting with 5-foot high flap-type crest gates. The purpose of the crest gates is to raise the year-round elevation of water in the reservoir to approximately what the elevation is during high flow periods. This will allow for a higher and more constant operating head for hydropower generation similar to previous operation and provide a more reliable means of regulating spill.

Installing 5-foot-high crest gates will increase the spillway crest elevation to 1049.3 feet for normal maximum reservoir elevation (with no spill). During normal operation, the water surface elevation will be kept just below the crest of the gates (i.e., about elevation 1048.3 feet) to avoid uncontrolled spill due to surge or waves. At this elevation, the reservoir extends about 2.3 miles upstream from the dam, has a surface area of 76.6 acres, a mean depth of 10.1 feet, and a volume of 775 acre-feet.

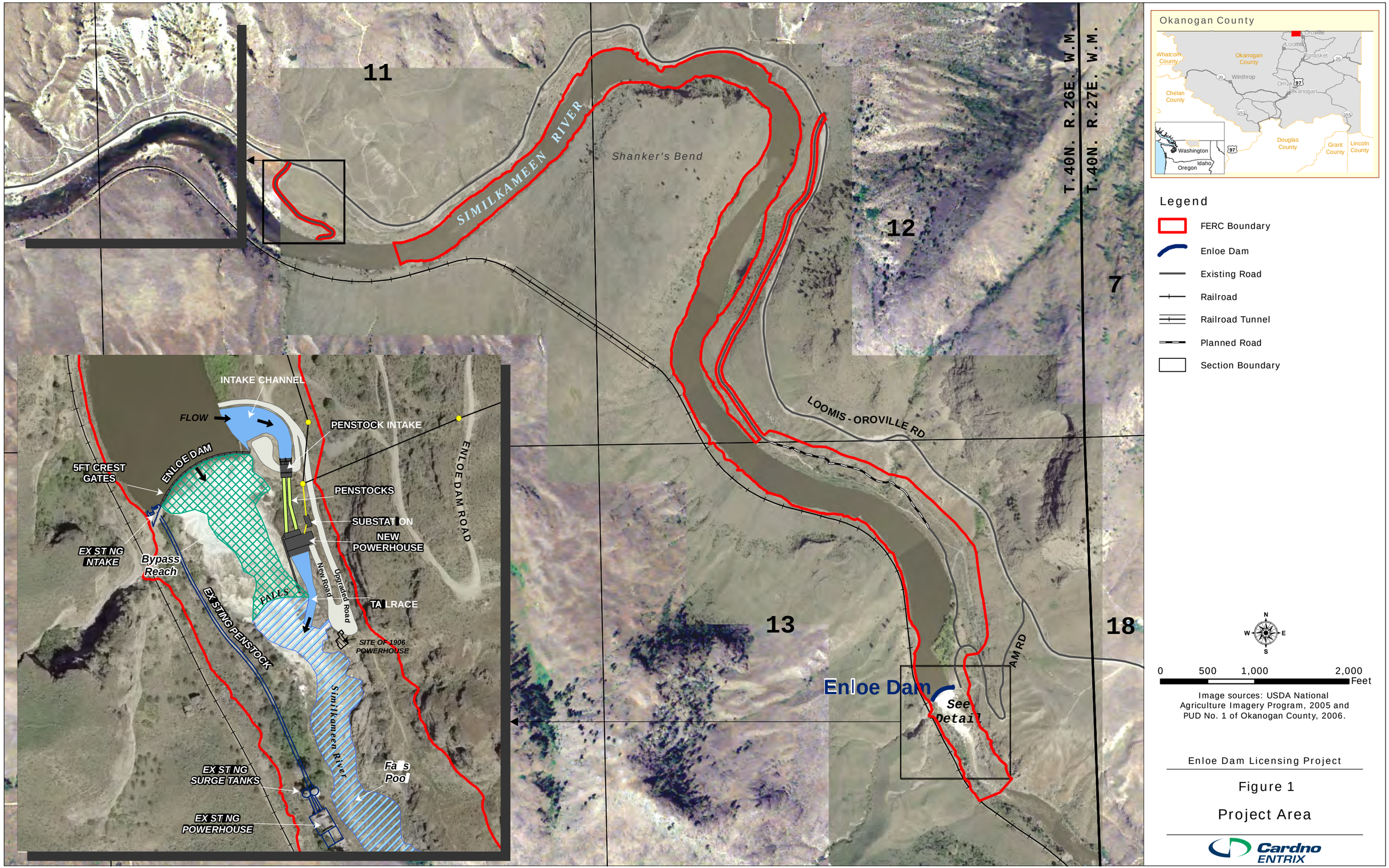

Image sources: USDA National Agriculture Imagery Program, 2005 and PUD No. 1 of Okanogan County, 2006.

Enloe Dam Licensing Project

Figure 1

Project Area

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1.5 OVERVIEW OF THE PLAN

Section 2 of the RWMP describes the goals and objectives of the riparian revegetation plan, and presents the mitigation plan for riparian areas, schedule for implementation, costs, maintenance, and monitoring plan.

Section 3 describes the existing wetlands in the project area, impacts resulting from the project, and proposed wetland mitigation measures.

Section 4 provides references used in developing this plan.

2.0 RIPARIAN REVEGETATION

2.1 GOALS AND OBJECTIVES

The goal of the RWMP is to facilitate the rapid development of riparian vegetation within the Project Area and at the site channel enhancement site for the benefit of wildlife and visitors.

The objectives of the RWMP are to ensure that the following PM&E measures are successfully planned and executed:

- PM&E BOTA-02: Plant Riparian Vegetation Along the Reservoir
- PM&E BOTA-03: Abandon Existing Shoreline Road
- PM&E BOTA-04: Plant Riparian Species Along Abandoned Road Corridor
- PM&E BOTA-05: Plant Riparian Species on East and West Banks Downstream of Shanker's Bend
- PM&E BOTA-06: Install Temporary Grazing Control Measures
- PM&E BOTA-07: Monitor Restored Areas and Replant if Necessary
- PM&E BOTA-11: Implement a Noxious Weed Control Program
- PM&E REC-01: Install Barricades and Fencing to Control Livestock and Prevent Unauthorized Access
- PM&E FISH-10: Side Channel/Off Channel Development/Enhancement

Each PM&E measure is explained in detail below, outlining the purpose and objective of each measure, an analysis of the impact of each measure on other resources, the expected results and actions to be taken if the expected results are not achieved.

2.2 PM&E BOTA-02: PLANT RIPARIAN VEGETATION ALONG THE RESERVOIR

Objective

The objective of this mitigation measure is to facilitate the rapid development of riparian vegetation to replace any lost when the low-flow elevation for the reservoir is increased. This measure will also benefit fish and aquatic resources along the impoundment shoreline.

Impacts to Other Resources

Beneficial impacts to wildlife species that use riparian vegetation should result. No negative impacts are expected to occur from planting riparian vegetation along the reservoir shoreline.

Expected Outcome and Further Actions

The expected outcome is the establishment of additional stands of woody riparian vegetation. The monitoring element of this plan includes provision for replacement planting of restored areas should the plantings fail to establish themselves adequately during the first 5 years after planting.

2.3 PM&E BOTA-03: ABANDON EXISTING SHORELINE ROAD

Objective

A portion of the existing unimproved shoreline road along Enloe Reservoir will be returned to natural condition, eliminating the current interruption between the shoreline and upland habitat.

Impacts to Other Resources

No impacts to other resources are expected from the abandonment of this road. An existing primitive road will be improved for access to the dam and recreation site, so that visitor access is not affected.

Expected Outcome and Further Actions

Abandoning the road will eliminate traffic disturbance to wildlife utilizing the riparian habitat. No further actions will be needed.

2.4 PM&E BOTA-04: PLANT RIPARIAN SPECIES ALONG ABANDONED ROAD CORRIDOR

Objective

In order facilitate the re-establishment of riparian vegetation in the abandoned road bed, woody riparian species will be planted in the riparian section of the abandoned road. This will improve habitat along the reservoir for wildlife.

Impacts to Other Resources

No negative impacts are expected to occur from planting riparian vegetation along the abandoned road corridor.

Expected Outcome and Further Actions

The expected outcome is the establishment of additional stands of woody riparian vegetation. The monitoring element of this plan includes provision for replacement planting of restored areas should the plantings fail to establish themselves adequately during the first 5 years after implementation

2.5 PM&E BOTA-05: PLANT RIPARIAN SPECIES ON EAST AND WEST BANKS DOWNSTREAM OF SHANKER'S BEND

Objective

The purpose of this mitigation measure is to facilitate the rapid development of riparian vegetation to replace any lost when the low-flow elevation for the reservoir is increased. This measure will also benefit fish and aquatic resources along the impoundment shoreline.

Impacts to Other Resources

Beneficial impacts to wildlife species that use riparian vegetation should result. No negative impacts are expected to occur from planting riparian vegetation on the east and west banks downstream of Shanker's Bend.

Expected Outcome and Further Actions

The expected outcome is the establishment of additional stands of woody riparian vegetation. The monitoring element of this plan includes provision for replacement planting of restored areas should the plantings fail to establish themselves adequately during the first 5 years after implementation.

2.6 PM&E BOTA-06: INSTALL TEMPORARY GRAZING CONTROL MEASURES

Objective

Protective enclosures for individual plants will be used to protect the young plants from consumption by wildlife such as beaver or deer. In addition, a temporary fence may be required on the west side of the river to protect riparian areas from potential cattle impacts.

Impacts to Other Resources

Beaver and deer will be prevented from consuming new plantings, but they will be unaffected from accessing existing vegetation. No negative impacts are expected to occur from installing protective enclosures for individual plants or through the temporary cattle exclusion fencing proposed for the west side of the river.

Expected Outcome and Further Actions

Increased survival of the new plantings is expected to result from the installation or protective enclosures and fences. The protective enclosures and temporary fencing will be routinely inspected and repaired as necessary.

2.7 PM&E BOTA-07: MONITOR RESTORED AREAS AND REPLANT IF NECESSARY

Objective

In order to ensure that new plantings are becoming established, the District will monitor restored areas during years 1, 2, 3, 4, 5, 7, and 10. Additional riparian trees will be planted if the original plantings fail to meet the performance criteria outlined in this RWMP.

Impacts to Other Resources

No impacts are expected to occur from monitoring riparian vegetation in the Project Area, or from installing additional plants.

Expected Outcome and Further Actions

Monitoring and additional planting, if necessary, are expected to confirm and supplement the establishment of additional stands of woody riparian vegetation. Monitoring is also expected to confirm the development of herbaceous wetland vegetation in areas along the reservoir that will be more mesic under future operating conditions, as further discussed in Section 3.3.1. The District will provide a monitoring report for years 1, 2, 3, 4, 5, 7, and 10 to BLM and Ecology. If the original plantings do not meet the performance criteria in the RWMP, additional riparian plants will be installed.

2.8 PM&E BOTA-11: IMPLEMENT A NOXIOUS WEED CONTROL PROGRAM

Objective

In order to control noxious weeds along access roads and construction sites for the Project, the District will implement a Noxious Weed Control Program. Once the desired control and reduction in noxious weed infestations has been assured, any bare areas of the sites will be re-vegetated with native grasses to facilitate the re-establishment of native vegetation and help prevent further incursion from noxious weeds.

Impacts to Other Resources

Impacts to sensitive species could occur from chemical or manual weed control methods if any are present at a treatment site. However, no sensitive species have been reported from the current treatment sites.

The sensitive plant surveys were reported in the *Technical Memorandum for Special Status Plants Study* which is Appendix E.3.6 of the FLA. These surveys covered the entire Project Area from the upstream end above Shanker's Bend to the downstream end below the existing powerhouse. In most areas, the Project boundary does not extend much above the ordinary high water mark. Conducting surveys of the Project Area often required traversing land outside the actual FERC Project Area. As stated in the *Technical Memorandum for Special Status Plants Study*, areas that were inaccessible for foot surveys included steep cliffs, unstable slopes, and areas bounded by impassable stream conditions, and were inspected by professionally accepted alternative methods. These areas generally also have little land surface within the project boundary that can support vegetation.

