

North Umpqua Hydropower Mitigation Strategic Plan

Working Outline

2 March 2015

Appropriate Uses of Mitigation Funds

Background:

Four types of mitigation funds were established in the North Umpqua Hydroelectric Project Settlement Agreement (SA) Section (§) 19 Mitigation: Tributary Enhancement Fund (ODFW MOU), Long-Term Monitoring and Predator Control Plan (Soda Springs), Federal Mitigation Fund (federal managed lands), and an Early Implementation Fund (before license became final). One of these items was the federal Mitigation Fund, SA §19.3 to provide for mitigations on federally owned and/or managed lands.

SA §19.3 requires PacifiCorp to deposit funds into an interest bearing escrow account at intervals beginning in January 2004: annually \$250,000; and \$1 million dollars in 2004, and on the 2nd (2006), 7th (2011), 10th (2014), 13th (2017), 16th (2020), 19th (2023), and 22nd (2026) anniversaries of this first payment. These funds shall be administered at the sole discretion of the Forest Service.

Use of the Funds:

The primary direction for the use of the funds is the SA which states succinctly that the funds exist: "... for the purpose of offsetting adverse impacts to aquatic, terrestrial, and other natural resources caused by the Project and not otherwise mitigated for in Sections 4 through 18 of this Agreement." Here it is clearly acknowledged that both aquatic and terrestrial resources are to be considered. Sections 4 through 10 of the SA relate to aquatic resources; Sections 11 through 13 address wildlife and vegetation; Sections 14 is erosion and sediment control; and Sections 15 through 18 deal with transportation management, aesthetics, recreation and cultural resources respectively. The best effort was made to mitigate resources to the degree practicable with design features and operations management under terms and conditions of the license, however, it was understood that not all resources could be entirely mitigated. The clause invoking Sections 11 through 18 of the SA emphasizes that the intent of the Mitigation Fund is not to repeat or revisit mitigations that are already in place in the SA, but rather to pick up where they fall short.

The SA goes on to identify five specific areas "to mitigate or compensate for Project impacts to". These areas are:

- Wetlands and stillwater amphibian habitat
- Riparian and aquatic species connectivity

- Vegetation management
- Terrestrial species connectivity
- Soil loss and soil productivity resulting in erosion

The Explanatory Statement doesn't much elaborate on what is in the SA although it provides a slightly different description of the types of appropriate projects as: "stream or riparian restoration, road decommissioning, or other measures to benefit aquatic and terrestrial species and habitats". Here riparian and aquatic restoration is interpreted more broadly than in the SA, which discusses only connectivity, and road decommissioning is added, which is not explicitly discussed in the SA.

The other salient section from the SA that relates to use of the funds is the statement that the area in which funds are to be expended are limited to. "National Forest System lands and BLM-administered lands within the North Umpqua basin". There is no map accompanying the SA to delineate this area. Neither is there any indication within the SA or explanatory statement that explicitly designates any area within the basin to prioritize or emphasize.

Some of the language in the SA and Explanatory Statement is complicated by the fact that there are actually four mitigation funds and one of the four funds was redundantly called the Mitigation Fund. The other three are the Tributary Enhancement Fund, the Long-Term Monitoring and Predator Control Fund and the Early Implementation Fund. Nevertheless, the Explanatory Statement provides insight to the purpose of all four funds collectively with four bulleted statements:

- "Mitigate for impacts of the Project to aquatic, terrestrial, and other resources that are not otherwise being mitigated by specific terms and conditions of the New License, water quality certification, TMDL, water quality management plan, or water right;
- Increase wild anadromous fish populations and their habitat within the North Umpqua River basin pursuant to the goals and objectives of the Oregon Plan for Salmon and Watersheds and the North Umpqua River Fish Management Plan (OAR 635-500-0200) and the requirements of Oregon Laws 1999, chapter 882, and the Fish and Wildlife Habitat Mitigation Policy (OAR 615-415-0000 to 0025);
- Promote the objectives of the NFP's ACS and other federal mandates; and
- Encourage efforts that promote or enhance partnership opportunities, collaborative relationships with stakeholders, and community benefits."

These statements provide additional understanding primarily related to anadromous fish and aquatic resources by directly citing existing laws, plans and policies. The final bullet above reiterates language in the SA that requires the USDA-FS to "consult with the Parties, fully engage the public, and fully consider all public comment throughout the NEPA environmental analysis process for each undertaking".

Identified Impacts from the NU Hydroelectric Project and Restoration Objectives

The following sections outline impacts to various resources resulting from the North Umpqua Hydroelectric Project. Impacts are categorized within six areas arranged in alphabetical order: anadromous fish; invasive species; soil loss and soil productivity resulting in erosion; vegetation management; wetlands and stillwater habitat; and wildlife. Some of these headings have subheadings such that a total of 15 areas of impacts have been identified. Within each of the headings or subheadings, objectives are defined. Objectives are divided into fundamental and means objectives. The fundamental objective describes the overarching concern (i.e. what we want to see) while the means objective describes the types of activities or projects that would be required to attain the fundamental objective (i.e. how we get there). If this plan is well conceived and executed then the fundamental objectives should have been obtained upon exhaustion of the mitigation funds, or there should be at least substantial, meaningful progress towards achievement of the fundamental objective.

