NORTHWEST STRAITS
marine conservation initiative

Northwest Straits Commission
Water Quality Research Needs Workshop
November 15, 2006

Summary of Workshop Discussion

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The Northwest Straits Commission held a Water Quality Research Needs Workshop on November 15, 2006 to identify a list of priority scientific research needs related to pathogens, biotoxins, and water quality in the Northwest Straits region. The workshop was designed to elicit recommendations for research priorities from a variety of scientists, researchers, and Marine Resources Committee representatives active in water quality issues of the Northwest Straits and Puget Sound. A list of workshop participants and contributors is Appendix A of this document.

Workshop discussion focused on: pathogens that affect humans, fish and wildlife health, such as bacteria, viruses and protozoa; naturally occurring biotoxins, such as domoic acid; and water quality constituents, such as dissolved oxygen and nutrients. Current work related to those topics was reviewed prior to and during the workshop. The participants focused their discussion on areas where more work is needed and where more information is necessary to adequately protect and restore water quality in the Northwest Straits region.

The goal of the Northwest Straits Initiative is to protect and restore the marine waters, habitats and species of the Northwest Straits region to achieve ecosystem health and sustainable resource use. The Northwest Straits Commission works toward this goal in a number of ways, including identifying gaps in knowledge that limit protection and restoration efforts. This was the first of three research needs workshops that the Northwest Straits Commission will host in 2006 and 2007. Subsequent workshops will cover nearshore and marine habitat, and species and trophic interactions. Summaries of all workshops will be produced. A final document outlining research recommendations will be produced after all workshops are completed.

Summary of workshop discussion and potential recommendations

1. Methods to predict harmful algal blooms

There are a number of efforts currently underway to study and address harmful algal blooms. Some efforts are looking at the organisms that cause toxic algal blooms, some are looking at the effects of those toxins on shellfish and fish, and some efforts are looking at environmental conditions related to harmful algal blooms.

Despite these many efforts, resource managers, shellfish farmers, and citizens still are forced to respond to harmful algal blooms in a reactive, rather than a proactive mode. There is no accepted way to predict harmful algal blooms. With a predictive capability health officials could more effectively avoid possible poisonings and shellfish farmers could take proactive measures to reduce the impact of harmful algal blooms on their businesses.

Topics discussed:

- Relationship of harmful algal blooms to physical conditions. What triggers the production of toxins by some algae? What is the role of upwelling? What are the relationships between nutrient loading and biotoxins?

  One project discussed was the potential replication of the Washington coast project that determines environmental factors that trigger, or predict, harmful algal blooms. The SOUNDHAB project, proposed by Vera Trainer, NOAA NWFSC and Jack Rensel, Rensel Associates, would identify these environmental conditions in Puget Sound. The project would also identify which economically important fish and shellfish are impacted by harmful algal blooms. The project includes development of a model with predictive capabilities.

- The effects and pathways of biotoxins in shellfish, fish, wildlife, and humans. What are the depuration rates and uptake rates by shellfish of toxins and pathogens? What are the long-term effects of biotoxins and pathogens on fish and wildlife? What are the effects of low level chronic biotoxin exposure on wildlife and humans? What are the routes of exposure of biotoxins in wildlife? How long do biotoxins stay in shellfish and fish tissue?

2. Models at different scales to synthesize water quality data and provide predictive capabilities

There are a number of coarse scale models that have been developed to look at Puget Sound and large basins within the Sound. While these models are helpful, there is a need to further develop models at smaller scales to understand specific characteristics of linkage zones, such as the nearshore and small bays. Such models can be used to understand and predict how certain inputs, like nutrients, will affect water quality.

Topics discussed:

- Small to large scale circulation and wind modeling. Small to large scale modeling of chemical and biological parameters and sediment transport. Small scale modeling focused on bays and nearshore areas such as the Elwha River nearshore.
- Focused investigations of areas at risk for nutrient loading. Risk-based assessment of areas with potential for degraded water quality based on land-use and other factors.
- Relationship between harmful algal blooms and physical conditions

3. Enhanced monitoring to refine our understanding of pathogenic species and water quality, particularly in the nearshore environment

Much is currently being done to monitor for traditional water quality parameters and for indicators of pollution such as fecal coliform bacteria. Much of this monitoring is done in the marine environment, away from the intertidal zone. There is a need for enhanced monitoring in the linkage zones between the mouths of river and stream and the nearshore, and in smaller estuaries.