Expected Outcome and Further Actions

Temporary eradication of noxious weeds at treatment sites is expected to result from implementation of this measure. Long-term control provisions have been included because these noxious weeds are present elsewhere in the Project vicinity and are likely to recur.

2.9 PM&E REC-01: INSTALL BARRICADES AND FENCING TO CONTROL LIVESTOCK AND PREVENT UNAUTHORIZED ACCESS

Objective

The actions proposed by the District under this PM&E measure are intended to improve water quality and prevent damage to wetlands and proposed riparian and wetland mitigation sites. Additional objectives are addressed under this PM&E measure within the Recreation Management Plan.

Impacts to Other Resources

There are no expected negative impacts to other wildlife. Smooth bottom wires will prevent injury to fawns and yearling deer who often try to move between lower fence wires. Adult deer easily jump a fence with a top wire 40 inches above the ground.

Expected Outcome and Further Actions

The permanent fence will aid in riparian vegetation establishment, and will protect water quality. The permanent fence will be inspected on a regular basis and repairs will be made as necessary.

2.10 PM&E FISH-10: SIDE CHANNEL/OFF CHANNEL DEVELOPMENT/ENHANCEMENT

Objective

Elevated summer (late July through mid-September) stream temperature is probably the most significant limiting factor for salmonids in the lower Similkameen and adjacent Okanogan rivers. The purpose of the side cannel enhancement project is to address this limiting factor by providing cool water suitable for rearing salmonids while not affecting other important habitat in the area.

Impacts to Other Resources

Permanent impacts would result from the installation of a well pad and one additional power pole to service the well. The proposed well pad site would be adjacent to the existing U.S. Army Corps of Engineers (USACE) flood control dike, which would serve as the access route to the well pad. The well pad area is expected to be 50 feet in width and 150 feet in length, to create an area of approximately 7,500 square feet. This area has been heavily modified with riprap, and contains very little herbaceous vegetation. Plants observed at the site include cheatgrass (*Bromus tectorum*), fescue (*Festuca* spp.) and bluegrass (*Poa pratensis*). However, three willow trees have grown at the base of the dike, within the riprap, and would be removed. Trees and other large vegetation that begin to grow at the base of dikes are generally removed since vegetation may damage the dike slopes as expanding root systems displace the riprap protective cover and create seepage pathways (USACE 2006). Thus, removal of these three trees for the well pad would also help to prevent damage to the existing dike.

Power for the well would be obtained from the existing power line situated on the north side of the dike within cultivated upland meadow. The installation of one pole would be required to extend power lines to the well location. The temporary disturbance of vegetation for the proposed side channel enhancement would be approximately 40 feet wide within the existing 800-foot-long channel, which would result in a temporary disturbance of approximately 32,000 square feet. Along the pipeline route, that the disturbance area is assumed to be a 10 feet wide 300-foot-long corridor (3,000 square feet) would be disturbed. A more detailed assessment of the temporary disturbance will be possible once the final construction plans are finalized.

Disturbed vegetation would be limited to herbaceous plants including reed canary grass (*Phalaris arundinacea*), horsetails (*Equisetum* spp.), and sedges (*Carex* spp.), as well as shrubs including willow (*Salix* spp.), alder (*Alnus* sp.), red-osier dogwood (*Cornus sericea*) and hawthorn (*Crataegus* sp.). The impacted areas would be stabilized and replanted and or seeded with native vegetation. Canopy trees would be protected and retained to provide habitat benefits to the finished channel. Additionally, existing large woody debris would be maintained or replaced in the constructed channel.

Most of the construction activity will be accomplished in a dry channel. However, sediment, erosion control, and water quality protection will be conducted using procedures outlined in Washington Department of Ecology's Stormwater Management Manual for Eastern Washington (2004), if necessary.

During operations, stream banks will be inspected by the Certified Erosion and Sediment Control Lead (CESCL) and turbidity sampling of surface waters will be conducted as described in the Erosion and Sediment Control Plan (ESCP) and the Storm Water Pollution Prevention Plan (SWPPP). The specifics of the monitoring program will be developed with Department of Ecology staff and in accordance with a designated Quality Assurance Project Plan (QAPP).

Expected Outcome and Further Actions

The benefit of the proposed side channel enhancement is multifaceted. It would provide cool water rearing habitat for juvenile salmonids during summer thereby decreasing mortality, improving fish condition and increasing production. It will also provide an example through which to assess the cost-effectiveness of developing additional cool water rearing habitats in the Okanogan basin and promote contributing enhancement from various sources of salmon recovery enhancement funds. Native grasses and other native vegetation are expected to establish at this location. If noxious weed species[1] encroach, then the areas will be added to those scheduled for treatment under the noxious weed control section of this plan (Section 2.5.1).

2.11 MITIGATION PLAN FOR RIPARIAN AREAS

2.12 SITE LOCATIONS

Three general areas have been identified as suitable locations for planting riparian species at Enloe reservoir, all of which are between the dam and Shanker's Bend. Two of these areas are on the east side of the reservoir, and the third is on the west side. It is not possible to accurately determine the exact planting sites at this time. In addition, riparian vegetation will be planted at the side channel site; vegetation that is disturbed during enhancement of the side channel will be restored. Development of the planting plan will be carried out through consultation with stakeholders to determine the exact location and extent of mitigation.

[1] Although reed canary grass is considered an invasive species, it is not listed as a noxious weed. Due to the pervasive presence of the species in the vicinity of the project and the sensitivity of the habitat, control of this species is not proposed.

2.13 SITE PREPARATION

Site preparation prior to planting enhances growing conditions for the plant material installed. Site factors that may inhibit successful establishment include unsuitable substrate and invasive weeds.

General Site Preparation

Site preparation includes the scarification of surface soils to reduce soil compaction and provide a suitable planting bed. In culturally sensitive areas, other methods that do not disturb the ground can be used such as adding a mulch mixture to the surface of the site.

For relatively small sites, site preparation may be accomplished by hand raking. For larger sites, mechanical methods to scarify the site may be used, followed by raking or harrowing. The planting area must be free of living sod and perennial weeds before planting.

Site preparation may include the entire area, strips or patches or individual 'scalp' areas for each plant. Scalp planting is a method that places plants in an area cleared of competing vegetation and the area for each tree/shrub should provide a minimum 3-foot-diameter circle (1.5 feet on each side of the planted stock) (NRCS 2007). This procedure is typically carried out by hand, backhoe or front-end loader immediately prior to planting. By preparing only small strips (4 to 10 feet wide), or scalp areas which maintain the existing vegetation between rows, wind and water erosion will be reduced and wildlife benefits will be provided. It is important to ensure that noxious weeds in the immediate area are removed to prevent rapid re-colonization of weeds. If needed, soil amendments may be applied, such as compost.

The District shall not use polyacrylamide or hay or straw on exposed or disturbed soil at the wetland mitigation site(s).

If weed-barrier fabric is used on the site, the District shall use only permeable, fully biodegradable, non-toxic weed-barrier fabric for entire-site and/or individual plant weed control. Non-biodegradable plastic weed-barrier fabric shall be used only at the base of individual plants and shall be removed before it starts to break down, before it interferes with plant growth, or before the end of the monitoring period, whichever comes first.

If seeding is used at the wetland mitigation site, the seed mix must contain only native, annual, non-invasive plant species.

Site Preparation for Road Beds

Due to the proximity of identified cultural and historic resources, the construction team will work closely with the Historic Properties Management Plan Coordinator (HPMPC) to insure the sites are not disturbed and consistent with the Historic Properties Management Plan.

Site preparation of road beds involves removing some of the existing roadbed (gravel), scarifying the ground, importing soil and mixing native and imported soils together. The road surface is scarified or decompacted, using an excavator, to improve infiltration and promote the establishment of vegetation. Surface treatment may include providing undulations that correspond to the local topography. Weeds in the immediate area will be removed to prevent re-colonization of the new soil by weeds. If needed, additional soil amendments may be applied, such as compost, sawdust, or woodchips.

2.14 PLANTING PLAN

Riparian vegetation will be planted at selected locations along the reservoir and the side channel enhancement site. While riparian shrubs are expected to establish naturally along the new low water elevation, planting riparian vegetation is expected to facilitate the replacement of existing plants that may be lost after the low water elevation is increased.

Construction site areas that are not in use for on-going operations once construction is completed will be part of the recreational use area. Development of this area is described elsewhere and not addressed in this plan.

Pole cuttings of cottonwoods (*Populus spp.)* and willows (*Salix spp.)* will be obtained from native stock in the surrounding area to ensure lower cost, local ecotype and availability. Plants adjacent to the reservoir that are likely to be inundated are a likely source of this material (subject to BLM approval). The riparian zone at Enloe is currently dominated by willow, but other native species that are also present, such as red-osier dogwood and mountain alder, may also be used.

Salvage planting is not proposed due to the low success rate and additional watering requirements, although the willows and any young cottonwoods at the current low-flow shoreline of Enloe Reservoir may be harvested to provide planting stock.

Rooted stock is not proposed due the high cost and time involved in locating material. Also, rooted stock must either be planted close to water or irrigated which would require additional permitting. It is anticipated that the use of pole cuttings from native stock will be sufficient to adequately restore riparian areas to a natural state, without the need for irrigation.

It is anticipated that pole plantings will not be significantly affected by competition with weeds, because mesic conditions do not benefit weed colonization. However, an integrated noxious weed management plan is provided in this mitigation monitoring plan to address the potential for noxious weeds invasion (Section 4.2).

Pole cuttings are sensitive to trampling and consumption by livestock and wildlife. Protection from livestock requires adequate fencing (section 2.2.4) as described in this plan.

Cutting Procedure

1. Pole cuttings will be harvested during the dormant season after leaves have fallen and before buds start to swell (early winter to early spring). After planting, rooting occurs from root primordia along the complete length of the stem, creating an extensive root system (Hoag 1995).

2. Healthy, vigorous young poles with larger diameters and no obvious insect or disease problems will be chosen as these establish quicker and more successfully than older or thin poles (NRCS 2008). This is because a larger supply of energy is stored in the stem to improve establishment success (Hoag 1995).

3. Cuttings will be thinned from live wood at least 2 years old. Up to ⅔ of the plant will be removed to ensure remaining habitat exists for wildlife while the cuttings become established (NRCS 1998).

4. Willow poles will be ¾ inch diameter or greater and young cottonwood poles will be 1.5 to 3.5 inches in diameter. The length of the cuttings will be determined by the depth of groundwater and height of surrounding vegetation. The poles long enough so that the above-ground portion will be tall enough to avoid shading by the surrounding herbaceous vegetation. Generally, willow poles will be 18 inches long minimum and cottonwood poles will be 6 to 9 feet long.

5. The cuttings will be prepared by removing all side branches and the top 2 feet in order to remove the apical bud and most of the flowering parts. This ensures that the majority of energy in the stem will go to the auxiliary buds for rooting and sprouting, rather than be spent on flowering (Hoag 1995).

6. Cuttings will be tied into bundles of 8 to 12 inches diameter using two pieces of twine to ease transportation and soaking.

7. Between harvest and planting of poles, the cut ends of the poles will be placed in water to prevent dehydration. The pole cuttings will be stored in a cool (34-36°F), dark place until ready for planting for up to 6 months (NRCS 1998).

8. The cutting bundles will be soaked for 5 to 7 days before planting to allow swelling of the root buds before planting and to aid in leaching out natural anti-rooting hormones found in the cuttings. The bundles will be removed from the water before roots emerge.

Planting Procedure

1. Planting will be done in late fall or early spring to the extent consistent with the Project schedule, dependent on whether the planting sites are accessible at that time.