The existing condition is then described by each impact area to determine what has been done up to this date to mitigate impacts. This includes existing requirements under the hydropower license along with previously completed mitigation fund projects. Once these completed actions have been taken into account, unmitigated impacts remaining once these completed actions have been taken into account represent the potential pool of impacts that could be considered for future actions under the Mitigation Fund. In some cases, impacts may be considered to be provisionally mitigated in full pending future monitoring to validate the effectiveness of the mitigation. Also, given the long term of the hydropower license, it is anticipated that our understanding of many of these identified impacts along with the methods to mitigate them will evolve over time.

Anadromous Fish

1. Aquatic Connectivity
 - a. Fundamental Objective: Maintain downstream transport and routing of natural material (gravel, sediment, wood, etc.) comparable in extent and distribution to what had existed prior to the hydroelectric project.
 - b. Means Objective: Restore, enhance, and maintain transport and routing of natural material in all waterways that historically allowed for such connectivity.
 - c. Existing Situation: SA Section 7 (Restoration of Fluvial Geomorphic Processes) and SA Section 8 (Main-Stem North Umpqua Anadromous Fish Spawning Habitat Enhancement) have largely been implemented, though rates and timing of natural material transport and routing continue to be unnaturally impacted by the hydropower infrastructure, primarily Soda Springs and Slide Creek Dams. With the remaining treatment under these listed SA subsections nearing completion. Additional treatments and

monitoring in response to prior efforts is necessary to satisfy associated objectives.

- 1) Direct mitigation within the North Umpqua River
 - i. How much and how often? Does it have to be 100 percent?

- d. Potential Projects - *below each potential project are criteria to evaluate the success of each project:*

Gravel augmentation within the North Umpqua River below Soda and Slide Creek dams:

- Surface area of gravel before and after project
- Spawning activity after augmentation
- Longevity of treatment benefit (duration of gravel retention)

Non-fish bearing stream barrier removal or modification possibly including direct gravel augmentation upstream of all fish distribution

- Probability of sediment transport to reaches with anadromous or resident fish

Estimation of the volumetric amount of sediment captured behind hydropower impoundments relative to the magnitude, frequency and duration of sediment routing prior to the hydropower project

- Credible estimates of sediment volumes and associated magnitude, frequency, and duration information provided.

- e. Evaluation Criteria – criteria to evaluate between projects within the Aquatic Connectivity category:

- Amount of stream miles restored
- Amount of habitat restored (surface area of gravel)
- Proximity to the impact

2. Aquatic Habitat Ecology

- a. Fundamental Objective: Maintain aquatic habitat conditions that are able to sustain aquatic- and riparian-dependent organisms.

- b. Means Objectives: Restore, enhance, and maintain aquatic habitat conditions. Utilize restoration techniques that encompass a holistic approach to aquatic ecology and water quality. Floodplains are maintained through actions that support inundation and flood flows at frequencies similar to historic conditions, restoring floodplain sediment regimes to support species diversity of riparian areas and ensure riparian area resiliency.

- c. Existing Situation:

- 1) Construction of Soda Springs Generator and Slide Creek Generator Tailrace Barriers has been completed. Both barriers have been constructed with Soda balanced and operating.

- 2) Toketee Reservoir trash rack was modified to "isolate" brown trout. Appropriately sized intake grate was installed to exclude brown trout >5" to decrease the numbers of brown trout downstream of Toketee Reservoir that may prey on anadromous fish juveniles.
 - 3) A monitoring plan was developed and assessment will occur when anadromous fish populate the reach between Soda Springs Dam, Slide Creek Dam, and tributaries.
 - 4) Riparian habitat along project affected reaches of White Mule and Potter Creeks has been modified and planted with native species.
 - 5) Priority 1 and 2 tributaries as listed in Schedule 10.6 of the Settlement Agreement have been reconnected to their historic channels.
 - 6) Creation of canal shut-off and drainage systems on the Clearwater 2, Lemolo 2, and Fish Creek canals to prevent excessive erosion due to canal breakage or overtopping.
 - 7) A long-term monitoring and predation plan has been completed. Monitoring/data collection will continue for numerous parameters for the life of the license. Potentially most impactful are predation of juvenile anadromous fish by brown trout in Soda Springs Reservoir. The extent of the potential impact was modeled but remains invalidated.
 - 8) Spawning gravel augmentation in Upper North Umpqua River below Slide Creek Dam. Implementation occurred in 2008, 2009, 2011. A total of 3569 cubic yards of gravel was added to the North Umpqua River.
 - 9) Instream wood placement project in lower 0.75 miles of Buster and Johnson Creeks. The project added 40-80 pieces per mile.
 - 10) Four mainstem side channels in Rock Creek had log placement and tree lining activities to enhance physical habitat components. Approximately 200 trees were added over one mile of stream in 2011.
 - 11) Historic fish habitat enhancement log weir reconstruction in Copeland Creek to offset degradation of the structure while maintaining existing gravel accumulations.
 - 12) Instream wood restoration in Copeland Creek consisting of 150 pieces placed by tree lining, lining cut logs, and tree falling.
- d. Potential Projects- *below each potential project are criteria to evaluate the success of each project:*

Woody material and boulder additions (to aggrade substrate; create scour processes, channel complexity, floodplain connectivity, etc.)