Biotoxin monitoring is focused on the safety of shellfish for human consumption. There is little known about the potential role of pathogenic viruses or protozoa on humans and wildlife in Puget Sound and the Northwest Straits. In other areas of the country, these toxins have had large impacts on marine wildlife populations.

Topics discussed:

- Focused monitoring and study of pathogenic species in linkage zones, such as river mouths, the nearshore and small estuaries.
- Monitoring of protozoa and viruses in shellfish, as it relates to human health. Monitoring of viruses in Puget Sound. What viruses are in Puget Sound and in what number? What risks are associated with discharges from cruise ships and other boats?
- Stormwater monitoring in smaller jurisdictions.
- Ballast water monitoring related to the importation of pathogenic species.
- Surveillance for mortality in marine bird and mammal populations related to harmful algal blooms...

4. Synthesizing existing data with new data to look at water quality issues more holistically

There is a host of existing water quality data available from a variety of sources. These data are valuable as baseline measures and also as additions to a comprehensive look at specific systems, such as small bays. Energy could be devoted to mining these data and incorporating them into current water quality assessments.

Also, many different entities monitor for water quality parameters, using accepted protocols and also testing newer, emerging technologies. The effectiveness of newer technologies could be assessed on a broad scale and the information disseminated to scientists and resource managers.

Topics discussed:

- Existing data should be analyzed from a smaller system, such as Penn Cove, and combined with newer data to develop a broad-based picture of water quality at specific sites over time.

- A comprehensive review of new techniques, such as microbial source tracking, should be undertaken. Such a review could include the accuracy or effectiveness of the technique in different environmental conditions and the relative cost. Case studies would be helpful.

- Multi-disciplinary, topic-focused research focused on a smaller system, such as a nearshore area or small bay, should be undertaken.

5. Exploring the role of larger scale drivers influencing water quality in Puget Sound and the Northwest Straits

Large scale drivers, such as the Fraser River discharge, influence water quality in a very large geographic area. A multi-disciplinary approach is needed to pull different pieces of data together to try and develop an understanding of the effects of such drivers.

Large scale drivers discussed:

- Fraser River discharge
- Climate change
- Shoreline development
- Victoria sewage discharge

6. Disseminating and publishing key findings related to water quality in Puget Sound and the Northwest Straits

While much monitoring and research are being done related to water quality in Puget Sound and the Northwest Straits, there is a dearth of information in the literature. Likewise, resource managers, business, and citizens should be better informed of water quality issues affecting their interests. More efforts should be made to disseminate research findings and to inform key audiences about emerging scientific understanding of water quality in the region.

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Appendix A - List of workshop participants

Nicky	Beck	Environmental and Occupational Health Sciences, University of Washington
Chris	Betchley	Snohomish County Marine Resources Committee
Kim	Bredensteiner	Island County Marine Resources Committee
Ginny	Broadhurst	Northwest Straits Commission
Atina	Casas	Whatcom County Marine Resources Committee
Andrea	Copping	Pacific Northwest National Laboratory & Northwest Straits Commission
Frank	Cox	Washington Department of Health
Joe	Gaydos	SeaDoc Society & Northwest Straits Commission
Stuart	Glasoe	Puget Sound Action Team
Mark	Herrenkohl	Whatcom County Marine Resources Committee
Joe	Hillers	Island County Marine Resources Committee
Scott	Meschke	Environmental and Occupational Health Sciences, University of Washington
Jan	Newton	Applied Physics Lab, University of Washington
James	Postel	School of Oceanography, University of Washington
Jack	Rensel	Rensel Associates Aquatic Sciences
Anne	Shaffer	Washington Department of Fish & Wildlife & Clallam County Marine Resources Committee
Vera	Trainer	National Oceanic and Atmospheric Administration
Michelle	Wainstein	Washington Sea Grant, University of Washington