2. The site will be prepared by removing major weed colonies by hand.

3. Holes between 1 to 4 inches wide and 18 inches to 3 feet deep (dependent upon the size of the pole cuttings) will be made with a power auger or punch bar tool. This hole will of a sufficient depth for the cut end of the pole to remain in ground water throughout the growing season. Willow species in general can tolerate shallower ground water depths (1.5 feet or deeper) than cottonwoods (4 feet or deeper) (NRCS 2008). To minimize labor, excavation time, and moisture loss, hole size will not be any larger than necessary to insert the poles without damage to the buds.

4. Pole plantings may be planted in rows, or at random in the most suitable places, at a rate of 2 to 5 poles per square yard where appropriate.

5. The cuttings will be placed carefully in the hole to prevent major damage to the buds.

6. At least ½ to ⅔ of the cutting will be planted below ground to provide support during high flows. At least 2 to 3 feet should be below ground.

7. After placing the cutting, the hole will be backfilled with a soil and water slurry to remove air pockets. It is critical that all air pockets are removed.

8. Fertilizers and rooting hormones will not be used as these rarely increase success enough to offset the material and labor costs involved (NRCS 1998).

9. Protective enclosures for individual plants will be used to protect the young plants from consumption by wildlife such as beaver or deer. These enclosures may consist of wire cages or rigid protection tubes.

10. The locations of the plantings will be mapped, either as individual plants or as groups of a certain number of individuals.

2.15 PROTECTION FENCING

The lands within the boundary of the Enloe Hydroelectric Project and adjacent lands are currently not fenced. Currently, three ranchers have rights to graze cattle on Bureau of Land Management (BLM) land within the Project Area. Because there are no fences to limit or control livestock access, cattle freely roam the entire site. Cattle access the river for drinking water wherever the topography allows.

In order to improve water quality, prevent cattle from entering the proposed recreation site, and prevent damage to wetlands and proposed riparian/wetland mitigation sites, the District will install an 8,000-foot-long cattle fence along the eastern boundary of the Project Area from Shanker's Bend to Enloe Dam. At its northern end, the cattle fence will tie in to a rock outcrop just south of the apex of Shanker's Bend. Cattle will have access to the river just upstream from the rock outcrop. At its southern end, the fence will tie in to another rock outcrop just east of the proposed powerhouse. Additional details of the fencing plan can be found in the VMMP.

Fence Description

The configuration of the cattle fence will be consistent with BLM guidelines for livestock fencing installed in areas inhabited by common ungulate species (BLM Manual Handbook H-1741-1 Fencing). The fence will consist of three well-stretched horizontal wires with the top wire no more than 38 inches above the ground. The other wires will be spaced at intervals 16 and 26 inches above the ground. The bottom wire will be smooth and the other two wires will be barbed. This configuration will reduce injury to fawns and yearling deer who often try to move between lower fence wires. Adult deer easily jump a fence with a top wire 38 inches above the ground. One access point through the fence for pedestrians will be provided near the north end of the recreation site.

The District will install a stock watering tank approximately 300 upslope from the river, just inside the Project boundary and north of the proposed recreation site, as an alternative source of drinking water for grazing cattle. The tank will be supplied with water from an existing pump and water line located on the east bank of the river. The pump and water line is owned by one of the grazing lessees. The grazing lessee has an existing water right to withdraw water from the river for stock watering purposes. The District will monitor the need to install a security fence around the pump and electrical power system to discourage vandalism and theft if it becomes a problem.

A cattle guard will be installed where the cattle fence crosses the main access road to the dam. The cattle guard grid will be designed to bear the maximum expected vehicle load (which may include construction equipment). A gate (accessible only by authorized personnel) will be installed where the cattle fence crosses Enloe Dam Road.

Maintenance

Inspection of the livestock and security fences will be conducted routinely by District staff or contractors. Maintenance will be conducted when necessary to preserve the integrity of the fences.

2.16 SCHEDULE

The RWMP implementation schedule will be determined once the date that the license order will be received is known. Scheduling of all vegetation-related activities would be dependent upon both the Project construction schedule and seasonal constraints. The schedule will be dictated by the operation of the crest gates, because this determines when suitable hydrology will be present at most proposed planting areas.

2.17 COST ESTIMATES

Cost estimates for each of the proposed riparian PM&E measures described in this RWMP will be developd in detail during subsequent design work.

2.18 MAINTENANCE

The District shall maintain all mitigation site plantings so as to meet the plan's goals and objectives.

The District will be responsible for maintaining restored riparian areas, fencing and livestock water storage facilities in acceptable conditions through routine maintenance, repair, replacement and replanting.

2.19 INTEGRATED NOXIOUS WEED MANAGEMENT PLAN

There are multiple small areas of noxious weed infestations within the Project boundary that will be controlled, reduced, or eradicated. Following treatment at these areas, native species will be seeded to facilitate the re-establishment of native wildlife habitat. Additional sites may be identified for treatment in the future by BLM or the PUD, but those are beyond the scope of this plan.

Biocontrol is not proposed because successful establishment for biocontrol agents may take from one to several years. When effective, their result is to reduce populations over time. However, the weed control as addressed in this plan is for the eradication or control of specific weed stands that occur within the FERC Project boundary and at the restoration sites.

Area Identification

Weed control treatments described in this plan will be conducted at the Enloe reservoir riparian planting sites and the side channel enhancement site.

An estimated total of approximately 69,696 square feet (1.6 acres) will be treated using herbicide and manual methods for controlling noxious weeds. Herbicide application will be limited to areas upslope of the existing lower access road, unless otherwise determined by BLM's lease administrator. Weed control at the side channel enhancement site will be limited to manual control except in upland areas.

Proposed weed control is limited to the Project boundary and the restoration areas. Weeds are present elsewhere in the vicinity of the Project, but these are outside the District's area of responsibility.

Weed Identification

Targeted species for eradication/reduction that have infested the Enloe Dam area are as follows:

Class B:

- Houndstongue (*Cynoglossum officinale*)
- Diffuse knapweed (*Centaurea diffusa*)
- Sulfur cinquefoil (*Potentilla recta*)

Class C:

- Babysbreath (*Gypsophila paniculata*)

Method and Type of Application

Methods

The methods used in the integrated noxious weed management plan will be a mixture of hand pulling and hand spraying of herbicides. This is to ensure the careful removal of noxious weeds without harming beneficial plant species.

For chemical treatment using broadleaf herbicides, two hand-spray methods will be used: 1) hose reel from a slurry tank on a 4WD pickup and 2) backpack sprayer. All chemicals will be mixed off-site and no chemicals will be stored, flushed or mixed on the Enloe site. Near the Similkameen River bank, where there is a small infestation of diffuse knapweed near the high-water line, hand pulling and bagging of knapweed will be the preferred method.

Types and Application of Herbicides

Proposed herbicides for broadleaf control will be a combination of 2, 4-D Amine 4, Roundup. Use of other broadleaf herbicides such as Tordon and Redeem will also be considered to aggressively treat heavily infested roadway edge for diffuse knapweed. Application rates will follow Specimen Labels for each respective herbicide. No use of soil sterilization chemicals will occur at this site. MSDS and Specimen Labels will be provided upon request.

Post Treatment and Site Rehabilitation

After the desired control and reduction in noxious weed infestations have been established, a native grass mix such as the western native grass mix described in Table 2 generally will be used to re-establish the areas. Where weed control is conducted in developed recreational use areas, a grass mix that includes non-native species may be used if approved by BLM for this purpose. The rate of seed/acre will depend on the type of mix used.

Table 1. Grass Mix Species Composition
Western Native Grass Mix
25% sheep fescue
25% Sandberg bluegrass
20% Indian ricegrass
10-15% bluebunch wheatgrass
10-15% prairie junegrass

Schedule

Weed control methods for targeted species are expected to be implemented in early May, with a possible follow-up treatment in October of the same year. If necessary, the treatment may be repeated in May of the following year to further reduce knapweed regeneration. Any native grass seeding will be done in early spring and fall of the second year to ensure coverage.

Long Term Control of Noxious Weeds

Monitoring of noxious weed infestations within the Project boundary and the side channel enhancement site will be carried out in the summer/fall during years 1, 2, 3, 4, 5, 7, and 10. The method and type of application for control of new weed infestations will be the same as described in Section 4.1.3, unless more effective methods are developed. If dramatic changes in weed populations occur during these time periods, it may be necessary to re-evaluate the weed control measures. Consultations with BLM, U.S. Fish and Wildlife Service (FWS), and Washington Department of Fish and Wildlife (WDFW) will be considered prior to implementation of new weed control plans.

2.20 MONITORING PLAN

2.21 MONITORING OBJECTIVES

The District shall monitor the riparian mitigation areas as described herein.

Revegetation monitoring will be conducted to evaluate the establishment of the woody riparian plantings and to identify any problems that may need to be corrected. The focus of the monitoring will be on the reestablishment of riparian woody species.

2.22 MONITORING PERFORMANCE CRITERIA

It is anticipated that the new riparian plantings will have at least a 75% survival rate, as determined by counting surviving individuals, for the first 5 years. If the riparian vegetation in any area becomes too dense to identify individuals, that area will be considered to have met the performance criteria, with the equivalent of a 100% survival rate. Should the survival rate of the riparian plantings decrease to less than 75% of the original planting during the first 5 years of monitoring, or 75% in the last 5 years of monitoring, new riparian plants will be planted to replace those deceased. The type of

plants used and technique of planting will remain the same. However, if losses occur because the depth to water table depth at a planting site is different from the anticipated depth, then the actual planting locations may be shifted to more suitable sites.

Areas that have been planted with grass seed following weed control efforts will be monitored by visual inspection and by photo points. It is anticipated that vegetation will attain a 75% cover value, not including any new individuals of the targeted species. If this cover value is not achieved, then additional grass seed will be planted. If the targeted weed species re-establish, then weed control treatment will continue.

Monitoring of noxious weed infestations within the Project boundary will be carried out in the summer/fall annually in years 1, 2, 3, 4, 5, 7, and 10. Year 1 would start after plantings have been in the ground for a minimum of 12 months. The method and type of application for control of new weed infestations will be the same as described in Section 2.5.1, unless more effective methods are developed. If dramatic changes in weed populations occur during these time periods, it may be necessary to re-evaluate the weed control measures. Consultations with BLM, FWS and WDFW will be considered prior to implementation of new weed control plans.

The District shall develop and implement contingency measures if this Plan's goals and objectives are not being met. Prior to implementing contingency measures not specified in the Plan, the District shall consult with and obtain written approval from Ecology for the changes. Subject to this Plan, when necessary to meet the goals and objectives, the District shall replace dead or dying plants with the same species, or an appropriate native plant alternative, during the first available planting season and note species, numbers, and approximate locations of all replacement plants in the subsequent monitoring report.

2.23 MONITORING SPECIES

Woody riparian species that will be planted and monitored are willow species and cottonwood. Red-osier dogwood and mountain alder may also be planted if suitable material is available.

Grass establishment will be monitored only at sites where facilities are removed and grass seed is planted. The species list is provided above.

2.24 MONITORING PROTOCOLS

Woody riparian plantings will be monitored either by counting the surviving individuals or, if access for counting individuals is not feasible, by counting surviving individuals in quadrats distributed across the planting area. If the riparian vegetation in any area becomes too dense to identify individuals, the extent of that area will be mapped.

Monitoring techniques will include photo-points and plant cover sampling, either on line intercept transects or in quadrat plots randomly distributed along a line. Alternatively,

point-intercept sampling along a line may be used to determine species distribution. The choice of methods will depend on the site conditions when initial monitoring begins, but the same method will be used throughout the monitoring period. Due to the narrow zone in which such changes may occur, randomized sampling may not be feasible, and the final selection of a monitoring method will depend on the condition of the shoreline and banks when monitoring is initiated.

