Report as of FY2007 for 2005ID50B: "Seasonal variation in anthropogenic nutrient additions and food web response in a large deep lake (Lake Crescent, Olympic National Park)"

Publications

Project 2005ID50B has resulted in no reported publications as of FY2007.

Report Follows

Seasonal variation in anthropogenic nutrient additions and food web response in a large deep lake (Lake Crescent, Olympic National Park)

RESEARCH

Shoreline development is known to degrade water quality and nearshore habitat for lake biota. Deep nutrient-poor lakes – particularly prized for their fisheries and beauty in the Pacific Northwest – may be especially sensitive to shoreline development that affects nearshore habitat. Shallow nearshore water in a steep-sided basin comprises relatively little of the total volume and surface area, but may provide the most crucial breeding habitat for fishes and, potentially, the primary feeding habitat. Even if pollutants entering at the shore are not sufficient to change open water conditions, nearshore communities may exhibit biomass and compositional changes that have disproportionately large impacts on food webs dependent on these shallow waters. In Olympic National Park, Washington, Lake Crescent has modest residential development, and nuisance filamentous algal mats are now regularly observed at developed sites.

In May 2005, I brought on Elizabeth Seminet-Reneau as a M.S. student in the Fish & Wildlife department at UI to work on localized effects of nutrient pollution in Lake Crescent. Seminet-Reneau has a strong work and educational background in limnology, fisheries, and quantitative ecology. In her first year, she collected field samples of lake organisms to complete our stable isotope data set characterizing the food web structure of Lake Crescent. The data strongly suggest substantial dependence of the animal community on nearshore resources, as hypothesized. I am presently preparing a manuscript for submission to a peer-reviewed journal, with Seminet-Reneau as second author.

For her own distinct M.S. thesis research, Seminet-Reneau is currently involved in the collection and analysis of periphyton (attached algae) and macroinvertebrate samples, to determine how community composition shifts in response to localized nutrient pollution. As part of this work, she has begun collecting samples at Lake Pend Oreille and Coeur d'Alene Lake in Idaho so that she may make generalizations about periphyton and macroinvertebrate responses to localized pollution from septic systems. In the fall she will also set up experiments designed to determine electivity of macroinvertebrates for different types of periphyton – i.e., those commonly associated with sewage pollution vs. those associated with unpolluted shorelines in oligotrophic lakes. She has formalized her periphyton counting methods but has not yet begun enumeration of samples.

Importantly, we have found that in Lake Crescent, nutrient content of the water column is generally below detectable limits, and therefore differences in nutrient pollution among sites can not be discerned using standard methods. In a lake that is still oligotrophic such as Lake Crescent, but receiving nutrient inputs, monitoring the biota in the area where pollution enters is likely to give the first detectable "early warning" of ecosystem change. We had hoped to discern an anthropogenic nitrogen signal in the algae from polluted sites, but the signature of algae may be too variable for this distinction; there is some indication that macroinvertebrates may carry the signal with more fidelity. Seminet-Reneau's 2006 summer sampling will increase our power to detect anthropogenic signal among the macroinvertebrates. She plans to present her work at the annual meeting of the Washington Lake Protection Association in the

A. **PUBLICATIONS:** No manuscripts are published yet.
B. **INFORMATION TRANSFER PROGRAM:** No activities to report yet.
C. **STUDENT SUPPORT:**

Elizabeth Seminet-Reneau, M.S. Received May 2007

	Section 104 Awards		NIWR-USGS Internship	Supplemental Awards	Total
	Base Grants	Competitive Awards			
Undergrad.					
Masters		1			1
PhD.					
Post-Doc.					
Total		1			1

D. **NIWR-USGS STUDENT INTERNSHIP PROGRAM:** No internships on this project.
E. **NOTABLE ACHIEVEMENTS AND AWARDS:** No activities to report yet.