- Number of pools created
- Floodplain channels re-watered at flood prone height flow stage
- Side channel length reconnected
- Diversity of fish species affected
- Surface area of aggraded substrate
- Probability of retention

- Potential for adverse impacts to infrastructure (e.g. unintended scour or erosion)

Gravel augmentation (provide macro invertebrate substrate) (see criteria under Aquatic Connectivity category above)

Channel construction

- Number of pools created
- Floodplain channels rewatered at flood prone height flow stage
- Side channel length reconnected
- Diversity of fish species affected
- Surface area of aggraded substrate
- Probability of retention
- Potential for adverse impacts to infrastructure (e.g. unintended scour or erosion)

Nutrient augmentation

- Macro invertebrate biomass increase
- Marine derived nitrogen uptake analysis from riparian trees

- e. Evaluation Criteria - criteria to evaluate between projects within the Aquatic Habitat Ecology category:
- Measure of miles of stream that have had ecological function impacted by the project
 - Measure also by number of fish species affected and significance of species affected

3. Aquatic Organism Passage (AOP)

- a. Fundamental objective: Maintain upstream and downstream fish passage comparable in extent and distribution to what had existed prior to the hydroelectric project.
- b. Means objective: Restore, enhance, and maintain upstream and downstream connectivity for aquatic biota in all waterways (with exception to Slide Creek by-pass reach) that historically allowed for passage.
- c. Existing situation:
- 1) Fish passage waiver to PacifiCorp from ODFW for selected areas and terms/agreements in MOU (Settlement Agreement Appendix E).
 - 2) A fish ladder was constructed over Soda Springs Dam. This ladder supports upstream and downstream migration. The Soda Springs fish ladder and screens were semi-operational as of June 2013 due to damage sustained to the fish screens in December 2012. Hydraulic balancing and biological evaluation occurred in 2013-2014 returning the system to fully operational status. Since then, periodic flow-related

damage has occurred to the fish screens and tailrace barriers, temporarily impacting fish migration.

- 3) In lieu of a fish ladder at Slide Creek Dam, there is an agreement to provide "...mitigation measures and funding to benefit wild anadromous and other migratory fish populations on-site or in proximity to the project..." to offset the 1.8 miles of historic anadromous habitat that is no longer accessible.
- 4) "PacifiCorp shall provide benefits to fish and wildlife in the upper North Umpqua Basin in lieu of installing fish ladders at Toketee, Clearwater 1, Clearwater 2, and Lemolo 1 Dams...". Lemolo 2 fish ladder modification is complete. Fish Creek fish ladder is functioning properly with no modification required. Fish Creek fish screens have been installed at Fish Creek Canal intake and balanced.
- 5) A culvert inventory has been conducted in other areas of the hydropower project and culverts prohibiting fish passage have been replaced. A fish passage culvert was installed under 3401 road. It was designed for improved fish passage and to allow for up to one-hundred year flow events. A fish passage culvert was installed in Deep Creek and allows access to an additional 3 miles of anadromous stream. A fish ladder modification was completed on the Steamboat Falls fish ladder. The project improved passage on 55 miles of mainstem Steamboat Creek and tributaries. An aquatic organism passage culvert was installed on White Mule Creek under 2610 road that was designed for one-hundred year flow events. A fish passage culvert was installed on Johnson Creek that allows access to an additional 2 miles of anadromous stream.

- d. Potential Projects- *below each potential project are criteria to evaluate the success of each project:*

Road–stream crossing modification for aquatic culvert and bridge passage

- Aquatic organism presence above and below the previous barrier
- Passage of inorganic and organic material

Fish ladder construction, modification and maintenance

- Fish presence above and below the previous barrier

- e. Evaluation Criteria - criteria to evaluate between projects within the Aquatic Organism Passage category:

- Measured by miles of navigable/habitable stream reconnected
- Life stages of organism affected

4. Water Quality

- a. Fundamental objective: Maintain water quality parameters that are within Oregon DEQ standards and comparable to conditions that existed prior to the development of the hydropower project.