Fixed start and end points for the sampling will be established and recorded by global positioning system (GPS). These points may be marked with rebar stakes in the first year. However, since flooding is likely to remove or obscure the stakes in some years, the points may have to be located by coordinates each year. If changes to the shoreline remove a monitoring area during the monitoring period, then a new sampling site will be established inland of the original location.

Examples of data sheets for monitoring are provided in Appendix B, although the data sheets used may be modified versions.

2.25 MONITORING IMPLEMENTATION SCHEDULE

Monitoring of riparian plants will be carried out in the late summer or early fall annually for 5 years beginning in the year following planting, and then in years 7 and 10. Data recorded will include an evaluation of the condition of the plants, as well as the counts or cover data.

Table 2. Riparian Areas Monitoring Schedule

Year	0	1	2	3	4	5	7	10
Quantitative		x	x	x	x	x		
Qualitative		x	x	x	x	x	x	x
Noxious Weeds		x	x	x	x	x	x	x
Reporting	x	x	x	x	x	x	x	x

2.26 COST ESTIMATES FOR MONITORING STUDIES

Monitoring costs for woody riparian plantings will be refined in during final development of the PM&E's.

2.27 REPORTING

Within 90 days of completing construction and planting of the mitigation site(s), the District shall submit to Ecology one hard copy and one electronic file of the final as-built report including maps. The as-built report will document site conditions at year 0.

Each year that monitoring is conducted a report will be prepared, using the monitoring data to assess the state of riparian mitigation areas and any management actions that

may be necessary to achieve the performance criteria. The report will also provide information on the current state of the exclusion fencing.

The District shall submit to Ecology one hard and one electronic copy of monitoring reports documenting mitigation site conditions for years described in the plan by December 31 of each monitoring year.

3.0 WETLANDS

3.1 WETLANDS IN THE PROJECT AREA

Wetlands in the Project Area were generally described in *Enloe Hydroelectric Project FLA, Environmental Report, Exhibit E (FERC No. 12569)* (District 2009). This section provides more detailed information to assess project wetland impacts and proposed mitigation.

Wetlands were delineated following the methods described in the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987), *the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2006), and *the Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Arid West Region* (USACE 2008).

The delineation in the original FERC Project Area at Enloe Reservoir and Dam was conducted on July 31 through August 9, 2007, by Gretchen Lebednik, Jeremy Bunn, and Jenner McCloskey from Cardno ENTRIX. The gravel augmentation sites were inspected by Gretchen Lebednik in June, 2009, and the side-channel enhancement site was surveyed on September 18, 2010 by Sandra Slayton and Darcey Miller from Cardno ENTRIX.

Wetland areas were grouped by assessment unit following the *Washington State Wetland Rating System for Eastern Washington – Revised* (Hruby 2004), and ratings are summarized in Table 3. Data sheets and wetland rating forms are available under a separate cover.

Two main wetland community types occur in the Project Area: riparian shrub wetlands and herbaceous wetlands (see Figure 2 for the wetland locations). Table 3 presents the area and rating category for each assessment unit. The individual wetlands comprising the wetland assessment units are listed in Table 4.

Riparian Shrub Wetlands

The riparian shrub wetland community consists of woody vegetation that is less than 12 feet tall. Much of this community could be considered a scrub-shrub class under the US Fish and Wildlife classification (Cowardin et al. 1979) and occupies approximately 7.4 acres in the Project Area, of which 1.98 acres are jurisdictional wetlands (Figure 2). The wetlands are found primarily along the banks of the reservoir and on stabilized floodplain sediment deposits. This riparian shrub wetland community transitions into upland shrub-steppe along an elevational gradient where the slopes are gentle. It also occurs as a narrow fringe elsewhere along the reservoir. Willow stands, varying in size from bands of seedlings or small shrubs to large dense thickets, provide over 75% of the total shrub canopy cover. The dominant willow species are Bebb willow (*Salix bebbiana*) and sandbar willow (*Salix exigua*). Other species in this community include

red-osier dogwood (*Cornus sericea*), chokecherry (*Prunus virginiana*), clematis, smooth sumac, and young black cottonwoods (*Populus balsamifera*).

Herbaceous Wetland

Herbaceous wetland is analogous to an emergent wetland class (Cowardin et al. 1979) and is found on wet or seasonally flooded areas. This community occupies approximately 3.5 acres in the Project Area, of which 3.0 acres are jurisdictional wetlands (Figure 2). This wetland community occurs in scattered patches on low-elevation terraces immediately adjacent to the reservoir. Dominant species are perennial graminoids, including reed canary grass (*Phalaris arundinacea*), spikerush (*Eleocharis* spp.), scouring rush (*Equisetum* spp.), and bluegrass. Other species include cattail (*Typha* spp.), horsetail, milkweed (*Asclepias* spp.), and knapweed. Woody species found in these areas include Wood's rose, red-osier dogwood, black hawthorn, and willow, but provide less than 5% of the cover in this community. Herbaceous wetlands are listed in Table 4.

Table 3. Areas and Ratings for Wetland Assessment Units at Enloe Reservoir

Wetland Assessment Unit	Acres[1]	Rating Category	Impact
East 1	0.1	IV	Yes
East 2	1.5	III	Yes
East 3	0.1	IV	Yes
East 4	0.2	III	Yes
East 5	0.3	III	Yes
West 1	0.3	III	Yes
West 2	0.2	III	Yes
West 3	1.1	III	Yes
West 4	0.6	III	Yes
West 5	0.1	IV	Yes
West 6	0.4	III	Yes
Below Dam	0.1	III	No
Total Acres	**5.0**		

[1] There may be differences in totals due to rounding.

Table 4. Wetlands In Each Wetland Assessment Unit by Community Types in the Project Area

Wetland Assessment Unit	Herbaceous	Riparian Shrub
East 1	5, 10, 11, 13, 23, 27, 44	--
East 2	16, 41, 70, 75	22, 52, 89
East 3	57	--
East 4	7, 9, 30, 43, 54, 57, 62	--
East 5	72, 76	--
West 1	42, 68, 74	--
West 2	3, 12, 35, 69	--
West 3	25, 34, 56, 78	48, 59, 80, 83
West 4	4, 18, 28, 33, 38, 77, 79	--
West 5	64	--
West 6	52, 60, 81	--

3.2 PROJECT IMPACTS TO WETLANDS

Project impacts would result from project operation, project construction, and implementation of PM&E measures. These activities would result in conversion of wetland types, modification of wetland functions, small loss of wetland area, or minor temporary impacts to vegetation. The impact assessment has been updated from the February 2012 RWMP using new LIDAR information for the Project Area.

3.3 IMPACTS FROM PROJECT OPERATION

Enloe Dam Reservoir Area

The project will cause two types of changes in pool elevations. First, the year-round elevation of the reservoir will be increased from ~1045 feet, excluding spring and early season flood events, to a normal pool of 1048.3 feet in elevation. This pool elevation will be maintained from roughly July through April (Figure 3). Second, the existing spring flood elevations will rise to 1050.3 feet for about 30 days longer than under the current conditions. The spring hydrograph will occur from late April to mid-June instead of late April to mid-May. These two changes in pool elevations will have different impacts to wetlands in the Project Area, and will be discussed separately below.

Factors affecting the degree of change will include the type of wetland (emergent or scrub-shrub), elevation, substrate, and slope. To assess the degree of hydrologic change to a particular wetland, the elevation of each wetland was determined using LIDAR data, and was compared to the 1048.3 and 1050.3 foot elevation contours to determine the area and depth of inundation under the new hydrologic regimes.

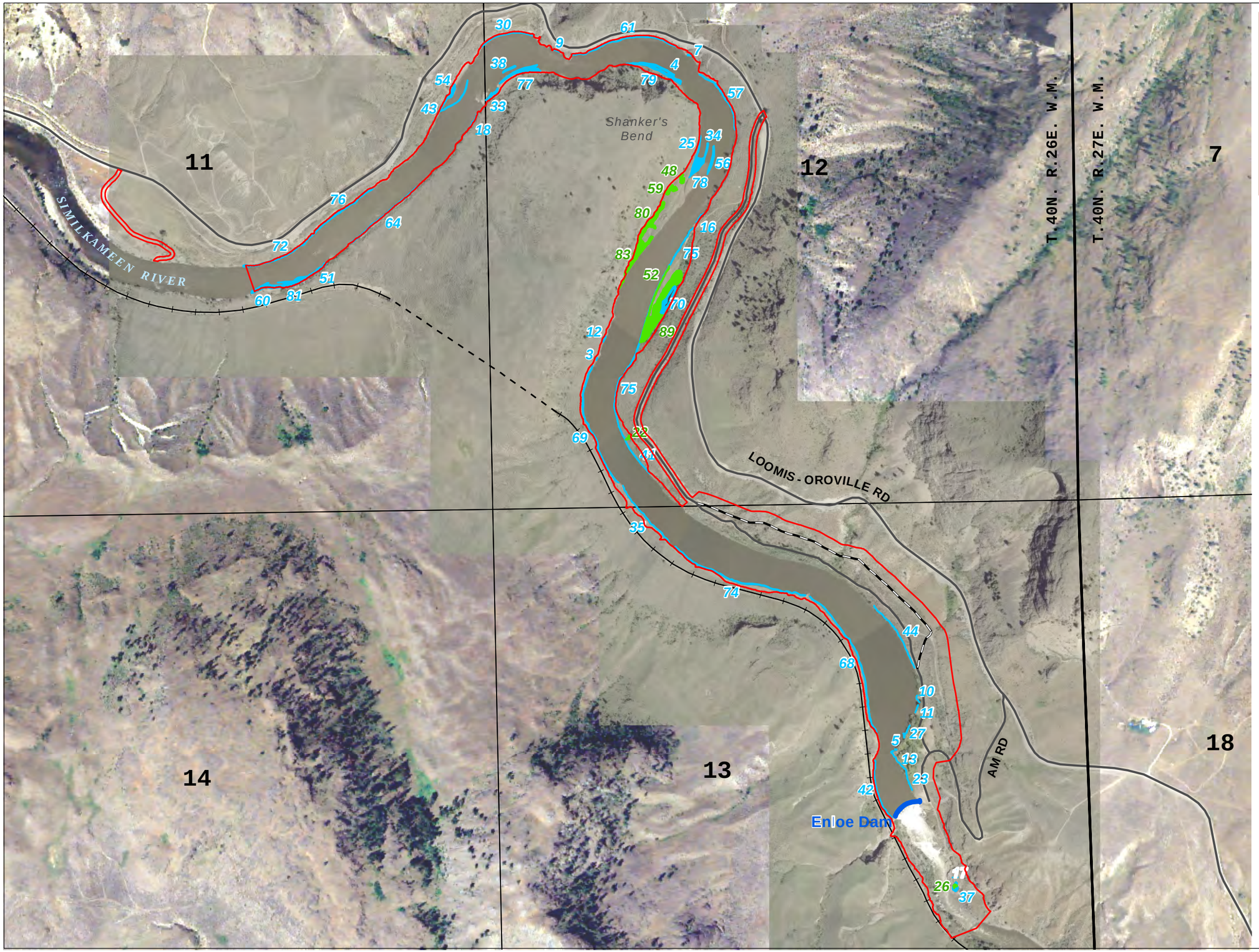
Overall, in the Project Area, wetland habitat types will be converted to other wetland types that are adapted to deeper hydrologic regimes and will, in turn, support different

plant communities. Shoreline areas that currently support upland vegetation will be inundated and flooded for longer periods, thereby converting some of them to wetlands.

The increase in permanent inundation of up to 3 feet will change existing wetlands to different classes or types. This change is considered a conversion of wetland types as described in Ecology et al. 2006. For example, scrub-shrub wetlands that established on floodplain soils under existing conditions are not adapted to permanent inundation of up to three feet. However, this depth of water is suitable for establishment of aquatic bed wetlands. At slightly higher elevations with less inundation, wetland vegetation may change to emergents, or herbaceous wetlands.

