Focus on Modeling Dissolved Oxygen in Puget Sound

DEPARTMENT OF ECOLOGY
State of Washington

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The Washington State Department of Ecology (Ecology) is using a water quality model to evaluate the effects of current and potential future nutrient loads on dissolved oxygen levels in Puget Sound.

What is a water quality model?

A water quality model is a mathematical tool that scientists use to represent a water system. With this tool, scientists can visualize and understand factors that may be contributing to pollution both now and in the future.

Go to the following web site to find out more about water quality modeling in Puget Sound:
www.ecy.wa.gov/biblio/0803006.html

What questions will the model answer?

The Puget Sound model, a computerized prediction tool, will help answer the following questions:

- Are human sources of nutrients in and around Puget Sound significantly impacting water quality?
- How much do we need to reduce human sources of nutrients to protect water quality in Puget Sound?

These model findings will help decision-makers use resources wisely and determine where additional study or action is necessary.

Ecology and the Pacific Northwest National Laboratory (PNNL) will work collaboratively with the U.S. Environmental Protection Agency (EPA) and advisory groups to conduct the nutrient pollution modeling.

This work is part of Ecology's and EPA's mandate under the federal Clean Water Act to manage pollution to meet Washington State water quality standards.

Why are nutrients such as nitrogen a problem?

Fish need oxygen like humans do. Where dissolved oxygen levels are low, fish and other marine life become stressed and die or are forced to flee their habitat.

Nitrogen is the main nutrient that causes low dissolved oxygen levels in Puget Sound. Excess nitrogen causes excess algae growth. As the algae die and decay, they rob the water of dissolved oxygen.

Discharges from wastewater treatment plants – as well as streams affected by septic systems, fertilizers, animal waste, and other sources – can add nitrogen to Puget Sound. Once released, nitrogen moves around; therefore, discharges at one location may cause low dissolved oxygen levels many miles away.

More Information on the Web

www.ecy.wa.gov/programs/wq/PugetSound/DOModel.html

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Two water quality models will be used

This project will create two models for the entire Puget Sound, one at a large scale and one at an intermediate scale. These models also can be used by others who need to learn more about Puget Sound's behaviors.

- The *large-scale model* is a simple, very broad model. Scientists will use it for screening-level evaluations, and results of this effort will help refine the intermediate-scale model.
- The *intermediate-scale model* is more detailed and focused to help scientists tailor their look at specific parts of Puget Sound. They will use it to evaluate the effect of human sources of nutrients on dissolved oxygen across Puget Sound. This model will also help define potential Puget Sound-wide nutrient management strategies and decisions.

While this project will not establish legal limits for meeting water quality standards, it will support other work beyond this project.

How does this project relate to other Puget Sound efforts?

Ecology is working on a number of projects related to Puget Sound and nutrients. This project focuses on the entire Puget Sound and extends the work currently being done as part of the *South Puget Sound Dissolved Oxygen Study.* For more information on the South Sound study, see www.ecy.wa.gov/puget_sound/dissolved_oxygen_study.html

This project will also complement Ecology's recently started study, *Technical and Economic Evaluation of Nutrient Removal Technologies.* For more information, see www.ecy.wa.gov/programs/wq/PugetSound/.

Advisory committees for this project

Ecology is forming two advisory committees:

- A model selection technical advisory committee will assist in selecting the appropriate intermediate-scale water quality model.
- A project advisory committee will assist with the overall project by offering suggestions on scientific and policy issues and by reviewing draft findings and reports.

Schedule for this project

Fall 2008:	Ecology forms advisory committees and begins project.
2009:	PNNL drafts reports on hydrodynamics and water quality.
Spring 2010:	Ecology writes final summary report.