IEH Undergraduate Intern Mentoring Opportunity

Deadline: **March 14, 2014**

**Name/Title/Institution(s) of senior mentor(s):** Tawnya Peterson/Assistant Professor/Oregon Health and Science University, Institute of Environmental Health

**Name/Title/Institution(s) of frontline mentor(s):** Claudia Tausz/MS student/Oregon Health and Science University, Institute of Environmental Health

**Project Title:** Exploring linkages between phytoplankton and salmon prey

**Context for Project**: Dramatic declines in Columbia River salmonid populations over the last several decades have prompted monitoring programs and restoration activities that aim to increase returns of endangered stocks through improved understanding of the mechanisms leading to improve fitness and survival. While the causes of salmonid declines remain uncertain, significant changes in physical and ecological habitat features have likely played an important role. Specifically, the installation of hydroelectric dams has led to a change in water clarity and sedimentation patterns in impoundments behind the dams that has resulted in a greater contribution by pelagic (fluvial) phytoplankton to river primary production. A shift from a macrodetritus-based food web to a phytoplankton-based food web has had unknown consequences for salmon prey populations and food web dynamics that support fish in river ecosystems. The goal of this project will be to investigate linkages between phytoplankton production and the dominant macroinvertebrate prey of salmonids, namely insects of the Family Chironomidae.

**Brief Description**: The intern will focus on developing two methods to assess the dependence of macroinvertebrate prey on phytoplankton: (1) direct microscopic examination of chironomids guts from samples provided by collaborators at the National Oceanic and Atmospheric Administration and (2) DNA sequence analysis chironomid specimens. As part of this work, the intern will assist in monthly sampling at sites within the lower Columbia River in conjunction with collaborators from the National Oceanic and Atmospheric Administration and the US Geological Survey. He/she will also be assisting with sample processing and data analysis. This will include setting samples using the Utermohl method, specimen identification and enumeration using an inverted light microscope, nitric acid digestion of whole water samples to determine species-level identification of diatoms, and production of permanent melt-mount slides for archiving.

**Proposed Outcomes/Broader Impact:** The proposed work will provide a deeper understanding of direct linkages between primary and secondary production within salmon food webs of the lower Columbia River. The work will be carried out in the context of ongoing activities supported by the Lower Columbia River Estuary Partnership, which aims to inform management decisions surrounding the recovery of threatened salmonids stocks.

**Proposed timeline (within a 10 week span):** June 23rd, 2014-August 30th, 2014 (flexible – can be moved forward)

Week 1: Reading, become familiar with microscopy and dissection of aquatic invertebrates

Week 2: Begin sample processing; DNA isolation

Week 3: Continue processing of invertebrate samples for microscopy; construct clone libraries from select samples

Week 4: Continue processing of invertebrate samples; send clones away for DNA sequencing

Week 5: Preliminary data analysis; present results in Needoba/Peterson lab meeting.

Week 6: Conduct field work; continue microscopic analysis

Week 7: Literature review; data analysis

Week 8: Continue microscopy; isolate DNA from additional samples

Week 9: Continue microscopy; data analysis; work on final report

Week 10: Final report due.

**Intern academic experience and skill set should include:**

-Experience with zooplankton and/or phytoplankton identification and enumeration

-Basic understanding of hydrological/ecological processes (aquatic ecology coursework very helpful)

-Proven laboratory experience (i.e. pipetting, filtration, slide preparation)

-Microscope experience and basic light microscope skills

-Field experience – capable of rigorous aquatic field work and spending long days collecting samples from a boat. Capable of lifting up to 40 lbs.