By raising the crest gates, the new pool will also inundate the narrow bands of mostly emergent habitat along the reservoir shorelines on a year-round basis and potentially convert some areas to aquatic bed wetlands. Most of these narrow bands occur on relatively steep slopes so available substrate is limited for re-establishment of similar wetlands upslope at the new pool elevations. However, it is expected that narrow bands of emergent wetlands will re-establish along the banks of the reservoir over a period of years.

The extended duration of higher pool elevations (i.e. 1050.3 ft) in spring could also change certain wetland types. Some wetland shrub species cannot tolerate long periods of inundation in the early spring when they are breaking dormancy. It is expected that the longer periods of inundation in the spring will change the species composition of some scrub-shrub wetlands and may convert them to herbaceous wetlands. In addition, although less susceptible, some herbaceous wetlands may also change from the extended inundation. Although these adverse impacts are uncertain, this assessment counts the wetlands that are subjected to extended inundation as impacted wetlands.



Legend

Wetlands

- Herbaceous Wetland
- Riparian Scrub
- Enloe Dam
- FERC Boundary
- Railroad Tunnel
- Railroad
- Planned Road
- Existing Road
- Section Boundary

N W E S

0 250 500 1,000 1,500 Feet

Image sources: 2005 USDA National Agriculture Imagery Program and May 2006 Okanogan County PUD.

Enloe Dam Relicensing Project

Figure 2

Wetlands in the Enloe Hydroelectric Project Area

Cardno ENTRIX

Total wetland acreage to be inundated by the permanent pool at 1048.3 feet is 0.98 acre, including 0.77 acre of herbaceous and 0.21 acre of riparian shrub wetlands. Extending the duration of inundation during spring floods will affect an additional 1.18 acres of wetlands, encompassing 0.48 acre of herbaceous and 0.70 acre of riparian shrub wetlands.The combined total amount of wetlands inundated and converted to other wetland types by the project is 2.16 acres (Table 5).

Two narrow riparian shrub wetlands (Wetlands 22 and 52) occur along the east shoreline of the reservoir (Figure 4). These habitats will be partially inundated year-round and are anticipated to be converted to emergent or aquatic bed wetlands over time.

Two large wetland complexes occur just downstream of Shanker's Bend and are the largest non-linear wetland areas in the Project Area. Impacts to these areas from inundation are expected to be the most pronounced, but are expected to result in a net increase in wetland areas and function.

Wetland 89 is a large (1.12 acres) riparian shrub wetland occurring on a portion of floodplain sandbar, or riverwash, on the east bank just downstream of Shanker's Bend (Figure 4). The floodplain has uneven topography (1047 feet up to 1052 feet) resulting in a variety of habitats. Adjacent to this wetland is a 0.13 acre herbaceous wetland (Wetland 70) and an unvegetated sand plain occurring in a depression or old channel meander against the hillside. Within this sand bar area, the lowest areas will be inundated with 1 to 2 feet of water year-round, but other areas will only be inundated during the high spring flows. It is expected that wetland classes or habitats in this area will readjust to the new hydrologic regime and comprise aquatic bed, emergent, and scrub-shrub wetlands. No wetlands will be lost in this important area, but some will be converted to other types. In addition, present upland areas, including a 0.70 acre upland meadow, will establish as wetlands because of the higher water elevations (Figure 2).

On the opposite side, or west bank, a riparian shrub complex (Wetlands 83, 80, 59, and 48) occurs in a depressional area (Wetland 80) and on a partially stabilized sandbar (Figure 2). Most of the sandbar willow-dominated wetlands are above the permanent pool of 1048 feet, except for a few small pockets in Wetland 80, and therefore these wetlands will be primarily affected by the longer duration spring floods. These wetland species may expand into the neighboring upland meadow (ranging from ~1,050 to 1,052 feet), which will be inundated or saturated for several weeks in the spring. In addition, three small herbaceous wetlands (Wetlands 25, 34, and 56), totaling 0.12 acre would be inundated permanently with 1 to 2 feet of water. Wetland 78 (0.22 acre) is slightly upslope and would be inundated with ~1 foot of water only in a few spots, but would be flooded during the spring flood period. It is anticipated that this floodplain area would support a complex of shallow aquatic bed, shallow emergent, herbaceous emergent, and scrub-shrub habitats after some years of Project operation. Thus, in this floodplain area there will likely be a positive expansion of wetlands as a result of the new hydrologic regime.

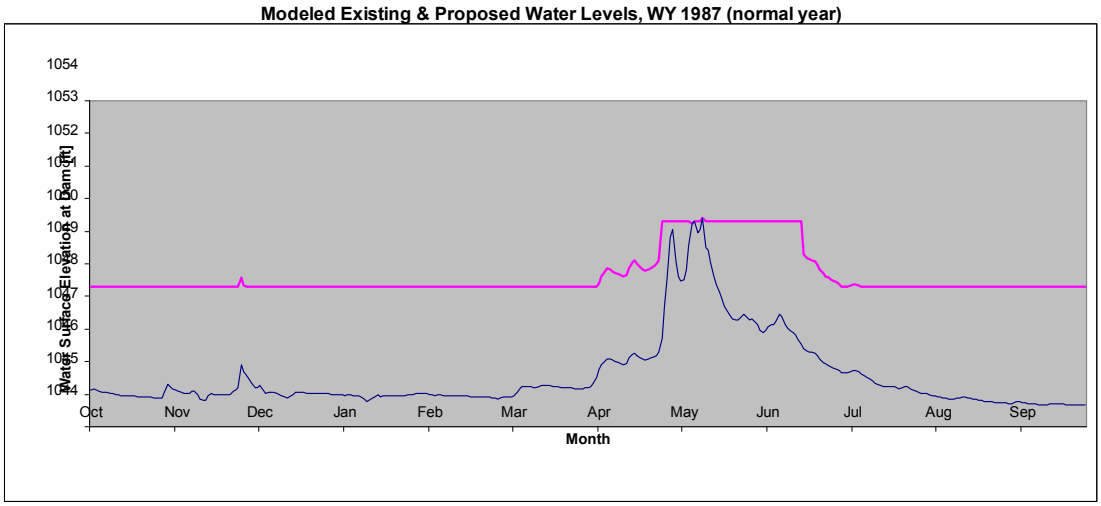
Additional narrow bands of herbaceous wetlands occur along the shoreline from Shanker's Bend upstream to the Project boundary. Many of these wetlands will be partially submerged by the permanent pool. Several wetlands (Wetlands 64, 51, 81, 60, 76, and 72) will be affected only by the spring runoff, similar to existing conditions. New emergent wetlands will likely also establish along new shallow shoreline.

Table 5. Summary of Wetland Impacts (acres)

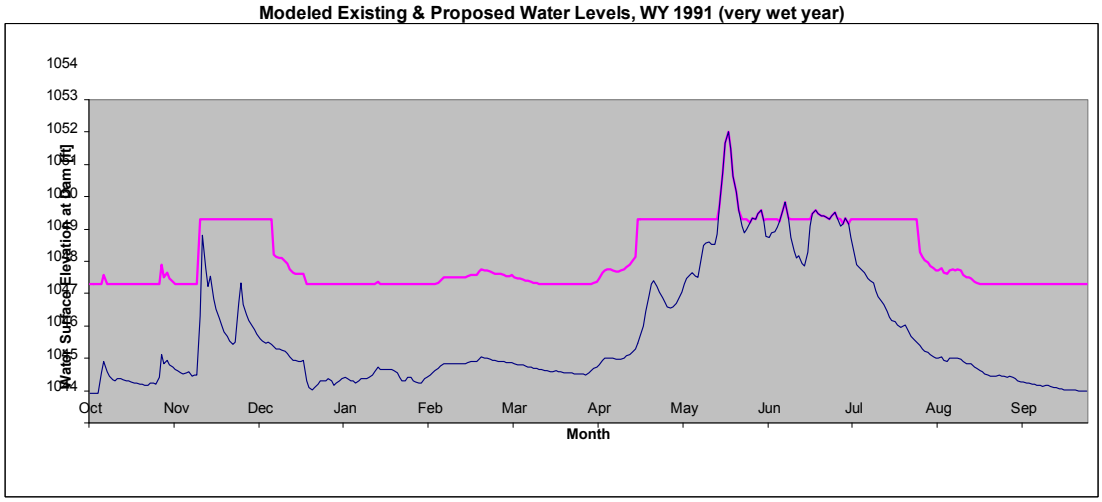
	Permanent Inundation (below 1048.3 feet)	Extended Inundation in Spring (1048.3 to 1050.3 feet)	TOTAL
Operation			
Category III			
RS	0.21	0.70	0.91
HW	0.67	0.42	1.09
Category III - sub-total	**0.88**	**1.12**	**2.00**
Category IV			
HW	0.10	0.06	0.16
Category IV - sub-total	**0.10**	**0.06**	**0.16**
TOTAL	**0.98**	**1.18**	**2.16**
Construction			
Enloe Dam Site			<0.01
Gravel Augmentation Site			0.00
Side Channel Enhancement Site			0.00
Sub-total			**<0.01**
TOTAL			**2.16**

RS = Riparian shrub; HW = Herbaceous wetland

Figure 3: Modeled Impoundment Water-level Variation for Representative Water Years
a) Normal
b) Very wet
c) Dry



a)



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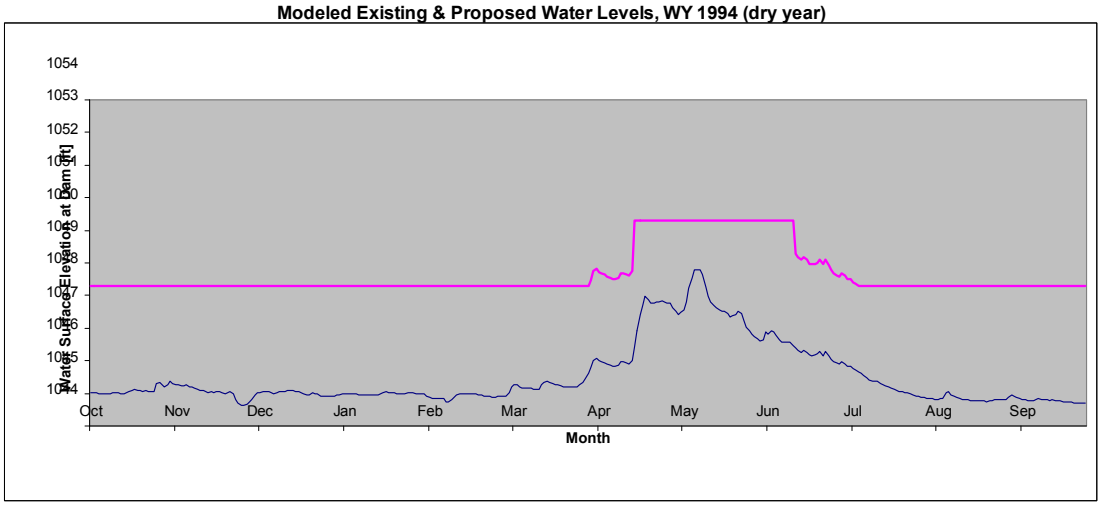