- b. Means objective: Ensure that water quality standards are not compromised during normal hydropower operations and related restoration and construction projects. Restore water quality parameters if operations contribute to degraded or compromised water quality conditions.
- c. Existing Situation:
- 1) ODEQ 401 Water Quality Certification was issued for the North Umpqua Hydroelectric Project.
 - 2) Creation of canal shut-off and drainage systems on the Clearwater 2, Lemolo 2, and Fish Creek canals to prevent excessive erosion due to canal breakage or overtopping.
 - 3) Remediation of 31 high priority and 27 medium priority erosion sites (see Schedule 14.4 of the Settlement Agreement) in close proximity to stream courses on Lemolo 2, Clearwater 2, and Fish Creek. High priority sites have been completed.
 - 4) Prolific algae blooms occurred annually from 2006 to present in a hydropower created environment. Potential causal (or contributing) factors include the following: invasive species (tui chub); non-native species present (brown trout and kokanee salmon); stocking of lake with rainbow trout; and PacifiCorp water handling changes since 2006. Potential ramifications include: public health risk, economic loss to businesses, reduced campground receipts, decreased recreational use (boating, fishing, swimming, etc.)
 - 5) Approximately 3,000 cubic yards of sediment delivered to North Umpqua River channel and floodplain by a July 2011 landslide caused by a canal breach. A site remediation was conducted and a remediation plan (mitigation payment and stream monitoring plan) was created. Monitoring is to continue for several years.
- d. Potential Projects- *below each potential project are criteria to evaluate the success of each project:*
- Riparian planting for management of stream temperature
- Reduced stream temperature to standards
- Treatment of roads (non-point source sediment delivery from road system)
- Amount of direct sediment inputs to stream
 - Reduction in turbidity or sediment within the watershed
- Algal bloom prevention
- Reduction in magnitude, extent and duration of toxic events
- e. Evaluation Criteria - criteria to evaluate between projects within the Water Quality category:
Assessment Methodology:

- Consider using the GRAIP (Geomorphic Road Analysis and Inventory Package) model for assessing road derived sediment transport
- Consider LiDAR acquisition to better inform the GRAIP model

5. Instream Flows

- a. Fundamental Objective: Maintain minimum instream flows for all stream reaches as defined in the Settlement Agreement.
- b. Means Objective: Restore, enhance, and maintain minimum instream flows for impacted stream reaches within the footprint of the hydropower project.
- c. Existing Situation:
 - 1) Instream flow implementation increased minimum instream flow release in bypass reaches to improve water quality parameters and aquatic organism habitat.
 - 2) Installed telemetered gaging stations in all hydropower affected reaches.
 - 3) Lemolo 2 Reroute ramped flows down 1 mile of pipe from generator tailrace directly to Toketee Lake.
 - 4) Ramping rates set for area below Soda Dam.
 - 5) No ramping allowed for areas above Soda Springs Reservoir, excepting during planned shutdowns.
 - 6) Emergency bypass valves installed to retain minimum instream flows.
- d. Potential Projects- *below each potential project are criteria to evaluate the success of each project:*

No direct mitigation since this is covered under the SA

Indirect mitigation through other aquatic habitat restoration activities

6. Riparian Habitat

- a. Fundamental Objective: Maintain properly functioning riparian areas and floodplains.
- b. Means Objective: maintain, restore and enhance properly functioning riparian areas through riparian vegetation treatments.
- c. Existing Situation:
 - 1) Permanently lost habitat due to physical improvements/infrastructure
 - 2) Impacted habitat due to ramping or other activities - Restoration of riparian habitat along project affected reaches of White Mule and Potter Creeks.

- 3) Lack of regular flooding has reduced regeneration within riparian areas and a loss of sediment on floodplains resulting in reduced soil development and nutrient inputs. This results in a lack of floodplain connectivity and riparian function which will change these ecosystems and the function of the aquatic ecosystem slowly over time.
- d. Potential Projects- *below each potential project are criteria to evaluate the success of each project:*
- Young stand thinning in riparian reserve
- Increased growth of conifers
 - Increased diversity of vegetation and structure
- Planting riparian vegetation
- Increased diversity of vegetation
 - Increased shade or streambank stability
 - Increased stem density
- Treatment of invasive species along riparian zone
- Maintain native plant diversity along riparian areas
- Gap openings for hardwoods for beaver and species diversity
- Establishment of stable, reproducing beaver population
- e. Evaluation Criteria - criteria to evaluate between projects within the Riparian Habitat category:
- Measured by stream miles or acres treated relative to amount of miles impacted within the project area.
 - Location would be determined, in part, by proximity to reaches with anadromous fish habitat and proximity to water temperature limited stream reaches
 - Proximity to and/or likelihood of benefitting *multiple* species of documented high conservation priority, by addressing primary limiting factors

Invasive Species

1. Aquatic Invasive Species
 - a. Fundamental Objective: Reduce/minimize Aquatic Invasive Species (AIS) within the North Umpqua Watershed.
 - b. Means Objective: Identify and control/remove AIS
 - c. Existing Situation: The Vegetation Management Plan requires PacifiCorp to inventory their impoundments for invasive plants every six years. There is no requirement under the SA to survey for other AIS. The Center for Lakes and Reservoirs at Portland State University surveyed 10 of the 11

PacifiCorp impoundments in 2012 for invasive submersed aquatic plants, crayfish, gastropods and adult bivalves, planktonic bivalve veligers, and zooplankton (Miller et al. 2013). Soda Springs Reservoir was not inventoried because of limited access due to construction activities. One non-native submersed aquatic vegetation species (*Potamogeton crispus*) and one non-native snail species (*Radix auricularia*) was detected. Neither species is listed as a priority for treatment under the Oregon Aquatic Nuisance Species Management Plan (Hanson and Systma 2001). The infestations appear to be stable at this time so no remedial action was proposed.

