

Attachment 1

No Net Impact and Mid-Columbia Regional Coordination

5-Year Action Plan for Pacific Lamprey

Proposed by

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Concept Paper

For Evaluations to Determine Project Effects

and

Implementation of No Net Impact

Presented to the

Rocky Reach Fish Forum

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Introduction

The Rocky Reach Fish Forum (Forum) functions to support the implementation of the Rocky Reach Settlement Agreement in general, and the Pacific Lamprey Management Plan (PLMP) specifically in addition to implementation of the 401 Water Quality Certification. Given that so little is understood about many aspects of the biology and behaviors of Pacific lamprey, the PLMP was written with a full expectation by the Forum that the notion of Adaptive Management would be central in our progress towards determining and eliminating Project effects on the species. Additionally, it was understood during the development of the PLMP that there would likely be Project effects that cannot be completely eliminated (either in the near term or longer term) and that mitigation would be required such as to render the Project operations as having No Net Impact (NNI) on the species.

To date, the majority of the ongoing effort has been associated with improving and measuring adult passage in the Project fishways. Many members of the Forum believe there are Project effects beyond adult passage issues but are stymied by the lack of technology and proven methods to quantify these potential effects. These members also recognize it is a responsibility of the Forum to implement reasonable and feasible actions to advance our understanding of these potential impacts in the face of uncertainty and to advance our goals and objectives as effectively and efficiently as possible, as discussed in more detail below. Therefore, the Forum concludes it is reasonable and useful to employ the NNI concept to mitigate *and* to advance our knowledge of lamprey biology and behaviors relevant to Project operations and Project effects.

Recognizing this need a regional holistic proposal incorporating 10 Objectives has been introduced to the Forum by the Yakama Nation (YN), Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Washington Department of Fish and Wildlife (WDFW) and the United States Fish and Wildlife Service (USFWS). This same proposal has been introduced and discussed in the Douglas County PUD and the Grant County PUD Fish Forum and its core components are embedded in the USFWS Pacific Lamprey Conservation Agreement. This holistic approach goes beyond addressing potential direct effects within the Project Area with the objective of substantially increasing lamprey productivity and spatial structure within the tributary streams of the Upper Columbia River (from Priest Rapids Dam to Chief Joseph Dam). By necessity, this approach recognizes the severely reduced lamprey population is a regional problem, which necessitates a regional response.

As stated above, many of the Forum members believe there are Project impacts related to the operation of the Rocky Reach Dam and that it is appropriate to apply the NNI concept. Furthermore many Forum members agree that it is warranted to define and incorporate mitigation measures into the existing PLMP, as provided by the State of Washington 401 Certification fish use section 5.3. As such, the Forum concludes and recommends that the proposal provided in this document, with an intended effective time frame of 5-years, is the appropriate manner in which to sufficiently address mitigation during this time and advance our understanding of Pacific lamprey in relation to the Rocky Reach hydroelectric Project. The following outlines the general concept and identifies specific actions to be applied under the FERC License requirement and actions implemented under the NNI concept.

Purpose

The purpose of this document is to provide to the Forum a conceptual context and meaning of No Net Impact (NNI) and clarity in its application over the next five years (2015 – 2019).

Goal

The goal of the PLMP is to achieve No Net Impact (NNI) on Pacific lamprey by measuring ongoing Project-related impacts, if any, on Pacific lamprey; implementing appropriate and reasonable measures to reduce or eliminate such impacts; and implement on-site or off-site measures to address unavoidable impacts.

The intent of the PLMP is to measure any impacts of ongoing Project operations on upstream and downstream passage of Pacific lamprey. To fulfill this intent, Chelan PUD shall, in consultation with the Forum, develop and implement measures to eliminate those impacts, to the extent appropriate and reasonable. The PLMP also states that the intent of the PME's contained in this PLMP is to: 1) protect, mitigate, and enhance lamprey resources; 2) ensure that the ongoing operation of the Project will not adversely impact lamprey; 3) minimize the effect of any incidental injury or mortality to lamprey that may occur as a result of ongoing Project operations on lamprey habitat; and 4) ensure adequate monitoring and reporting of results. The PLMP outlines the following objectives to achieve NNI.

Objective 1: Measure Any Ongoing Project-related Impacts on Upstream and Downstream Passage of Adult Pacific Lamprey, and Eliminate Those Impacts to the Extent Appropriate and Reasonable

Objective 2: Measure any ongoing Project impacts on downstream passage of juvenile Pacific lamprey, and eliminate those impacts to the extent appropriate and reasonable.

Objective 3: Measure any ongoing Project impacts on the existing reservoir habitat used currently by juvenile Pacific lamprey, and eliminate those impacts to the extent appropriate and reasonable.

Objective 4: Identify and implement measures to address unavoidable impacts to achieve NNI.

No Net Impact – The Concept

Definition: The Forum defines No Net Impact as actions provided by Chelan County PUD that mitigate Project effects on Pacific lamprey such that the presence and operation of the Rocky Reach Hydroelectric Dam, including the reservoir up to the tailwater of Wells Dam, is essentially “invisible” to impacts towards abundance, productivity, spatial distribution and genetic diversity of the species.

More specifically, during the term of this 5-year Action Plan, CCPUD will substantially support trap and haul (translocation) actions, as directed in the PLMP (but not included as an NNI contribution) and guided by the fisheries co-managers and will contribute **\$X dollars** to an account managed by the PUD for the purpose of (1) measuring the benefits of this translocation program, (2) to assist resource managers in identifying and correcting passage problems in the tributary streams and to (3) support identification of potential juvenile entrainment issues in the tributary streams and correction of these issues. Actions associated with this account are discussed in more detail below.

Application: Ideally, this definition requires perfect knowledge of both lamprey biology and Project effects. The Forum acknowledges problems associated with enumerating adult or juvenile mortality due to Project operations (either direct or indirect effects) and the incomplete understanding of lamprey

biology. However, neither of these limitations precludes the Forum from using existing information and, through consensus, define reasonable mitigation actions that are appropriate over a defined timeframe. The definition of Adaptive Management within the Settlement Agreement recognizes this notion. In addition, it is appropriate and reasonable to define NNI actions in a way that not only benefits the species but also implements actions that increases our knowledge of lamprey behavior and biology useful in measuring Project effects at some future time. It is intended that this information will be useful in determining reasonable and feasible actions to reduce, eliminate or as necessary mitigate for Project effects. These actions are described in more detail below.

Rational for Employing NNI: The Forum recognizes three specific facts that are the basis for the use of NNI at this time, including – but not necessarily limited to adult passage, uncertainties related to the reservoir and predation of juveniles in the turbine boils:

First, adult passage in the Rocky Reach fish ladders, as currently being measured, is likely below 80%. This does not include any unmeasured effects from ladder entrance efficiency or potential issues associated with the reservoir. Although it might be argued that this passage rate is *similar to other passage measurements on the Columbia River*, a passage rate of 80% contributes substantially to cumulative effects. For example, if three dams had 80% passage efficiency in the upper Columbia, less than half of the adults “destined” to migrate above these dams would make it (33% for 5 dams). Currently passage rate of 80% has not been achieved by any of the dams on the Columbia River. Applying NNI is consistent with Objective 4 of the PLMP as stated above.

Second, nearly 100% of the fish that pass Rocky Reach Dam are not accounted for at the Wells Dam count window. It is not likely that all of these fish are moving into the Entiat River. This situation is also attributed partly to Wells passage issues. The Forum is well aware of this situation and it is appropriate for Chelan PUD to work closely with Douglas PUD in providing an appropriate evaluation, consistent with Objective 1 of the PLMP, above. It is also consistent with the principles of Adaptive Management, outlined below.

Third, although not confirmed, there is reasonable cause to believe that predation on juveniles by Northern pikeminnow may be pronounced in the turbine boils where these predators are generally known to exist in established feeding stations. Although the PUD has an active predator control program, it is not clear to what extent the current pikeminnow removal program benefits lamprey. It is reasonable to evaluate the potential for increased predator control in the turbine boil area, consistent with Objective 2 of the PLMP.

Adaptive Management

Adaptive Management is defined in the Settlement Agreement.

“Adaptive Management” means an iterative and rigorous process used to improve decision-making in the face of uncertainty. In the context of the Rocky Reach relicensing, it is intended to improve the management of natural resources affected by ongoing Project operations, in order to achieve desired goals and objectives as effectively and efficiently as possible, within the provisions of this Agreement. The process has seven steps:

- a) Develop initial hypotheses regarding any ongoing Project impacts and potential remedial

measures;

b) Develop goals and objectives for addressing any such impacts;

c) Develop and implement appropriate and reasonable measures in accordance with an established schedule;

d) Develop or identify monitoring and evaluation methodologies for determining whether such goals and objectives have been achieved;

e) Monitor and evaluate the implementation of such measures and their effectiveness toward achieving such goals and objectives;

f) Review monitoring and evaluation efforts; and

g) Confirm that such goals and objectives have been achieved or, if not achieved, evaluate additional or revised measures, including those previously considered in the Comprehensive Plan, and implement any additional or revised appropriate and reasonable measures, or explain why such goals and objectives cannot be achieved. If such goals and objectives have not been achieved, the Rocky Reach Fish Forum (RRFF; see Section 15) may reevaluate and revise such goals and objectives.

The Forum recognizes the importance of several key concepts in this definition, including:

- iterative and rigorous process ...in the face of uncertainty,
- intended to improve the management of natural resources...
- in order to achieve desired goals and objectives as effectively and efficient as possible...

With this understood, it is the intention (and the obligation) of the Forum to apply these Adaptive Management principles to actions directed under the FERC License and mitigation actions developed under the NNI. The importance of this cannot be understated because it is only through these principles that the Forum can measure and be assured that actions implemented by Chelan PUD are in fact, *achieving the desired goals and objectives in an effective and efficient manner.*

Implementation Plan

The following is a brief summary of the 10 Objectives which have been under consideration by the Forum and proposed to be fully developed for both FERC License Requirements and NNI. The first six Objectives are relevant to the FERC license and must be accomplished accordingly. The last four Objectives are appropriate for NNI considerations.

Appropriate Actions Implemented through the FERC License

1. Mainstem Fishway Entrance, Passage and Exit Efficiency

Determine the proportion of tagged adult lamprey that successfully (1) enter fishways entrances (Fishway Efficiency), (2) ascend and exit mainstem fishways (Passage Efficiency) and (3) leave the forebay area without falling back. Describe behavioral attributes associated with general lamprey movements and elapsed time at fishway entrance and within fishways.

Task	Continue to evaluate specific areas within the fishways (as identified by the Forum) for passage improvement and implement actions recommended by the Forum in a timely manner.
Rationale	Consistent with the Goal and Objective 1 of the PLMP and the 401 Certification.
Timing	Ongoing

2. Proportion of Adults Ascending Tributaries

Estimate the proportion of migrating adult lamprey that leave the Mid-Columbia reservoirs and permanently ascend the Wenatchee, Entiat, Methow and Okanogan tributaries. Describe behavioral attributes associated with general lamprey movements and elapsed time as lamprey leave the reservoir and enter lower mainstem tributary reaches ("affirming" establishment into that tributary).

Task	<p>Establish radio telemetry and HD PIT receivers at the mouth of the Entiat River.</p> <p>Trap and tag sufficient adults (TBD by Forum) for evaluation.</p> <p>Employ USFWS to establish and maintain receivers, download and evaluate information and report on findings.</p> <p>Contribute \$X into the NNI Account funding to support for radio telemetry in the upper Columbia.</p>
Rationale	Consistent with the Goal and Objectives 1 and 4 of the PLMP and the intent of the 401 Certification. It is unknown what is happening with a substantial number of migrating adults within the Project Area after they exist the Rocky Reach fishway.
Timing	Equipment in place for the 2015 adult migration.

3. Fate of Adults in Reservoirs

Determine fate of adults that enter into PUD reservoir with regards to:

- movement behavior through reservoir (passage success and timing, over-winter, etc),
- successful passage up to the next counting window,
- mortality / predation within reservoir, and
- successful entry into tributary streams.

Task	Implement Task 2. Evaluate efficacy of using active tags to track or locate adults in the reservoir especially during the winter months of inactivity.
Rationale	Consistent with the Goal and Objectives 1 and 4 of the PLMP and the intent of the 401 Certification. It is unknown what is happening with a substantial number of migrating adults in the Project Area after they exist the Rocky Reach fishway.
Timing	Initial evaluations in 2016-2017, utilizing tagged adults for other evaluations. Study period anticipated to be approximately 3-years.

4. Predation on Juveniles in Tailrace

Determine the relative level of predation on juvenile lamprey in turbine boils and tailrace areas and implement measures to further reduce excessive predation, as warranted.

Task	Tasks not yet identified. Evaluation of additional fishing effort from powerhouse deck.
Rationale	Consistent with the Goal and Objective 2 of the PLMP and the intent of the 401 Certification.
Timing	Section 4.2.3 indicates these evaluations are to be conducted within the first 5-years of the License period. Initial evaluations anticipated to begin in 2017.

5. Juvenile Occupancy and Use of Reservoir Habitat

Measure juvenile lamprey presence and relative abundance in habitat areas that may be affected by ongoing Project operations. Identify and measure Project effects on lamprey in these areas, if any.

Task	Continue to evaluate presence/absence and relative abundance in habitat areas that may be affected by ongoing Project operations.
Rationale	Consistent with the Goal and Objective 3 of the PLMP and the intent of the 401 Certification.
Timing	Planning for future actions completed in 2016. Begin implementation in 2017-2018.

6. Juvenile Propagation Research

Determine the efficacy of using artificially produced lamprey to develop the means to provide sufficient numbers of juvenile lamprey for evaluations intended to measure the type and magnitude of any on-going Project impacts on downstream passage of juvenile lamprey, specifically, mortalities associated with migration timing and passage survival through Project areas.

Task	Support Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation and the USFWS (Abernathy Lab) in artificial propagation research to provide juveniles of sufficient size for future studies addressing potential Project effects on juveniles within the Project area, including but not limited to dam passage, reservoir fluctuations or predation. Estimated support \$100,000 per year for three years, per Section 4.2.3 of the PLMP. In addition, Chelan PUD will provide \$100,000 per year for three years to the PNNL to support ongoing tag development already in progress supported by the US ACE and the US DOE.
Rationale	Section 4.2.3 of the PLMP specifically identifies that Chelan PUD will investigate Project impacts on juvenile lamprey and develop the means to provide sufficient juvenile associated with these studies. This Section recognizes the potential for contributions “to other local or regional lamprey investigation programs in order to gain efficiencies in the development of methods for lamprey investigations at the Project. Recent development in artificial propagation indicate promise to obtaining juveniles in a timely manner to use for these studies, assuming methodologies are also available. Approximately \$620,000 is currently available.
Timing	Annual funding for both propagation and tag development will be made available in the second quarter of 2015.

Appropriate Actions Implemented through NNI

7. Adult Translocation Research

Evaluate the success of translocated adult lamprey in producing viable redds, eggs, larvae and early age ammocoetes in key stream reaches (many of which are identified in the Pacific Lamprey Artificial Propagation and Rearing Investigations: Rocky Reach Pacific Lamprey Management Plan).

Task	<p><u>Trap and Haul</u>: Chelan PUD will provide sufficient effort and/or funding to trap X adults from Priest Rapids and/or Rock Island Dams and translocate into tributary streams.</p> <p><u>Adult Tagging – Radio</u>: Chelan PUD will provide \$X sufficient funding to radio tag 60 (TBD) adults per year for three years (2015 - 2017) to be released at locations specified by the Forum. (Funded by PUD)</p> <p><u>Telemetry Equipment Setup</u>: Chelan PUD will provide \$X sufficient funding into the NNI Account to support establishing radio receivers at the mouths of the W-E-M-O prior to 2015 adult migration and maintain equipment through 2017 migration.</p> <p><u>Air Radio Telemetry Surveys</u>: Chelan PUD will provide \$X sufficient funding into the NNI Account to support performance of air surveys twice per year for two years in the W-E-M-O preferably in October and May-June, or as determined by the Forum (2015 – 2017).</p> <p><u>Field Radio Telemetry Surveys</u>: Chelan PUD will provide \$X sufficient funding into the NNI Account to support USFWS survey capacity to provide mobile field telemetry tracking of adults to determine spawning locations (2015 – 2017).</p> <p><u>Field Juvenile Distribution and Abundance Surveys</u>: Chelan PUD will provide \$X sufficient funding into the NNI Account to support existing tribal survey capacity providing surveys in Index Sites to determine juvenile relative abundance and spatial distribution.</p> <p><u>Genetic Samples</u>: Chelan PUD will provide sufficient funding into the NNI Account to support genetic analysis of translocated adults and subsample of juveniles found in the W-E-M-O during 2019 field surveys. Analyze genetic samples from W-E-M-O to estimate proportion of juveniles produced from translocation program. Numbers of adults and juveniles sampled to be determined by the Forum.</p>
Rationale	Translocation is the primary means to mitigate for Project effects. Appropriate monitoring is obligated through the PLMP and 401 Certification to determine benefits to the species for this mitigation.
NNI Funding	\$X to support field efforts for both adult surveys (2015-2017) and juvenile surveys (2017-2019) and genetic analysis.

8. Regional Establishment Baseline / Status and Trend Information

Establish baseline information by enumerating (relative abundance) local populations (watershed scale) of adults and juveniles in priority watersheds and stream reaches.

- Track and understand behavioral characteristics and long-term changes of both juvenile and adult local populations in priority monitoring locations (index sites) over time.
- Compare and evaluate these changes relative to other Columbia Basin regions.

Task	<p>Establish long term “Index Sites” in the Wenatchee, Entiat, Methow and Okanogan subbasins to monitor and track changes in juvenile abundance, spatial distribution and population age/size-class characteristics.</p> <p>Monitor juvenile presence, relative abundance and age/size class characteristics using screw traps, fyke-nets, electroshocking or other monitoring methods.</p> <p>Consolidate and evaluate data and report on findings.</p>
Rationale	Baseline information is critical to establish to determine long-term benefits of lamprey NNI mitigation measures associated with supplementation and natural production of the local populations.
NNI Funding	Chelan PUD will provide \$X sufficient funding into the NNI Account for two years (2015-2016) to support existing tribal juvenile survey capacity at Index Sites to determine juvenile relative abundance and spatial distribution.
Timing	Funding available in Years 1 and 2. Baseline juvenile information completed in 2017.

9. Adult Passage in Tributary Streams

Identify primary spawning areas of adult lamprey and establish, where feasible specific spawning locations and timing. Identify, evaluate and correct adult passage issues in priority areas within the Upper Columbia subbasin tributary streams.

Task	<p>Establish radio telemetry receivers at various locations (Dryden Dam, Tumwater Dam, irrigation diversion dams) to identify potential adult migration passage issues.</p> <p>Provide sufficient funding and excess telemetry receivers to support identification of potential adult passage issues in the W-E-M-O and implementation of corrective actions.</p>
Rationale	Consistent with the Goal and Objectives 1 and 3???. Mitigation for passage issues associated with Rocky Reach Dam.
NNI Funding	Chelan PUD will provide \$X sufficient funding into the NNI Account to support USFWS for radio telemetry installation and maintenance of equipment and retrieval, evaluation and reporting of information.
Timing	Established prior to March 2016 and maintained through 2018 to insure full two year (minimal) analysis.

10. Juvenile Entrainment: Dryden Ditch / Other Irrigation Structures

Evaluate and correct juvenile entrainment into irrigation facilities within priority watersheds / stream reaches in the Upper Columbia subbasin tributary streams.

Task	Evaluate alternative strategies to prevent or minimize juvenile entrainment into the Dryden irrigation ditch and other irrigation ditches to increase effectiveness of juvenile salvage operations until such time that preventative strategies can be implemented, appropriately monitored and determined to be successful.
Rationale	Mitigation for Project effects to adult passage.
NNI Funding	Chelan PUD will provide \$X funding into the NNI Account to support agency actions associated with this Objective.
Timing	Implement preventative strategy as appropriate. Implement improved salvage operations beginning October, 2016.

Summary of Actions to be Implemented through NNI and/or Regional Coordination

Objective	Grant	Chelan	Douglas
FERC Required Actions			
1. Mainstem Fishway Entrance, Passage and Exit Efficiency	Passage improvements needed – continued evaluation		
2. Proportion of Adults Ascending Tributaries	Evaluation required. 2015 - 2016		
3. Fate of Adults in Reservoirs	Ongoing consideration, preliminary acoustic evaluations warranted.		
4. Predation on Juveniles in Tailrace	Ongoing consideration Evaluation warranted	Contribution to JLAT development (Section 4.2.3)	Ongoing consideration Evaluation warranted
5. Juvenile Occupancy and Use of Reservoir Habitat	Additional evaluations deferred until 2018-2019	Additional evaluations deferred until 2018-2019	Preliminary evaluation needed (2016)
6. Juvenile Propagation Research	No Requirement	Contribution to ongoing efforts. Section 4.2.3	No Requirement
NNI / Regional Coordination Actions			
7. Adult Translocation Research	Trap and Haul for passage studies. Trap and Haul into Tribs. <u>Contribute Funds to NNI.</u>	Trap and Haul for passage studies. Trap and Haul into Tribs. <u>Contribute Funds to NNI</u>	Trap and Haul for passage studies. Trap and Haul into Tribs. <u>Contribute Funds to Reg. Coord</u>
8. Regional Establishment Baseline / Status and Trend Information	<u>Contribute Funds to NNI.</u>	<u>Contribute Funds to NNI.</u>	<u>Contribute Funds to Reg Coord.</u>
9. Adult Passage in Tributary Streams	Contribute telemetry equipment. <u>Contribute Funds to NNI.</u>	Contribute telemetry equipment. <u>Contribute Funds to NNI.</u>	Contribute telemetry equipment. <u>Contribute Funds to Reg Co.</u>
10. Juvenile Entrainment: Dryden Ditch / Other Irrigation Structures	<u>Contribute Funds to NNI.</u>	<u>Contribute Funds to NNI.</u> Evaluate and correct Dryden.	<u>Contribute Funds to Reg. Co.</u>