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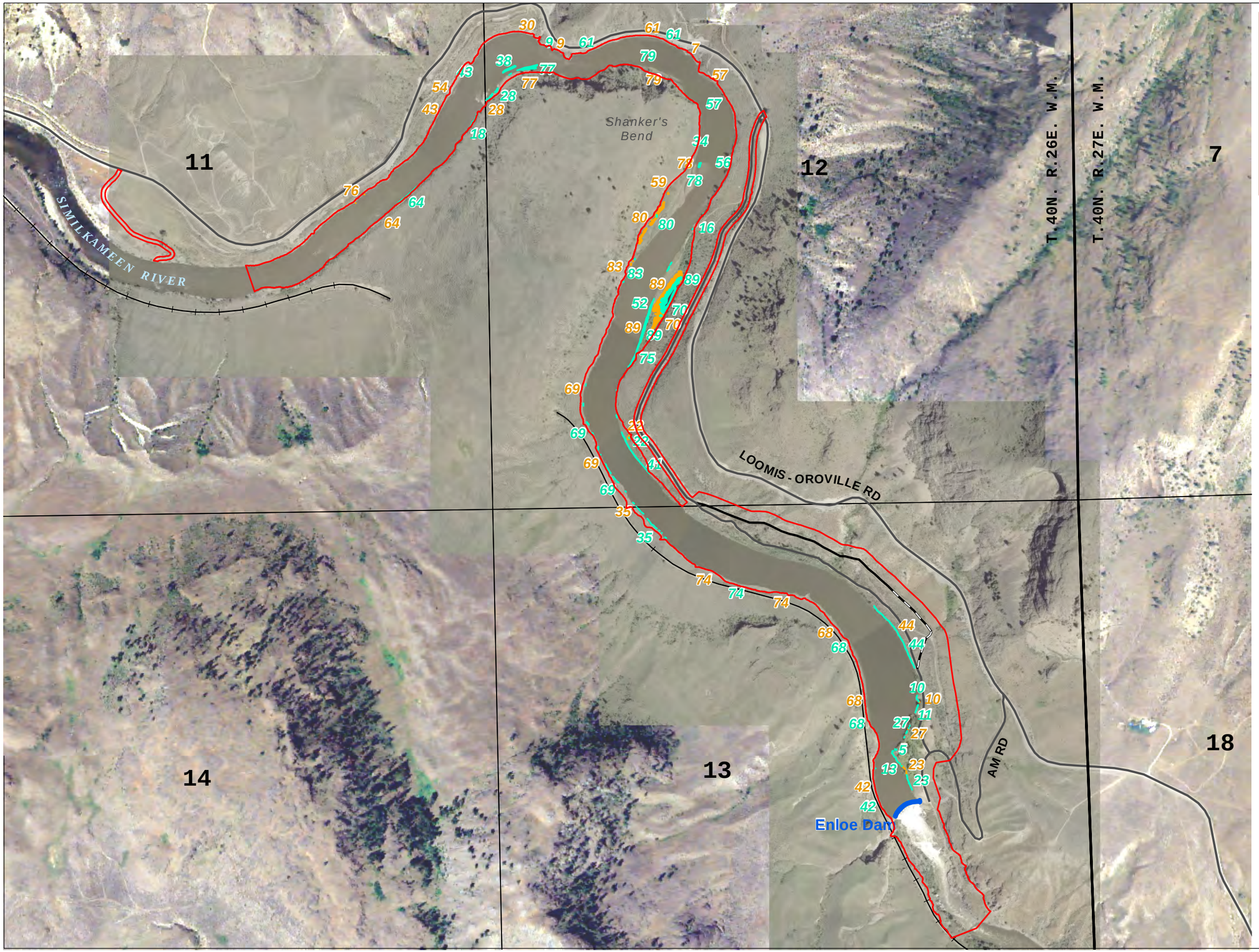


Legend

Wetlands

- Conversion
- Extended Inundation
- Enloe Dam
- FERC Boundary
- Railroad Tunnel
- Railroad
- Planned Road
- Existing Road
- Section Boundary

N W E S

0 250 500 1,000 1,500 Feet

Image sources: 2005 USDA National Agriculture Imagery Program and May 2006 Okanogan County PUD.

Enloe Dam Relicensing Project

Figure 4

Location of Operation Impacts to Wetlands

Cardno ENTRIX

3.4 IMPACTS FROM PROJECT CONSTRUCTION

Project construction would result in minor temporary and permanent impacts to wetlands from construction of the powerhouse facilities and at two locations as a result of implementation of the PM&E measures. These two locations are the gravel augmentation staging area (if the west site is selected) and the side-channel enhancement site downstream of the dam. Those impacts are described and quantified to the extent possible in the following sections.

Enloe Powerhouse and Associated Facilities

Construction of the intake channel will permanently fill <0.01 acre of Wetland 23, which is a linear shoreline herbaceous wetland. The impacts are anticipated to result in negligible effects on this wetlands habitat functions.

Implementation of PM&E Measures

Gravel Augmentation

Because of the upper basin geology and topography, the Similkameen River has very limited potential for gravel recruitment. Artificially increasing the amount of spawning gravel (1 to 3 inches) in the river downstream of Enloe Dam is proposed in PM&E FISH-11 to improve anadromous fish spawning habitat, with the potential to increase the overall reproductive success of Upper Columbia River steelhead and other native species.

The District proposes to supplement gravel in the Similkameen River a total of five times during a 23 year period. Gravel will be delivered by truck, transported by conveyor, stockpiled in the summer, and distributed by high flows that occur during the winter and/or spring. Gravel placement will begin post-license at year 3 when the project is constructed. The subsequent stockpiles would be placed every 5 years for the next 20 years (e.g., year 8, year 13, year 18, and year 23).

Stockpiling will occur in mid-August. The estimated total volume of gravel to be placed is 3,000 cubic yards. The benefit of this proposed gravel supplementation effort will be an increase of 1 to 2 acres every 5 years in spawning habitat for the benefit of Upper Columbia River steelhead, as well as other salmonids and native fish species found in the Similkameen River. This PM&E measure is further described in the FLA (District 2008).

Two potential sites for a rock conveyor to transport gravel into the channel of the Similkameen River are currently under consideration. Site 1 is located on the east side of the river and Site 2 is on the west side. Site 2, the preferred location, supports a small number of willow shrubs (*Salix* sp.) and small cottonwoods (*Populus* sp.) growing in the riprap. Use of Site 2 will require that approximately ~ 8 willow shrubs along the edge of the river be cut periodically. The cut willows are expected to resprout and

require cutting prior to the next use of the conveyor system. This impact area is very small and the impact will be short-lived. No mitigation for the willow trimming is proposed.

Side Channel Enhancement Site

The Side Channel Enhancement (as described in PM&E FISH-10) will focus on addressing two of the most substantial limiting factors for salmonids in the system—high temperatures during low flow and the limited rearing habitat for salmon and steelhead in the system. The general plan is to first modify an existing side channel so that it has direct access to the river, and bury a perforated pipe in spawning-sized gravel in the new channel. Cooler water will be obtained from a groundwater well and distributed to the site via a pipe. This water will be pumped to the perforated PVC pipe during critical warm water periods and will provide upwelling of the cooler water for fish.

Enhancement of the side channel will excavate a portion of the existing side channel, creating a deeper aquatic habitat adjacent to the river. Installation of the pipeline would disturb an area averaging 10 feet wide, ranging from 3 to 15 feet deep, by 300 feet long (3,000 square feet). Wetlands occur along the side of the channel in some places. It is the intent of the project to install the pipeline within the existing channel and avoid wetland impacts to the extent practicable. However, because the channel design has not been finalized, wetland impacts, if any, cannot be determined. A more detailed assessment of the impacts will be possible once the final construction plans are finalized. For the purposes of this document, it is assumed that no wetlands will be permanently impacted. If any temporary impacts occur from construction, appropriate mitigation will occur at this site.

3.5 WETLAND MITIGATION PLAN

The wetland mitigation plan is an integrated plan using several of the riparian revegetation PM&E measures in combination with other project PM&Es and site-specific wetland mitigation activities.

3.6 ESTIMATE OF REQUIRED MITIGATION

The required wetland mitigation was estimated using Table 1b, Mitigation Ratios for Eastern Washington and guidance in Section 6.5.6 *of Wetland Mitigation in Washington State, Part 1: Agencies Policies and Guidance* (Ecology et al. 2006). Ecology's standard wetland mitigation ratios for creation are equal or greater than those in Okanogan County Code (OCC 14.12.670.E). The principal impact type to wetlands is conversion of one type of wetland to another. In accordance with the guidance, typical ratios for conversion are one-half (0.5 times) the standard ratio (p. 78, Ecology et al. 2006). Using impacts listed in Table 5, the total required mitigation (using ratios for creation of 2:1 for category III wetlands and 1.5:1 for category IV wetlands) is estimated to be 2.14 acres (Table 6).

Table 6. Estimation of Required Mitigation (acres)

	Impact Area	Standard Ratio (Creation)	Conversion Factor	Total Mitigation Required
Category III				
RS	0.91	2:1	0.5	0.91
HW	1.09	2:1	0.5	1.09
Category III - sub-total	**2.00**	**2:1**	**0.5**	**2.00**
Category IV				
HW	0.16	1.5:1	0.5	0.12
Fill	**0.01**	**1.5:1**	**NA**	**0.02**
Category IV - sub-total	**0.16**	**1.5:1**	**0.5**	**0.14**
TOTAL	**2.16**			**2.14**

3.7 PROPOSED MITIGATION

The District proposes to provide a total of 2.16 acres of wetland mitigation to offset project impacts to wetlands. This mitigation proposal will ensure a minimum of 1:1 mitigation area to impact area ratio. The mitigation will occur at five different sites within the Project Area and will include planting new areas that will be inundated and/or saturated to provide sufficient wetland hydrology to support wetland vegetation.

Location of Wetland Mitigation Sites

Five sites have been identified for wetland mitigation (Figure 5). Mitigation Site 1 is located on the east shoreline of the reservoir downstream of Shanker's Bend. Mitigation Site 2 is located on the opposite, or western, shoreline just south of Shanker's Bend. Mitigation Site 3 is the abandoned shoreline road. Mitigation Site 4 is located on the west shoreline upstream of the dam. Mitigation Site 5 is a 'catch-all' site that encompasses all the other new shoreline fringe areas that will convert to wetlands during the project licensed period. Table 7 lists the acreage for each of the mitigation sites. These locations were identified by topography, slope, and soil conditions, and are anticipated to support wetland vegetation post powerhouse construction based on these factors.

Mitigation Activities

Mitigation Site 1: East Shoreline Downstream of Shanker's Bend

On the east shoreline of the reservoir, downstream of Shanker's Bend, adjacent to Wetlands 89 and 70 is an upland meadow that currently predominantly supports grasses and willows. It varies in elevation from ~1049 to 1052 feet with a few knolls above 1052 feet. Much of this area will be inundated or saturated during the spring floods at least for 45 to 60 days. This hydrologic regime is anticipated to support

establishment of wetlands in the former upland meadow (0.70 acre; 30,710 square feet) areas. These areas will also be planted with sand bar willow and Bebb willow to establish wetland shrub communities.

Wetland Mitigation Site 2: West Shoreline Downstream of Shanker's Bend

Across the reservoir from Mitigation Site 1 are two upland meadow areas adjacent to Wetlands 80 and 78 that will be seasonally inundated and saturated after powerhouse construction. The new hydrologic regime will allow suitable hydrology to support riparian shrub and herbaceous wetlands. This area will establish wetland conditions in what is currently an upland meadow (0.98 acre; 42,645 square feet). These areas will also be planted with a variety of willows and herbaceous wetland species to establish riparian shrub wetlands. This wetland mitigation activity would be part of and implemented under PM&E BOTA-05.

Wetland Mitigation Site 3: Abandoned Shoreline Road

The shoreline road is proposed to be abandoned to restore riparian and wetland habitat. The restoration actions for the riparian areas are described in PM&E BOTA-03 and BOTA-04. A portion of the road currently floods during the high spring runoff but drains relatively rapidly. The lowest portion, comprising approximately 900 feet long by 10 wide, or 9,000 square feet, will be excavated in spots and graded to create depressions and a varied topography to support seasonal hydrology sufficient to establish wetlands. Other road portions will be ripped. The entire wetland area will be planted with willows and other shrub species, such as red-osier dogwood. It is expected that this area will be inundated or saturated during spring from project operations, thereby creating 0.21 acre of riparian shrub wetlands from the former uplands.

