

## Interim Progress Report for Climate Change Vulnerability Assessment of Pacific Lamprey

**1. ADMINISTRATIVE INFORMATION:** Include Recipient Project Manager name and contact information, organization, project title, agreement number, date of report, and period of time covered by the report.

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Climate Change Vulnerability Assessment of Pacific Lamprey

Date of Report: February 3, 2015

Report period: June 2013 – September 30, 2014

No agreement number because we have a station charge code.

**2. PURPOSE AND OBJECTIVES:** This section should include information about the issue(s) the project has addressed, and the target audience for the project results and products. Describe the project goals and objectives.

Pacific Lamprey are a native anadromous species that, like salmon, historically returned to spawn in large numbers into watersheds along the West Coast of the United States, but populations have declined in abundance and become restricted in distribution throughout Washington, Oregon, Idaho, and California. Threats to Pacific Lamprey occur in much of the range of the species and include restricted mainstem and tributary passage, reduced flows and dewatering of streams, stream and floodplain degradation, degraded water quality, and changing marine and climate conditions. The U.S. Fish and Wildlife Service recognized the need for a comprehensive plan to conserve and restore Pacific Lamprey in collaboration with Native American tribes; Federal, State, and local agencies; and other entities. The Pacific Lamprey Conservation Initiative (Initiative) is the U.S. Fish and Wildlife Service's strategy to improve the status of Pacific Lamprey throughout their range by helping implement research and conservation actions (<http://www.fws.gov/pacific/Fisheries/sphabcon/lamprey/index.cfm>).

One of the key areas of uncertainty identified through the Initiative (and our multiple partners) was the impact of climate change on Pacific Lamprey and how these effects would influence the priorities for restoration actions. Therefore a thorough climate change vulnerability assessment is extremely important to guide restoration actions across the riverscapes for Pacific Lamprey.

Goal: To develop a method for consistently scoring the vulnerability of Pacific Lamprey to climate change throughout the Pacific coast of the United States.

Objectives:

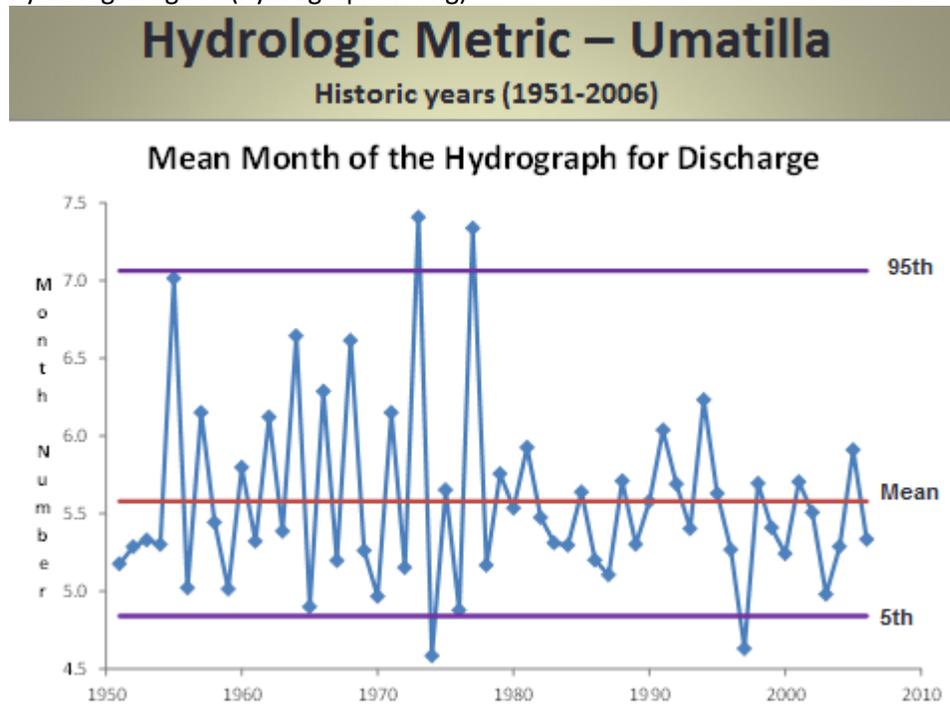
1. Identify metrics that capture downscaled environmental exposures that influence Pacific Lamprey vulnerability.
2. Select basins that cover the range of Pacific Lamprey in the U.S., which represent the ecological and environmental conditions that lamprey have experienced.
3. Work with Climate Centers to gather downscaled historic and projected exposure data for each metric and selected basins. Process metric data to statistically characterize exposure change for selected climate scenarios from historic conditions.
4. Characterize Pacific Lamprey life-stage sensitivity to direct exposure for specific environmental metrics defined above.
5. Modify the NatureServe Climate Change Vulnerability Index calculator to accommodate the more lamprey specific metrics and include the life stage specific sensitivities.
6. Conduct simulations to estimate climate change vulnerability of lamprey for the projected future climate scenarios.

**3. PROGRESS TO DATE:** Describe project objectives addressed and tasks completed during this reporting period. Highlight specific achievements (i.e. results, products, tools) completed or near completion. Include a description of any differences in project tasks from the original proposal and why these changes were made. Please include major lessons learned during this reporting period.

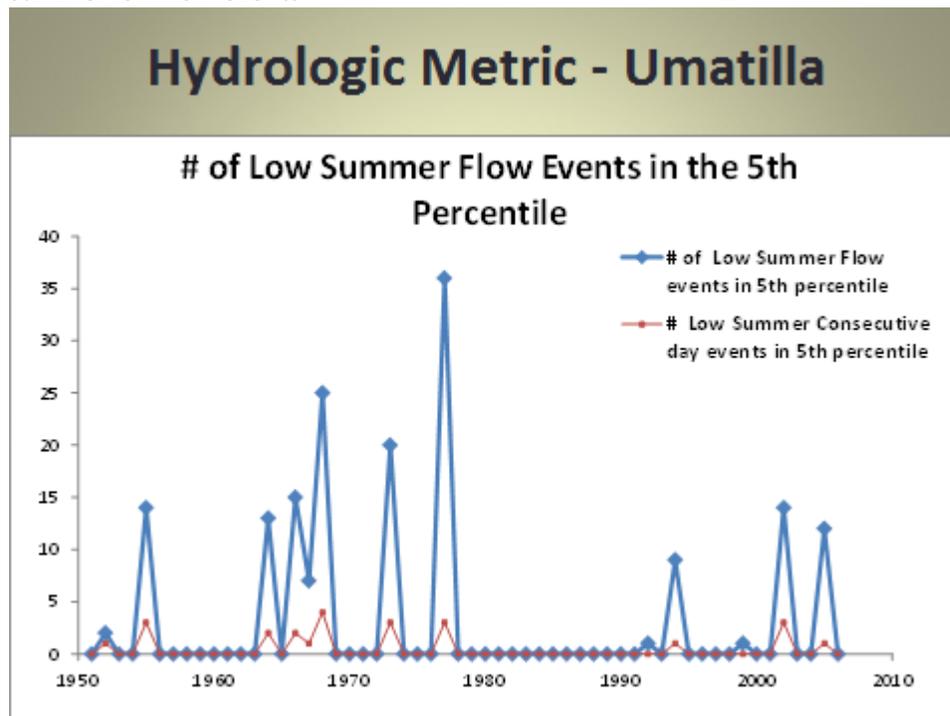
Progress on Objectives:

1. We identified metrics that capture downscaled environmental exposures that influence Pacific Lamprey vulnerability. This information captured changes in stream conditions from the downscaled climate projections:

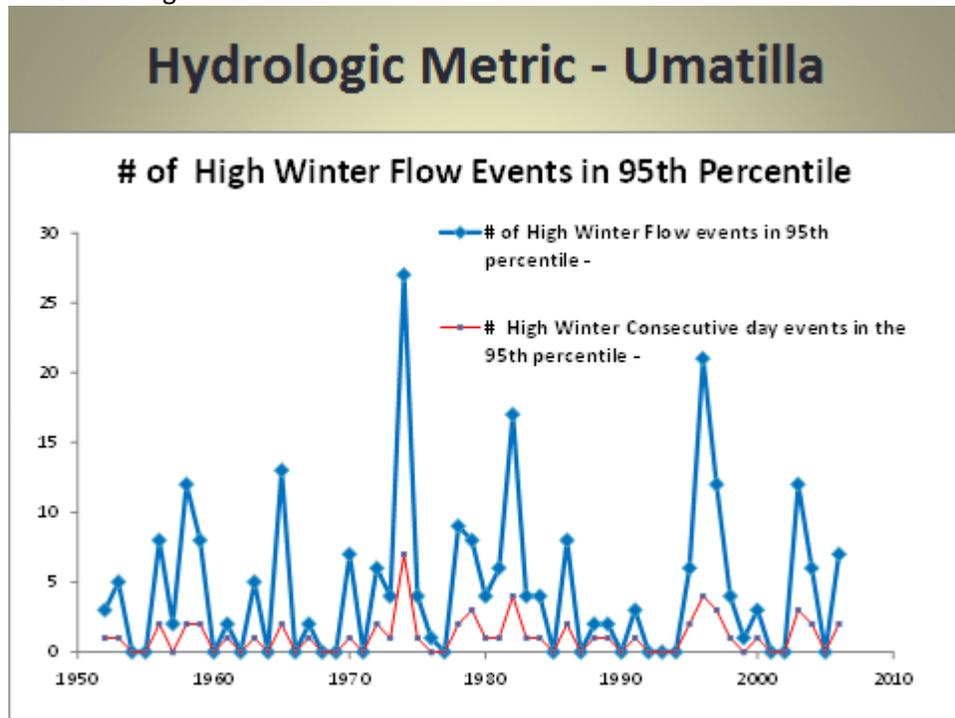
a. hydrologic regime (hydrograph timing)



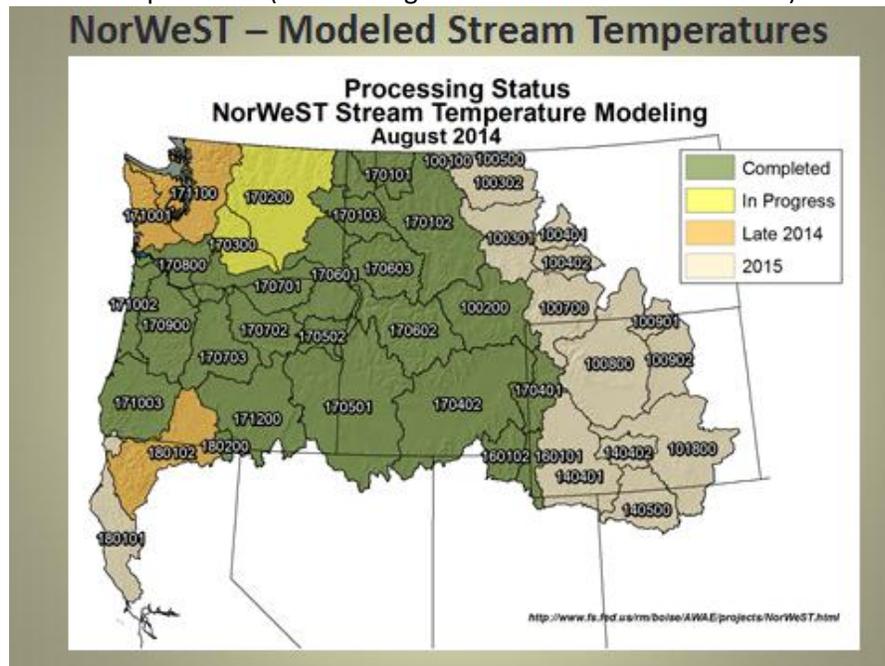
b. summer low flow events



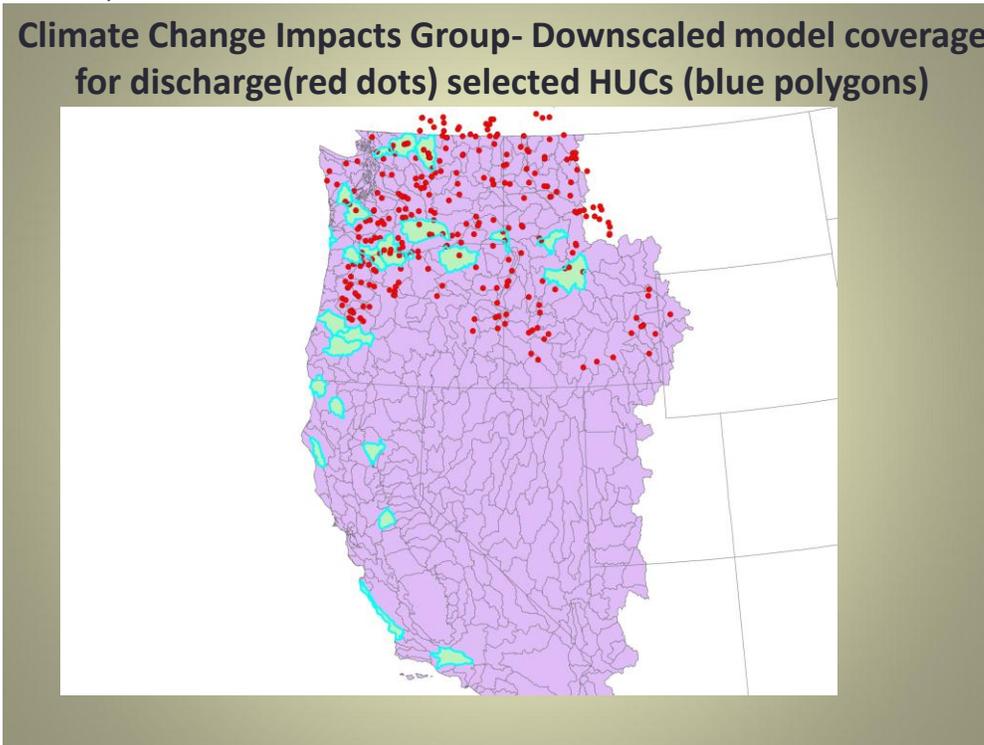
c. winter high flow events



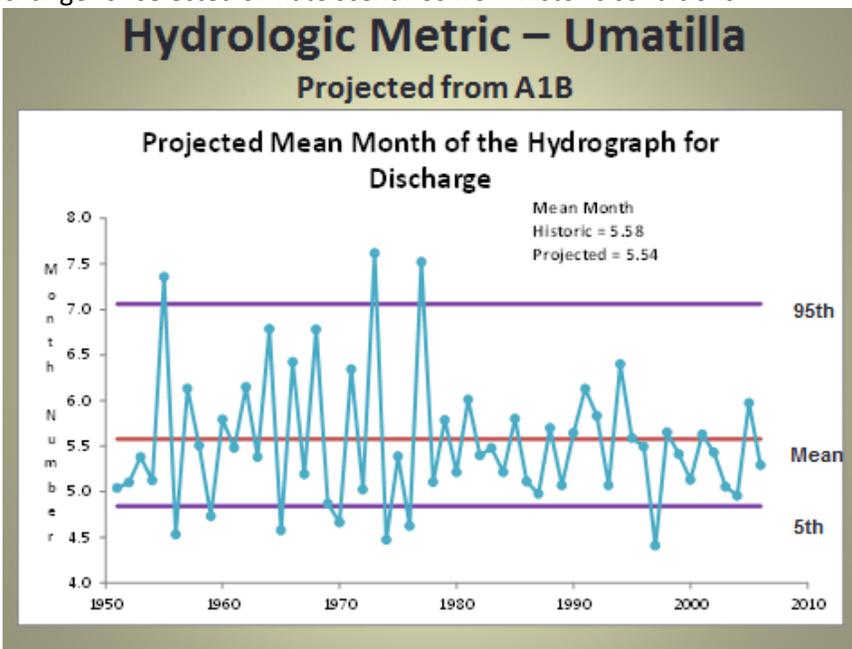
d. stream temperatures (summer high events and winter low events)



2. We selected basins over the distribution of Pacific Lamprey in the U.S. to represent the ecological and environmental conditions that lamprey experience. We targeted data collection and analysis for these basins.



3. We worked with Climate Centers to gather downscaled historic and projected exposure data for each metric and selected basins. We processed metric data to statistically characterize exposure change for selected climate scenarios from historic conditions.



- Working on characterizing Pacific Lamprey life-stage sensitivity to direct exposure for specific environmental metrics defined above.

**Proposal for Hydrologic Metrics**

- Species specific sensitivity for Hydrograph Timing**
  - Ends of scale capture earliest & latest possible timing over the U.S. range of Lamprey
  - Neutral is the timing range in the selected basin

<b>Greatly Increase Vulnerability</b>	Considering the mean timing of the hydrograph, the species has experienced mean timing earlier or later than mean timing observed for the past 50 years over the US range for Lamprey.
<b>Increase Vulnerability:</b>	...the basin has experienced distribution of mean timing that is incremented between basin and range wide values.
<b>Somewhat Increase Vulnerability:</b>	... the basin has experienced distribution of mean timing that is incremented between basin and range wide values.
<b>Neutral:</b>	Considering the mean timing of the hydrograph, the species has experienced hydrograph timing within the 10 <sup>th</sup> and 90 <sup>th</sup> percentile of the range of mean timing for the selected basin for the past 50 years.
<b>Somewhat Decrease Vulnerability:</b>	Considering the mean timing of the hydrograph, the species has experienced hydrograph timing within the range of mean timing for the selected basin for the past 50 years.

- We modified the NatureServe Climate Change Vulnerability Index calculator to accommodate these more lamprey specific metrics and include the life stage specific sensitivities.

#### Lessons Learned and Next Steps

We will use the products we have developed to date in Objectives 1-5 (metrics, basins, downscaled historic and projected exposure data, life stage sensitivities and the modified calculator) to conduct simulations to estimate climate change vulnerability of lamprey for the projected future climate scenarios. Use these results to evaluate how vulnerability assessments for lamprey could inform restoration and conservation priorities.

**4. PROJECT TIMELINE:** Provide a statement as to whether or not your project is currently on track to meet milestones included in your scope of work, including completing all work by the project end date. If applicable, include a statement explaining any problems or delays in meeting the agreement objectives or completing identified tasks.

Original time line:

June 2013 – March 2014 - Downscaled data, indirect exposure data gathering – We acquired downscaled data for metrics of interest from the climate impacts group. We analyzed the historic and projected exposure data as it applies to Pacific Lamprey. However, we discovered there were

geographic gaps in the historic and projected exposure data we needed to complete the lamprey CCVI.

To resolve these gaps we worked with Climate Impacts Group (CIG) to explore our options. CIGs recommendation was to incorporate the new global climate change model results (IPCC used in the latest report 2014– CMIP5). Our cooperators believed using this new information would be much more valuable in informing how climate change will affect Pacific Lamprey populations. Therefore we have entered into a cooperative agreement with the CIG for them to provide downscaled hydrologic information from the new global model runs. There was cost associated with acquiring the new downscaled information and CRFPO is covering the additional \$22,000 out of our office funds. The original date projected to receive the information was the end of October 2014, at which time we requested a no cost extension. However, we have recently been informed by CIG that there were errors in the down scaled model output and we will not be receiving the new downscaled analysis until end of February.

April – September 2014 - Analysis of data and report writing

We made significant progress on determining lamprey sensitivities and modification of NatureServe calculator to accommodate lamprey specific exposure metrics.

Modified time line:

October 2014 – June 2015 – Worked with cooperators to adjust work schedule to accomadate new delivery date for the CIG downscaled historical and projected exposure data. Developing methods to characterize historic and projected stream temperature consistent with the CMIP5 downscaled projections.

**5. COMMUNICATION AND OUTREACH:** List project communication and outreach completed during this reporting period and any near term outreach to be completed. Describe how the project objectives or results have been or will be communicated to managers and decision-makers. Identify managers, administrators, and decision makers you have worked with to date as part of this project, including their names, agencies, and their roles in the study (e.g., advisor, aided with project design, contributed data, tested a decision support tool). Describe any key coordination meetings and workshops completed. List presentations, webinars, publications, reports, and outreach such as Facebook, Twitter, local papers, and newsletters completed and please include dates.

We have had three meetings with our cooperators during FY 2014 to discuss direction and progress of the project. We have discussed the interim progress to the Pacific Lamprey Conservation Team and the public on August 27<sup>th</sup>, 2014. In addition, we have had coordination meetings with the Columbia River tribes, where we described progress on this project and anticipated results.

We plan to share the results of the project with the North Pacific LCC and Region 1 climate board in the late summer. We will be presenting the project findings at an international symposium on lamprey at the American Fisheries Society annual meeting in August 2015.

**6. Signature:** The Recipient Project Manager should sign and date this interim report to certify their submittal of this report.

A handwritten signature in black ink that reads "Howard Schaller". The signature is written in a cursive style with a long horizontal flourish at the end.

Howard Schaller, Project Leader  
Columbia River Fisheries Program Office  
U.S. Fish and Wildlife Service

February 3, 2015