

A West Coast Harmful Algal Bloom Monitoring, Alert and Response Network

*An Output of the Steering Committee of
The West Coast Regional Harmful Algal Bloom Summit*

*Under the directive of the **West Coast Governors' Agreement on Ocean Health**, eighty leading scientists, managers, and industry representatives met and unanimously recommended the creation of a West Coast Harmful Algal Bloom (HAB) monitoring, alert and response network. This summarizes their vision and recommended actions to activate the network.*

Vision of the West Coast HAB Network

We envision a **coast-wide monitoring network that improves response to HAB events through prediction of harmful algal blooms** similar to current day weather forecasts. The **goal** is to provide at least two types of warnings:

- Annual forecasts predicting the anticipated severity of harmful algal bloom impacts.
- Near term (1-7 day) response alerts that permit managers to take action to protect coastal economies and human health and inform the public about causes and consequences of these HAB events.

Our proposed network will incorporate and enhance existing state monitoring programs by capitalizing on recent research advances and by leveraging the strengths of existing west coast regional ocean observing associations. This system will benefit West Coast communities by minimizing fishery closures and losses, protecting the economy of coastal communities, mitigating the impacts to marine life and continuing to protect public health.

Need for the West Coast HAB Network

HAB events impact coastal waters irrespective of state or federal boundaries. As a result, a sustained and coordinated regional approach to predicting and monitoring HABs is needed to protect human health and marine resources. The Governors of California, Washington and Oregon recognized this need when they included in their agreement a request for a HAB workshop, "to reach consensus on the present state-of-knowledge and prioritize the information needed by decision makers to lessen the impacts of HAB events on humans and critical marine resources." The proposed network will support and enhance abilities of each state to comply with existing legislative mandates to ensure safe seafood, protect public health, ensure clean coastal waters, and protect threatened and endangered marine species. The system will also support ongoing federal initiatives to mitigate the impact of HABs along our coasts and develop an U.S. Integrated Ocean Observing System (IOOS).

Building the West Coast HAB Network

To attain our vision of a sustained and effective HAB network we would **build upon and integrate many existing programs** and incorporate enhancements such as improved biological observations and prioritizing HAB-relevant data integration which have been demonstrated to facilitate better response and advance HAB forecast development. A West Coast Regional HAB Coordinator would oversee coordination of the network which consists of three essential and coordinated components:

Why Harmful Algal Blooms are a Problem on the West Coast

In 2010, two Alaskans died soon after suffering paralytic shellfish poisoning from eating shellfish tainted with an algal toxin. This tragic outcome is a reminder of the need to maintain strong state monitoring and surveillance programs. However, threats from harmful algal blooms (HABs) to both human health and living resources are widespread, increasing, and often cross state boundaries. There are three toxic HAB organisms common in waters of the U.S. West Coast that can accumulate in shellfish and cause human illness or death if consumed. Another HAB species kills farmed salmon and may pose a threat to some wild salmon stocks. HABs may make Dungeness crabs too toxic to eat, close commercial and recreational harvests of razor clams, mussels and oysters, and cause large die-offs of marine mammals and birds, including threatened and endangered species like the Southern Sea Otter. HABs have devastating effects on economies and communities. In Washington State, HAB-related closure of the razor clam fishery for a year can cost \$22 million of lost revenue and Oregon estimated that a yearlong closure of razor clamming (based on 2009 figures) would cost the local communities \$6.1 million. High levels of HAB toxin forced the closure of commercial aquaculture in California for over two months. Toxic algae have also led to more than 14,000 sick or dead seals, sea lions, sea otters, dolphins, birds, and gray whales along the West Coast in the last decade. These highly visible impacts have eroded public confidence in seafood, community identity and recreation, and the traditional way of living for native coastal cultures.

● **Enhance regional IOOS focus on HABs.** The four IOOS Regional Associations that deliver ocean observations in Alaska (AOOS), Washington and Oregon (NANOOS), and California (CeNCOOS and SCCOOS) have existing infrastructure relevant to HABs. This includes sensor platforms (e.g., moorings, gliders), data visualization and delivery systems, modeling capabilities, on-line user products, and education and outreach activities. The Associations integrate multiple data streams and generate products with partners that include NOAA National Marine Sanctuaries, National Estuarine Research Reserves, tribal, federal, state and local governments and industry. Regional Associations recently identified the need to minimize harm from HABs as a critical issue in their plan to deliver products and services related to Ecosystems, Fisheries and Water Quality (2010 NFRA report).

Given a modest additional federal investment in IOOS, west coast regional associations are poised to leverage existing infrastructure with enhanced observations for HABs (e.g., include more sites, more biological sensors). This focus on product development for HAB forecasting and specific outreach activity on HABs would be cost effective.

● **Sustain State, Tribal, and Local HAB programs.** In each west coast state, partnership projects between government agency and university scientists have helped coastal resource, wildlife, and public health managers keep pace with the expanding HAB problem. These partnerships have demonstrated how incorporating technology and method advancements into routine monitoring benefits public health, coastal economies, and government efficiency. In Washington, one such partnership led the state to fund the collection of coastal HAB data through the Olympic Region Harmful Algal Bloom (ORHAB) program and another partnership, with industry and non-profits (SoundToxin) is being piloted for Puget Sound. In Oregon, the Monitoring Oregon's Coastal Harmful Algae (MOCHA) partnership has shown how access to HAB data can help the state better protect the health of recreational razor clammers. In California, partnerships with the Department of Public Health's Marine Biotoxin Monitoring Program, water districts, aquaculture industry, and marine animal responders have led to a new state-wide HAB monitoring system called CalHABMAP. Coast-wide, the Wildlife Algal Toxin Research and Response Network (WARRN-West) is poised to assess the HAB threat to marine wildlife.

Stable funding for existing state monitoring programs (e.g. seafood safety and public health) provides a base of professional staff, volunteers, and data for validating predictions critical to the success of our HAB network. States can continue to leverage management-science partnerships that utilize our HAB network to access data for decision-makers and to gain early access to new technologies that will benefit water quality and seafood safety programs.

● **Build capacity to focus on HAB 'hot spots'.** Researchers have discovered several places along the west coast that are HAB initiation or concentration sites. Often, these 'hot spots' coincide with areas of particular economic or ecological importance. Known HAB 'hot spots' include: the Juan de Fuca Eddy and Puget Sound, off Washington; Heceta Bank and Cape Blanco, off Oregon; and Monterey Bay, Santa Barbara Channel, and the Southern California Bight, off California. The intensive sampling of these 'hotspots' would allow us to take the pulse of the ocean by monitoring environmental factors and the abundance of harmful species and their toxins. This would enable better understanding of forcing functions and increase accuracy of predictive forecasting.

Regional associations have positioned some sensors in some of these areas but we envision expanding existing coverage to all known 'hot spots.' This will be done by adding more sensor platforms and by integrating data from shipboard sampling, especially during periods of vulnerability. The HAB community will continue to leverage available federal and state research vessels for needed offshore sampling.

Requirements for Successful Activation of the West Coast HAB Network

We must harness, integrate, and build the current capacity. Successful activation of the network depends on:

- ✓ **States** continuing to fund HAB monitoring and shellfish surveillance activities.
- ✓ **NOAA** supporting the enhancement of existing West Coast IOOS systems and continued funding for West Coast partnership projects that advance HAB prediction, monitoring, and response priorities.
- ✓ **IOOS Regional Associations** continuing and enhancing work to include HAB monitoring and research needs in planning and expansion of ocean observing systems.
- ✓ **The HAB Research Community** working closely with state, federal, IOOS systems, and industry managers to optimize the usefulness of the data collected by all.
- ✓ **The U.S. Congress** providing the financial support and legislative guidance to continue effective HAB monitoring networks into the future.