Wetland Mitigation Site 4: Natural Establishment of Herbaceous Wetlands from Inundated Upper Meadow

Three linear shoreline areas, which are located above the current herbaceous Wetland 74, are classified as upland meadow (Figure 5). These areas (0.17 acre; 7623 square feet) are expected to convert to wetlands because they are between 1050 and 1052 feet elevation. They will be inundated or saturated for about 2 months during the spring in an average water year. After the spring floods, the surface elevations will remain saturated for an additional period. The permanent, high water will provide an elevated groundwater table for riparian plants during the hot, summer months.

Wetland Mitigation Site 5: Natural Establishment of Wetlands on Other Shoreline Areas

Other new shoreline areas are expected to establish a narrow wetland fringe of either herbaceous or scrub-shrub habitats at the 1048.3 feet or higher elevations. These lake fringe areas would be similar to existing Wetlands 44, 68, 74, 35. Although there is a high probability that many of these shoreline areas will establish over time, only a minimum of 0.10 acre (~4400 square feet) will be counted as wetland mitigation in this plan. These areas will be monitored in year 10 in accordance with the monitoring plan to document a minimum of 0.10 acre of wetland establishment.

Table 7. Summary of Proposed Wetland Mitigation

Mitigation Site	Area (acres)
1	0.70
2	0.98
3	0.21
4	0.17
5	0.10
Total	**2.16**

Wetland Mitigation Goals

Overall mitigation goals for the project are as follows:

1. Replace wetlands inundated by reservoir operations by planting shrub species and allowing herbaceous species to naturally regenerate in Mitigation Sites 1 - 3.

2. Utilize natural revegetation by wetland species of shallow inundated or saturated areas to establish wetlands in Mitigation Sites 4 and 5.

3. Protect new plantings and improve degraded wetlands and riparian areas by fencing out livestock to eliminate grazing within wetlands.

Implementation and Schedule

Compensatory mitigation will be constructed before, during and after the construction of powerhouse facilities and when the reservoir level is raised. The first mitigation activities will be grading and ripping the shoreline road prior to inundation. Grading and planting will likely occur in the year after filling of the reservoir to review water levels and adjust planting locations as needed. The livestock exclosure fencing is anticipated to be installed beginning shortly after Project construction is initiated. All mitigation activities are expected to be completed by the second year after water level stabilization.

Unless otherwise approved by Ecology in writing, the District shall begin the compensatory mitigation project before, or concurrent with, project impacts. The schedule for implementation shall be discussed with Ecology within one year of receipt of the New License; the schedule is subject to approval by Ecology.

If the mitigation cannot be completed in accordance with the approved schedule, the District shall inform Ecology, in writing, of the status of the Enloe Project and the wetland mitigation identifying the reason for the delay and expected date of completion.

The District shall submit an updated written notification every 12 months thereafter until wetland mitigation site construction is complete.

The District shall have a wetland professional at the wetland mitigation site to supervise during construction and planting.

The District shall ensure that no construction materials are stockpiled or debris is deposited within existing wetlands at the wetland mitigation sites, other than those necessary for planting or fencing the mitigation sites, unless written approval is received from Ecology.

Planting Design

During the first year after water levels have been established, Mitigation Sites 1 through 3 will be assessed to confirm suitable riparian shrub wetland planting locations. Observed inundation and saturated areas will be marked in the field and by GPS survey both during the spring flood period and later at the base elevation of 1048.3 feet. Field observations will be correlated to actual recorded elevations at the dam spillway.

Mitigation Sites 1 through 3 are designed to have similar vegetation communities at the end of the monitoring period. To achieve the desired diversity, the mitigation areas will be planted with native woody vegetation to achieve diverse wetland and riparian communities. Planted species for the mitigation areas will include sandbar willow, yellow willow (*Salix lutea*), Bebb willow, red-osier dogwood, black hawthorn (*Crataegus douglasii*), Woods' rose (*Rosa woodsii*), golden currant (*Ribes aureum*), and whitestem gooseberry (*Ribes inerme*).

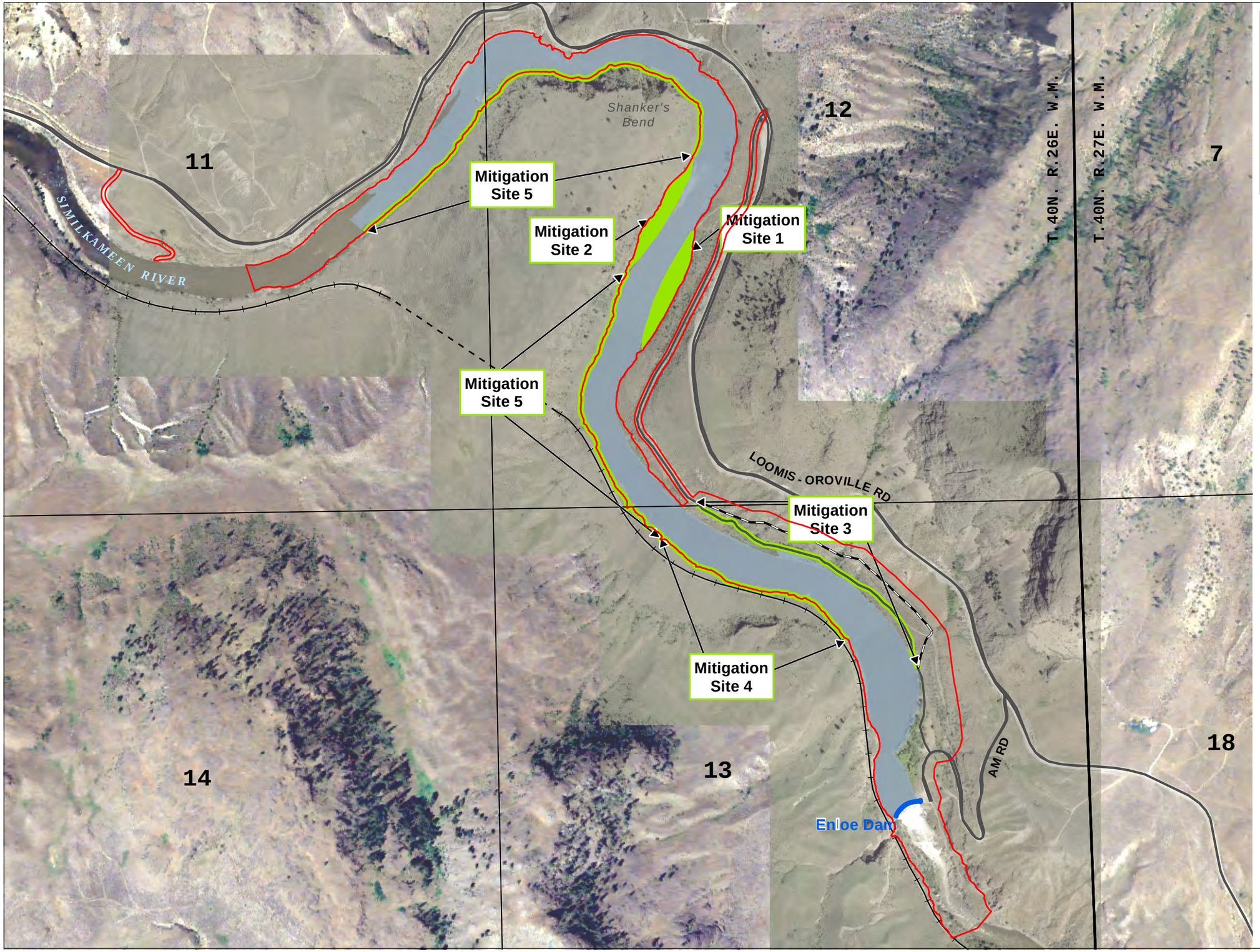
Signage and Fences

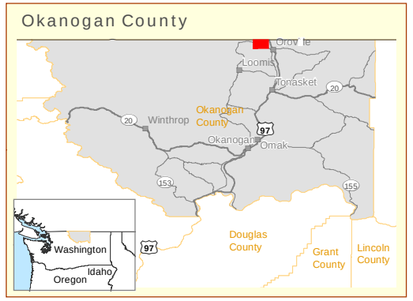
Permanent fences will be constructed around Mitigation Sites 1 through 3 to exclude cattle and vehicles.from. Permanent signs indicating that the area is protected from disturbance will be posted on the fence. Temporary fencing may be used in other replanted areas during the plant establishment period.

Invasive Species

Prior to installing new plant materials, noxious weeds in the wetland mitigation areas will be removed. The goal will be 100% removal in the planting areas prior to planting.

In addition, the Enloe Aquatic Invasive Species (AIS) Monitoring and Control Plan (Monitoring Plan) will be implemented. Monitoring for AIS, especially Eurasian watermilfoil, initially will focus on previously mapped unconsolidated shore areas, which could provide potential habitat for this species.





Legend

- Proposed Reservoir
- Mitigation Sites
- Enloe Dam
- FERC Boundary
- Railroad Tunnel
- Railroad
- Planned Road
- Existing Road
- Section Boundary

N W E S

0 250 500 1,000 1,500 Feet

Image sources: 2005 USDA National Agriculture Imagery Program and May 2006 Okanogan County PUD.

Enloe Dam Relicensing Project

Figure 5

Location of Mitigation Sites

Cardno ENTRIX

Mitigation Objectives

The goals of the mitigation plan will be achieved through the following objectives:

1. Establish riparian shrub and herbaceous wetlands within the Enloe Reservoir floodplain by planting seasonally flooded areas on the east bank of the reservoir.

2. Establish riparian shrub and herbaceous wetlands within the Enloe Reservoir floodplain by planting seasonally flooded areas on the west bank of the reservoir.

3. Re-establish riparian shrub wetlands within the Enloe Reservoir floodplain by reconfiguring, decommissioning the shoreline road, creating a varied topography, and planting adjacent to existing riparian shrub habitat.

4. Establish herbaceous wetlands along the Enloe Reservoir shoreline by natural recruitment of wetland and riparian species on the west bank above the dam.

5. Establish herbaceous wetlands along the Enloe Reservoir shoreline by natural recruitment of wetland and riparian species in other shoreline habitats.

6. Rehabilitate riparian function by removing livestock grazing from wetland mitigation areas by fenced exclosures.

Performance Standards

The mitigation plan will be measured against the following performance standards over the monitoring period:

1. Replace wetland functions on 0.70 acre of high shoreline terraces by establishing a Category III wetland at Mitigation Site 1.

2. Replace wetland functions on 0.98 acre of high shoreline terraces by establishing a Category III wetland at Mitigation Site 2.

3. Plant 0.21 acre of scrub-shrub Category III wetlands and increase habitat functions adjacent to riparian habitat on a former road bed at Mitigation Site 3.

4. Establish, at a minimum, 0.17 acre of Category IV wetlands along the new shoreline at Mitigation Site 4.

5. Establish, at a minimum, 0.10 acre of Category IV wetlands along the new shoreline at Mitigation Site 5.

6. Construct fences that will exclude livestock from the wetland mitigation areas.

Monitoring Plan

The wetland mitigation sites will be monitored for a 10-year period. Successful mitigation will be measured by attainment of the performance standards described

above. Monitoring will focus on vegetation cover and establishment, weed populations, and site disturbances. If after 7 years individual performance standards for a specific mitigation site are being achieved, as verified using Year 10 methods and documented in the monitoring reports, then the District may propose to Ecology that monitoring cease for that specific mitigation site prior to the full 10 year monitoring period.

Field monitoring will occur annually for the first 5 years and in years 7 and 10. Quantitative monitoring will occur in years 1, 3, 5, 7, and 10. More general qualitative monitoring will occur in years 2 and 4. Monitoring reports will be submitted by the end of the calendar year. An as-built report will be submitted to Ecology after mitigation installation is complete in order to document site conditions. This report will constitute the Year 0 monitoring report.

A general visual inspection of each mitigation area will be conducted each time sites are monitored to determine the condition of the plant materials, the effectiveness of the established hydrologic conditions, integrity and effectiveness of fences, and the need to remove invasive plants. Photo-points will be established at each mitigation area to permit a visual evaluation of planting success. All permanent photo-points will be marked on the mitigation plan for use in the field.

