

Summer Research Project

Senior mentors: António Baptista (OHSU) and Phil Roger (CRITFC)

Frontline mentors: Jesse Lopez (OHSU) and Patricia Welle (OHSU), both OHSU PhD students

Undergraduate Interns: Althea and Cynthia

Others involved: Mojgan Rostaminia, OHSU MS student; CMOP modeling team

Project Title: *Impacts of Columbia River Treaty on habitat opportunity for salmon and lamprey: a preliminary assessment*

Context for Project: The renegotiation of the Columbia River Treaty might reshape hydropower management in the Columbia and Snake rivers, with potential implications for the abundance, diversity and life cycle of salmon and lamprey stocks. The time scale of the implementation of the renegotiation of Columbia River Treaty requires that analyses of impacts include understanding of climate change effects in the basin. Science-driven approaches are needed to anticipate impacts, timely enough to support the decision-making process. To be effective, these approaches need to be broadly accepted at a regional level, and be synergistic with efforts being conducted or planned by state, federal and tribal agencies.

Brief Description: The project will consist of the analysis of change in habitat opportunity for salmon (sub-project 1) and for lamprey (sub-project 2), as derived from ‘filtering’ a small set of simulations of Columbia River circulation. Simulations will refer to (a) contemporary conditions and (b) selected scenarios of hydropower operation (post-Treaty) and climate change. Simulations will be ‘filtered’ using criteria that relate favorable habitat opportunity for fish to hydrodynamic variables (water levels, velocities, salinity and temperature). In the case of salmon, available filtering criteria (Bottom et al. 2005: Salmon at River’s End) will be adopted or, if necessary, adjusted. In the case of lamprey, new criteria will be developed. We will seek input from representative regional experts on the ‘filtering’ criteria and on the interpretation of the results.

Proposed Outcomes/Broader Impact: The outcome of the project will be a ‘blueprint’ of strategies for setting up, conducting and analyzing simulations directed at characterizing and contrasting impacts of alternative scenarios of hydropower operation associated with the renegotiation of the terms of Columbia River Treaty. The geographic focus is in on the main stem Columbia River below Bonneville Dam, including the estuary, the plume and the tidal freshwater.

Tentative timeline

Week 1: Familiarization, via literature, with relevant issues (Columbia River ecosystem; salmon and lamprey life cycles; climate change for Pacific Northwest; and Columbia River Treaty).

Week 2: Familiarization with the Virtual Columbia River and data extraction procedures. Interviews with fisheries experts.

Weeks 3-4: Development and pilot-implementation of a processing strategy to convert circulation simulations into products describing changes in habitat opportunity due to scenarios of change in hydropower operation and/or climate change.

Weeks 5-6: Organization of pilot products for presentation to a panel of regional experts, who will provide feedback.

Weeks 7-9: Creation and analysis of final products, including supporting web-publishing constructs.

Week 10: Presentation of results and of recommendations for next steps to a panel of regional experts. Creation of a web page summarizing outcomes.

Logistics: The full project team will meet bi-weekly, alternately at OHSU and at CRITFC. Interns will conduct most of their activities at OHSU, but will conduct interviews with fisheries experts at CRITFC and at state and federal agencies. Expert panels will be conducted at CRITFC, and will be convened by joint invitation of the partner institutions.

Funding for interns: One intern will be funded by CRITFC and the other by NSF (as a part of the core CMOP funding).

Out of scope:

- Systemic circulation simulations and their systemic analysis towards characterizing impact of the Columbia River Treaty, are out of scope. However, the project should inform and be useful for the design of such simulations and analyses.
- The scenarios of hydropower operation and of climate change to be used in this project will be defined by the senior mentors, in consultation with CRITFC staff, the frontline mentors and Mojgan Rostaminia, prior to and during the project.
- Simulations required for this project: Mojgan Rostaminia will conduct the underlying simulations of Columbia River circulation for Columbia River Treaty and for climate change scenarios; the CMOP modeling team will conduct the reference simulations for contemporary conditions, against which to characterize impacts.