Most other major lakes and ponds on the Umpqua NF have been surveyed for invasive species (Sytsma et al. 2010, Sytsma and Miller 2012) but there has been no systematic inventory of flowing waters within the North Umpqua River basin.

While several non-native fish species (brown and brook trout, kokanee, among others) are found in the North Umpqua Hydropower Project reservoirs, forebays, and channels, as described in the SA, only tui chub, golden shiner and brook trout are not considered a high priority management species by the ODFW, and therefore are considered invasive. The USFS shall defer to the ODFW regarding the management of fish species, in accordance with the ODFW MOU, as referenced in SA Appendix E, as the State retains jurisdiction over these species.

d. Potential Projects- below each potential project are criteria to evaluate the success of each project:

Periodic inventory for invasive species

- Survey at a frequency to insure AIS are detected before they become established

Treatment of priority aquatic invasive species

- Ability to manage before it becomes established

Prevention measures

- Number of publics reached

e. Evaluation Criteria - criteria to evaluate between projects within the Aquatic Invasive Species category:

- Species treatment priority
- Likelihood of spread
- Likelihood of effective treatment

2. Terrestrial Invasive Species

- a. Fundamental Objective: Maintain native plant community diversity and structure commensurate with the historic range of variability.
- b. Means Objective: Prevent new infestations of invasive species from establishing and prioritize current invasive species for management commensurate with USFS standards across the rest of the forest.
- c. Existing Situation: Approximately 227 acres of transmission line corridors, project facilities and roads facilitate establishment and movement of invasive weeds and other non-native plants. There were 639 infestations of 14 species totaling 111.4 acres in 2003 which has grown to 794 infestations of 15 species totaling 146.7 acres in 2012. The Vegetation Management Plan sect. 4.0 (SA sec 2.1 & 12.2, pg. 34) requires PacifiCorp to inventory and manage priority weed infestations within the project area. Some of this increase is the result of better mapping.

Approximately 147 acres of invasive weeds have been managed using mitigation funds to date. The primary target species have been meadow knapweed and sulfur cinquefoil along roadsides and false brome along two miles of Canton Creek.

- d. Potential Projects- *below each potential project are criteria to evaluate the success of each project:*

Re-vegetate barren areas where weeds occur

- Effective native vegetation cover

Treat roads radiating out from the project area where there are source infestations.

- Meet management objectives for weeds based on priority

Invasive weed treatments along riparian areas

- Meet management objectives for weeds based on priority
- Avoidance of adverse impacts from the treatment to the aquatic environment

- e. Evaluation Criteria - criteria to evaluate between projects within the Terrestrial Invasive Species category:

- Species treatment priority
- Likelihood of spread

Soil Loss and Soil Productivity

- a. Fundamental objective: maintain soil productivity to allow for ecosystem functioning both above and below ground. Soil productivity includes chemical, physical and biological functioning.

- b. Means objective: Modify, enhance or compensate for the network of roads, canals, penstocks, impoundments, facilities and other project features to maintain soil productivity and limit soil erosion. Where soil productivity has been lost to a semi-permanent change in land management (e.g. road, canal or impoundment removing/burying soil) mitigate the loss of soil productivity through indirect off-site restoration.
- c. Existing Situation:
- 1) 100 sites were identified where erosion and/or landslides has occurred (Justification Statements). 31 high priority, 27 medium priority (schedule 14.4)
 - a. The Erosion Control Management Plan (PacifiCorp) addressed all 31 high-priority sites and 10 of the medium-priority sites
 - b. 17 medium-priority sites and 42 low-priority sites remain unmitigated
 - c. Erosion from cut and fill slopes on 200 miles of roads associated with hydropower operations and canals (Justification Statements) – larger sites were addressed in the Erosion Control Plan, but smaller, chronic surface erosion sites are not addressed elsewhere.
 - 2) Improper sizing and placement of culverts results in failures.
 - a. The Erosion Control Plan addressed the need to upsize Hydropower related culverts
 - b. Loss of soil productivity on 760 acres where soil was buried (and severely compacted) or displaced during construction of canals (21.7 miles), penstocks (5.8 miles), flumes (9.8 miles), roads (36 miles – EIS states there are ~100 miles of PacifiCorp only roads), forebays and reservoirs (618 acres), and other associated infrastructure (other associated infrastructure such as buildings and houses were not quantified - Justification Statements). Minor changes in soil productivity are also expected under the 117.5 miles of transmission line but are not included in the area quantification above. There have been no mitigation funds spent on soils related projects to date.
- d. Potential Projects- *below each potential project are criteria to evaluate the success of each project:*
- Road modifications/de-compaction treatments
- Recovery of soil infiltration properties
- Subsoil compacted soils or waste areas.
- Recovery of soil infiltration properties
- e. Evaluation Criteria - criteria to evaluate between projects within the Soil Loss and Soil Productivity:

- Assessment of projected natural recovery rate without treatment compared to with treatment

Vegetation Management

1. Late-Successional/Old Growth Forest

- a. Fundamental Objective: Manage native plant community diversity and structure commensurate with the historic range of variability to compensate for areas of the Project footprint that are permanently converted to non-forested habitat.
- b. Means Objective: Manage legacy old growth components such as down wood under power lines in otherwise early-seral habitat. Compensate for late-successional/old-growth forest permanently lost to project operations through planting and stand improvement of nearby stands in suitable land allocations.
- c. Existing Situation: The permanent clearing along the transmission lines and associated roads occupy approximately 665 acres of lands classified as Late-Successional Reserves. Non-commercial thinning of young forest stands will accelerate growth of conifers and potentially development of other old-growth stand characteristics. To date, mitigation funds have contributed to complete planning for approximately 10,000 acres of non-commercial thinning treatments across both the North Umpqua and Diamond Lake Ranger Districts. To date, 578 acres of non-commercial thinning in LSR has been completed [using mitigation funds](#). Priority stands for treatment are late-successional reserve within critical habitat for the northern spotted owls within the North Umpqua basin. Remaining non-commercial thinning opportunities in these areas totals approximately 398 acres on the Diamond Lake Ranger District and 693 acres on the North Umpqua Ranger District for a total of approximately 1091 acres. These remaining units were largely harvested between 1990 and 1995 so most of these units may already be too advanced to benefit from pre-commercial thinning.
- d. Potential Projects- *below each potential project are criteria to evaluate the success of each project:*

Pre-commercial thin remaining acres in LSR/CHU allocations

 - Units that are still within the window to pre-commercial thin
- e. Evaluation Criteria - criteria to evaluate between projects within the Late-Successional/Old Growth Forest category:
 - Proximity to and/or likelihood of benefitting *multiple* species of documented high conservation priority, by addressing primary limiting factors

2. Unique Habitats including oak, madrone, dry meadows, cliffs and rocky openings

- a. Fundamental Objective: Provide for native plant community diversity and structure commensurate with the historic range of variability.
- b. Means Objective: Manage vegetation under power lines to provide open habitat with species composition and structure as close as possible to historic conditions consistent with clearing requirements for power lines. Compensate for oak, madrone, dry meadow and other unique habitats that have been lost or altered by project developments by restoring historic stand structure and composition in nearby stands.
- c. Existing Situation: There are approximately 159 acres of oak/madrone and dry meadow habitat that has been identified as being associated with project developments and another 261 acres of meadow openings under transmission lines. Water storage and transmission facilities have also impacted 367 acres of shrubland habitat, with another 497 acres of shrubland impacted by transmission lines. Currently the mitigation fund has funded 11 acres of chinquapin habitat restoration and 35 acres of oak habitat restoration, as well as planning for 122 acres of oak restoration at Oak Flat and Lonely Oak and 192 acres of madrone habitat restoration.
- d. Potential Projects: - *below each potential project are criteria to evaluate the success of each project:*

Thinning of conifers from hardwoods

- Ability to release and recover the encroached hardwoods

Prescribed burning

- Meet desired vegetation objectives
- Ability to burn at the appropriate severity

Revegetation

- Meet desired vegetation objectives

Consider an appropriate ratio of habitat replacement based on professional judgment or some other measure

- e. Evaluation Criteria - criteria to evaluate between projects within the Unique Habitats including oak, madrone, dry meadows, cliffs and rocky openings category:
 - Proximity to and/or likelihood of benefitting *multiple* species of documented high conservation priority, by addressing primary limiting factors

3. Fuels Management

- a. Fundamental Objective: to reduce the risk of uncharacteristic fire impacts related to vegetation management along the transmission lines.
- b. Means Objective: to conduct fuels management activities, including prescribed fire, to restore or maintain fire resilient stands and fire dependent species.
- c. Existing Situation: The Fire Suppression and Vegetation Management Plans provide standards for hazard tree removal (Vegetation Management Plan 3.1.2) along powerline corridors as well as managing slash & debris (Vegetation Management Plan 3.1.6). Even with adherence to vegetation control guidelines there remains a slightly elevated risk of fire starts that can result when vegetation contacts ungrounded supply conductors. The 8395 acre Williams Fire appears to have resulted from an ignition along a transmission line. In addition, the project area requires more aggressive fire suppression tactics to protect the associated infrastructure than might otherwise be the case if the project was not there resulting in greater departure from the historic fire regime. The mitigation fund has contributed to planning for fuels reduction with the Steamboat, Ragged Ridge and Lemon Buttes projects. There are in excess of 700 acres of planned for prescribed burning as a result.

The Forest Service database on fire cause does not include power line caused fire starts – or at least they can't be discerned from other human caused starts in a broader category. Based on western Oregon BLM data, a power line associated fire start occurs about 1 time every 5 years. Generally we are about 97% successful at initial attack, however most of our initial attack occurs following lightning events when relative humidities are high and/or the fire area receives some degree of precipitation. Our success rate with powerline-caused fires is probably something lower than that because they have more potential to occur during very hot and dry periods when initial attack is less successful. We haven't had enough power line fires on the forest to discern a reliable success rating. The professional estimate of the Umpqua NF's fuel planner is approximately 60-80% initial attack success. Based on these estimates, a powerline caused fire escaping initial attack would occur about every 10-15 years.

Power line fires can start from trees or tree branches making contact with lines, broken power lines, and grounding during very hot weather when lines can sag decreasing the distance to a ground. Powerline maintenance activities may also be an ignition source.

Fuels treatments strategically placed near power line corridors have the potential to reduce impacts in three ways:

- 1) Fuels treatments near powerlines have the potential to aid in initial attack by decreasing fire intensity, increasing the likelihood of successfully suppressing a fire before it gets large, costly, and threatens values at risk.
- 2) Fuels treatments are highly likely to reduce the fire severity within (and adjacent to) treated areas if the fire does escape initial attack, reducing resource damage.
- 3) Defensible space treatments around fire sensitive high value points (structures, improvements, habitat features, etc) near powerlines decreases the likelihood of loss/damage from power line started fires that escape IA.

d. Potential Projects- *below each potential project are criteria to evaluate the success of each project:*

Fuels reduction adjacent to or in the vicinity of powerlines

- Reduction of fuel loads to desired levels

e. Evaluation Criteria - criteria to evaluate between projects within the Fuels Management category:

- If project objectives include providing opportunities to minimize (through effective initial attack) the size of power line-caused fires;
 - The degree that the project proposal demonstrates that fire behavior (i.e. flame length, crowning index, etc.) within treated units will be reduced to a point that effective initial attack is likely to be successful under most conditions.
 - The degree that the project proposal demonstrates that treatment unit sizes are sufficient to meet this objective at a meaningful scale and locations are placed optimally in high risk areas (areas of high spread potential, areas where fire could cause resource damage, etcetera).
- If project objectives include treatments designed to reduce fire severity within (or adjacent to) treated areas (but not necessarily stop the fire);
 - The degree that the project proposal demonstrates that fire behavior will be reduced to a point that the key resource value is not negatively impacted under most conditions when a fire passes through the treatment unit (i.e. will torching index be reduced enough to protect a nest site in an old growth stand if a fire passes through under most conditions).
 - The degree that the project proposal demonstrates that unit sizes and locations are sufficient in meeting stated protection objectives (i.e. is the treatment unit large enough to protect the key resource value given expected fire behavior under most conditions).

Wetlands and Stillwater Habitat

- a. Fundamental objective: Maintain functioning wetland habitat proportional in size, distribution and function comparable to what had existed prior to the hydroelectric project. The Umpqua NF LRMP defines wetlands as “[t]hose areas that are inundated by surface or ground water with a frequency sufficient to support a prevalence of vegetation or aquatic life that require saturated or seasonally saturated soil conditions for growth and reproduction.” Stillwater habitats represent critical amphibian production sites. Desirable stillwater habitat is characterized by small ponds or wetlands that provide functional amphibian reproductive habitat in the absence of non-native predatory fish.
- b. Means objective: restore, enhance, purchase or create wetlands that are self-sustaining with native plant and animal species diversity and composition characteristic of the native ecosystem.
- c. Existing situation: Approximately 26 acres of wetlands were permanently inundated under the Lemolo, Toketee and Stump Lake reservoirs. The Settlement Agreement identified eight wetlands for enhancement or creation. No acreage targets were established. Five have been completed to date totaling about three acres. Another 2.9 acres of wetland have been created with mitigation funds to date. Effectiveness monitoring and potential maintenance of existing wetlands is warranted.
- d. Potential Projects - *below each potential project are criteria to evaluate the success of each project:*

Replace or enhance wetlands in accordance with current Environmental Protections Agency (EPA) - Army Corp of Engineers (USACE) wetlands regulations

 - Ability to be self-sustaining
 - Replacement wetlands meet EPA-USACE wetland standards (hydrology, vegetation and soils)
 - Provides habitat for a diverse or rare wildlife species
 - Replicates naturally occurring wetland types
- e. Evaluation Criteria - criteria to evaluate between projects within the Wetland and Stillwater Habitat category:
 - Likelihood of benefitting *multiple* species of documented high conservation priority, by addressing primary limiting factors
 - Degree that project replicates less common wetlands types

Wildlife

1. Terrestrial Species Connectivity and Wildlife Entrapment

- a. Fundamental objective: Provide terrestrial habitat connectivity and availability so movement, dispersal, migration, and interbreeding among subpopulations of all terrestrial wildlife species can occur. Where no otherwise required under the SA, create a project infrastructure system that has insignificant effects on populations of wildlife species in the Project vicinity and that minimizes wildlife entrapment-related injury and mortality of individuals.
- b. Means objective: Modify, enhance or compensate for the network of roads, canals, penstock, transmission lines and other project features necessary to facilitate wildlife movement and mitigate project induced wildlife mortality. Upgrade or provide new culverts that provide passage under roads or other project features for aquatic organisms, including amphibians and reptiles. Where infrastructure improvements are not completely successful in relieving connectivity or mortality impacts, use alternative management practices to replace affected resources.
- c. Existing Situation: As a condition of the Settlement Agreement, thirty four, 36 foot wide wildlife bridges have been constructed at identified areas across the 21.7 miles of canal. An additional nine under-pipe crossings have been excavated under the 5.8 miles of penstock. The 92 identified aquatic reconnections are either already constructed or in development. A “wiggly ramp” was installed at the dam at Stump Lake and passage for turtles at Stinkhole is being planned. Informal monitoring of wildlife bridges indicates that all of the bridges are receiving use by big game as intended. Although the wildlife bridges were strategically placed to accommodate big game movements, the crossings capture only 1% of the total area of canals, not including additional crossings provided by roads. More comprehensive monitoring would be necessary to determine the extent that these SA required mitigations have provided for connectivity to big game and other wildlife species. Continue to monitor bridges and aquatic reconnections to determine adequacy and make improvements where appropriate. The infrastructure improvements completed so far have reduced, but not completely prevented, wildlife mortality occurring in project canals and waterways. The power company reports wildlife mortality from individuals removed from water system trash racks. These records include multiple species including big game, heron, osprey, bobcat, rabbit, owl and beaver. Given the spacing of trash rack grates, black-tailed deer and Roosevelt elk comprise the large majority of individuals reported. Smaller bodied animal mortality simply passes through the trash rack. Company records for the six years since canal crossings and under-pipe crossings have been installed include 32 black-tailed deer and nine Roosevelt elk being documented as canal mortality. This can be considered a minimum estimate of continuing project mortality. Additional mortality is undoubtedly occurring but not being collected or recorded from canal system trash racks.

In the absence of additional alterations to facility developments, canal mortality mitigation has focused on deer and elk habitat enhancement to boost herd productivity enough to offset the continuing losses. Forage habitat quality and quantity are acknowledged as the limiting factors for big game herds in the project area. Consequently, improvements to forage conditions can bolster big game herd health and productivity and replace waterway mortalities. Using standardized range assessment methods and data from on-site forage habitat research, an estimate of compensatory forage production has been calculated. Since 2007, past mitigation fund projects have included 48 acres of new forage habitat creation or fertilization, and 341 acres of forage habitat enhancement (shrub mowing and prescribed burning). These forage enhancements have produced an estimated 66% of the forage necessary to replace the 32 black-tailed deer and nine Roosevelt elk currently reported as canal mortality. Continued canal mortality, similar to that which has been reported to date (6 deer and 15 elk annually) is expected to occur in the future.

- d. Potential Projects - *below each potential project are criteria to evaluate the success of each project:*

Monitoring

- Ability to validly assess whether the Project remains an impediment to wildlife movement
- Ability to accurately assess Project caused mortality to big game

Additional wildlife bridge installations

- Adaptive management option if monitoring determines additional need

Forage enhancement

- Reproductive success of big game

Seasonal/conditional road use restrictions

- Reproductive success of big game

- e. Evaluation Criteria - criteria to evaluate between projects within the Wildlife category:

- Likelihood of benefitting *multiple* species of documented high conservation priority, by addressing primary limiting factors

2. Avian Protection

- a. Fundamental Objective: To minimize adverse interactions between Project power lines and birds.

- b. Means Objectives: Follow established procedures for monitoring and managing bird mortalities and problem nests; retrofit or rebuild poles involved in bird fatalities; and construct new power poles in accordance with published “raptor-safe” guidelines.
- c. Existing Situation: 117.5 miles of power lines have potential to cause injury and mortality to birds. PacifiCorp provides an annual report that identifies incidental discoveries of bird fatalities. To date, a sapsucker (MIS cavity nester) fatality that occurred in 2009 and a dead bald eagle was found under a power line. A formal monitoring protocol would determine the need, if any, for improving power pole standards.
- d. Potential Projects - *below each potential project are criteria to evaluate the success of each project:*
- Monitor current or future new technology or methods of reducing bird/powerline interactions
- Reduce bird/powerline interactions and /or related injury or mortality
- e. Evaluation Criteria - criteria to evaluate between projects within the Avian Protection category:
- Likelihood of benefitting *multiple* species of documented high conservation priority, by addressing primary limiting factors