Quantitative monitoring will involve established sample techniques and data analysis for assessing the condition of the mitigation areas against the stated performance criteria. The results will be compared to the performance standards to determine the success of the mitigated areas. Sampling techniques described for riparian areas in Section 2.6.4 also will be applicable for wetland mitigation sites.

In years 5 and 10, the federal wetland delineation manual (USACE 1987) and the Arid West Region supplement (USACE 2008) will be used to delineate all compensatory mitigation wetlands for the Project to determine if sufficient mitigation area has been achieved. The wetland delineation results, including data sheets and maps, will be provided to Ecology in the Year 5 and Year 10 monitoring reports. In addition, at the end of the 10-year monitoring period, all wetlands will be rated using the August 2004 Washington State Wetlands Rating System for Eastern Washington to confirm that proposed wetland functions have been established. This information will also be included in the monitoring report.

Table 8. Wetland Mitigation Monitoring Schedule

Year	0	1	2	3	4	5	7	10
Quantitative		x		x		x	x	x
Qualitative			x		x			
Noxious Weeds		x	x	x	x	x	x	x
Wetland Delineation						x		X
Wetland Rating								x
Reporting	x	X	x	x	x	x	x	x

Long-term Management and Maintenance Plan

Following construction of the wetland mitigation sites, oversight will be required to ensure that the projects were successfully implemented.

The goal of the proposed mitigation is to create a functional, self-sustaining wetland that requires little or no long-term maintenance. Regularly scheduled maintenance activities, such as weeding during the monitoring period, will occur during years 1, 2, 3, 4, 5, 7, and 10. Wetland mitigation sites are dynamic systems that can evolve rapidly as site conditions change. Projects that require modification to soils, plant communities, topography, and/or hydrology do not always respond as predicted; therefore, the principles of adaptive management will be used to guide post-construction wetland management activities.

Adaptive management is driven by the performance standards that describe the desired condition of a site. If the interim standards are not met, adaptive management strategies would need to be developed to achieve the desired condition.

It is anticipated that the mitigation goal will be achieved with the construction and installation of the mitigation design. However, implementing contingency actions may be needed to correct unforeseen problems. The District shall develop and implement contingency measures if this Plan's goals and objectives are not being met. Prior to implementing contingency measures not specified in the Plan, the District shall consult with and obtain written approval from Ecology for the changes.

Financial Assurances

The District will submit a letter of assurance to the approving agencies to cover construction and monitoring costs and to also document that the District is the responsible party for ensuring the Project's compliance with the terms of the mitigation agreement. The assurance will be released after the mitigation has been deemed a success by the monitoring results and after approval by Ecology.

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APPENDIX A: FENCING PLAN

FENCE PLAN

Introduction

The lands within the boundary of the Enloe Hydroelectric Project (FERC Project No. 12569) on the Similkameen River (Project Area) and adjacent lands are currently not fenced. Cattle have free access to the river wherever the topography allows. In order to protect riparian/wetland mitigation sites for the project from grazing and trampling damage while mitigation plantings are establishing, livestock fencing is proposed for most of the eastern side of the Project Area along the Similkameen River between Enloe Dam and Shanker's Bend (Figure 1). An additional security/safety fence section is proposed for the landward side of the new powerhouse.

Cattle Fencing

The configuration of the cattle fence will be consistent with BLM guidelines for livestock fencing installed in areas inhabited by common ungulate species (BLM Manual Handbook H-1741-1 Fencing). The fence will consist of three well-stretched horizontal wires with the top wire no more than 38 inches above the ground. The other wires will be spaced at intervals 16 and 26 inches above the ground. The bottom wire will be smooth and the other two wires will be barbed. This configuration will reduce injury to fawns and yearling deer who often try to move between lower fence wires. Adult deer easily jump a fence with a top wire 38 inches above the ground. One access point through the fence for pedestrians will be provided near the north end of the recreation site.

The District will install a stock watering tank approximately 300 feet upslope from the river, just inside the Project Boundary and north of the proposed recreation site, as an alternative source of drinking water for grazing cattle. The tank will be supplied with water from an existing pump and water line located on the east bank of the river. The pump and water line is owned by one of the grazing lessees. The grazing lessee has an existing water right to withdraw water from the river for stock watering purposes. The District will monitor the need to install a security fence around the pump and electrical power system to discourage vandalism and theft if it becomes a problem.

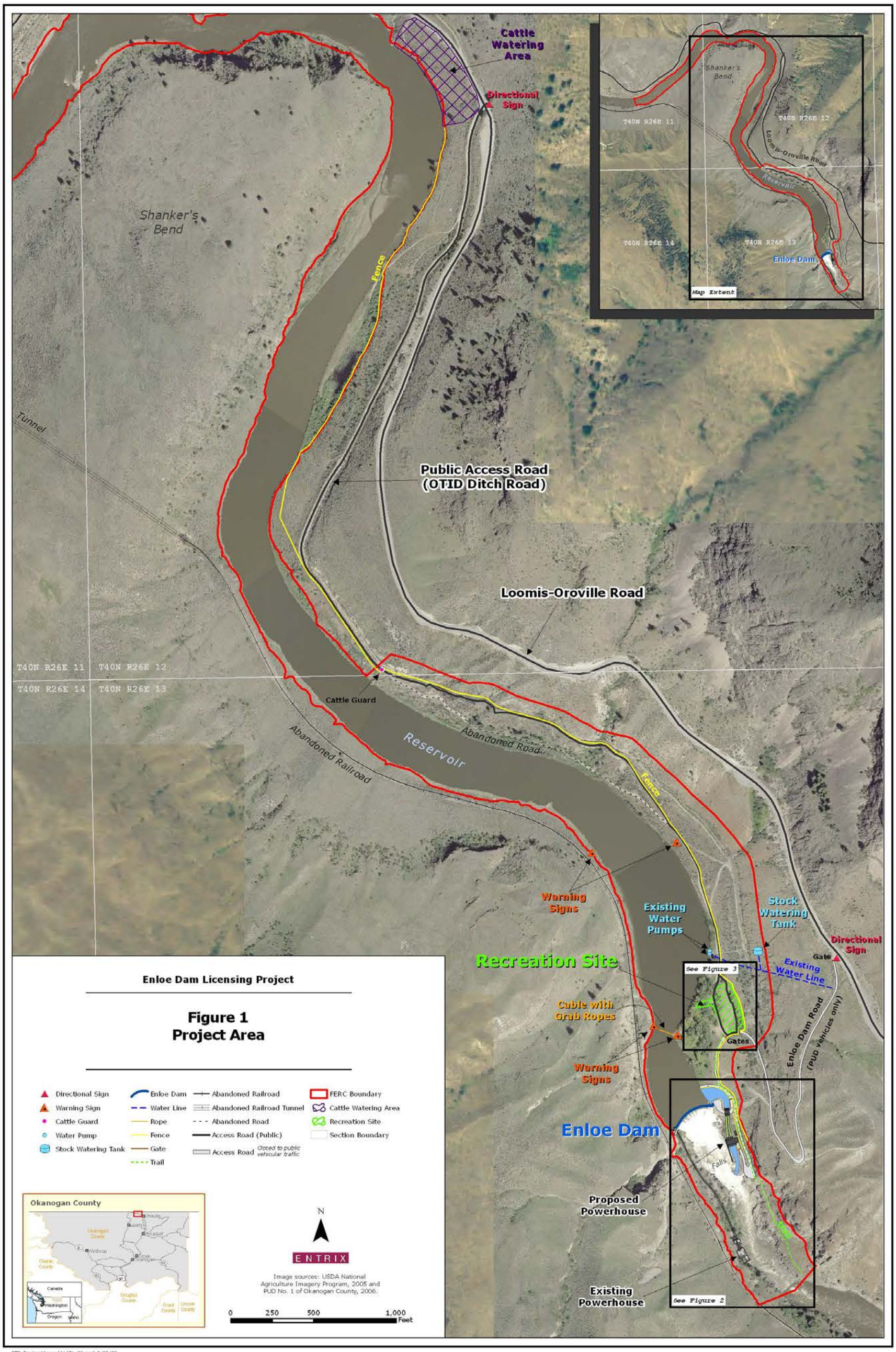
One cattle guard will be installed where the cattle fence crosses the main access road to the dam. The cattle guard grid will be designed to bear the maximum expected vehicle load (which may include construction equipment). A gate (accessible only by authorized personnel) will be installed where the cattle fence crosses Enloe Dam Road.

Safety/Security Fence

Currently, a chest-high approximately 100-foot-long chain-link fence separates visitors on the east bank of the river from the dam and the lower reaches of the impoundment. No other fences are currently present on the site. The existing fence will be removed and a new fence (at least 6 feet high) will be installed along the upland perimeter of the power generating facilities, including the intake channel, penstock intake, penstocks, powerhouse and tailrace (Figure 1). The fence will be constructed of small mesh chain link material finished in traditional galvanized zinc or coated in brown vinyl. A top rail will be installed to keep the fence from sagging. District staff and other authorized personnel will have keys to access selected locked gates. Signs warning the public of high voltage and other hazards will be posted on appropriate fence locations.

Maintenance

Inspection of the livestock and safety/security fences will be conducted routinely by District staff or contractors. Maintenance will be conducted when necessary to preserve the integrity of the fences.


Cattle Watering Area
Directional Sign
Shanker's Bend
Fence
Tunnel
Public Access Road (OTID Ditch Road)
Loomis-Oroville Road
T40N R26E 11
T40N R26E 12
T40N R26E 14
T40N R26E 13
Cattle Guard
Abandoned Railroad
Reservoir
Abandoned Road
Fence
Warning Signs
Existing Water Pumps
Stock Watering Tank
Directional Sign
Gate
Existing Water Line
Recreation Site
See Figure 3
Gates
Cable with Grab Ropes
Enloe Dam Road (PUD vehicles only)
Warning Signs
Enloe Dam
Falls
Proposed Powerhouse
Existing Powerhouse
See Figure 2
Map Extent
Enloe Dam Licensing Project
Figure 1
Project Area
Directional Sign
Warning Sign
Cattle Guard
Water Pump
Stock Watering Tank
Enloe Dam
Water Line
Rope
Fence
Gate
Trail
Abandoned Railroad
Abandoned Railroad Tunnel
Abandoned Road
Access Road (Public)
Access Road Closed to public vehicular traffic
FERC Boundary
Cattle Watering Area
Recreation Site
Section Boundary
Okanogan County
N
ENTRIX
Image sources: USDA National Agriculture Imagery Program, 2005 and PUD No. 1 of Okanogan County, 2006.
0 250 500 1,000 Feet

APPENDIX B: SAMPLE DATA SHEETS

Enloe Project – Riparian Vegetation Monitoring – Tree – Shrub Form

Mitigation Site _____ **Surveyor:** _____

Survey Date: _____ **Page** _____ **of** _____

Tag #	Species	Comment
001		
002		
003		
004		
005		
006		
007		
008		
009		
010		
011		
012		
013		
014		
015		
016		

Tag #	Species	Comment
017		
018		
019		
020		
021		
022		
023		
024		
025		
026		
027		
028		

Other Observations:

Enloe Project

Vegetation Data Sheet for Monitoring Percent Cover at Wetland Monitoring Sites

Monitoring Site _____ **Transect Length:** _____

Transect Number: _____ **Surveyor:** _____

Survey Date: _____ **Page** _____ **of** _____

Start Point	End Point	Species	Comments

Enloe Project

Vegetation Data Sheet for Monitoring Percent Cover at Wetland Monitoring Sites

Monitoring Site: _____ **Transect #** _____ **Surveyor:** _____

Survey Date: _____ **Page** _____ **of** _____

Position	Quadrat	Species	Percent Cover	Comments

Additional Species Occurring At Site & Estimated Percent Cover For Each Species: