

Gulf of Maine Contaminant Monitoring

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ABSTRACT

Contaminants are a transboundary concern in the Gulf of Maine (GOM) watershed. There are different types of contaminants that are of concern, including toxic chemicals, pathogenic and harmful microorganisms, nutrients and debris. Many efforts to monitor contaminants are currently underway in the region, especially in estuarine and coastal waters where resource harvesting and recreational uses can be adversely impacted by the presence of contaminants. Most contaminant monitoring programs in the GOM are limited in geographical coverage, and many studies on contaminants are of short duration. However, there are several long-term contaminant monitoring programs that are designed to address management issues across the GOM. At present, most programs are designed and conducted as stand-alone programs, but there are efforts underway to foster cooperation and integration where feasible and potentially beneficial.

Regional-scale monitoring programs have several characteristics. Foremost, they address regional management issues. By definition the geographical context is all or part of the GOM region. Only a few programs are specifically designed for the whole GOM, but there are several other programs that include the US or the Canadian portions of the Gulf. Some of these are national programs that include the GOM, others are sub-regional, including those in the Bay of Fundy. The regional contaminant monitoring programs also have standardized sampling and analytical procedures amongst all participants, and focus on contaminants in water, biota, sediments, air, or a combination of environmental media. Monitoring program designs typically have independently selected sampling sites, timing and frequency, although there are examples of purposeful overlap in GOM programs. Finally, programs also differ in mechanisms used for reporting results. Data reports, fully interpreted reports, scientific papers, on-line databases, fact sheets, short summaries, full web pages and linkages to related databases are some aspects of program reporting and dissemination.

There are a number of specific contaminant monitoring programs in the GOM that address regional issues, and many (but not all) of them are listed in Table 1.

GOM Contaminant Monitoring Programs

Gulf of Maine-wide programs

Gulfwatch, Mercury Deposition Network, Gulf of Maine Ocean Observing System

Canadian programs

Canadian Shellfish Sanitation Program (CSSP)/Maritime SSP, Atlantic Coastal Action Program, Dredged Material Ocean Disposal Site, Biotxin Monitoring Program, Moosehead Maritimes Beach Sweep and Litter Survey, Toxic Chemicals in CA Seabirds

US programs

National SSP/state SSPs, National Estuary Programs, National Estuarine Research Reserves-System Monitoring, Disposal Area Monitoring System, state biotoxin monitoring, National Marine Debris Monitoring Program, NOAA National Benthic Surveillance, Bioeffects Studies & Mussel Watch projects, EPA Environmental Monitoring and Assessment Program & National Coastal Assessment Program, Ambient Air & National Atmospheric Deposition Program, National Water Quality Assessment Program, Toxic Contaminants in Tissue of Seals in the Gulf of Maine

These programs focus on contaminants in water, biota, sediments, air, or a combination of these environmental media. Some also include collection of data on related or otherwise useful parameters, such as salinity, temperature, and turbidity in water, or grain size and total organic carbon in sediments.

A useful way to understand the diversity of approaches and potential for integration of different programs is to look at how programs address one contaminant. Mercury pollution is a high priority concern in the Gulf of Maine watershed and is

receiving heightened attention by environmental groups, government agencies, scientists and elected officials. Several contaminant monitoring programs in the GOM include mercury or are exclusively focused on mercury, like the Mercury Deposition Network (MDN). The MDN has eight existing or past sites located in the GOM watershed where mercury deposition rates and concentrations in precipitation are reported on a weekly basis. Gulfwatch has used over 70 sites around the coast of the GOM to measure tissue concentrations of mercury in blue mussels (*Mytilus edulis*) each year since 1991. The NOAA Mussel Watch program also has been monitoring mercury in blue mussels at 22 sites in the US GOM waters, along with 40 sediment sites in the Benthic Surveillance program and 21 fish sites as part of the Bioeffects Studies project. More recently the USEPA National Coastal Assessment program has established ~80 sites each in Massachusetts, New Hampshire and Maine where mercury has been measured in sediments and the tissue of several targeted species since 2000. The National Water Quality Assessment program has measured mercury in fish tissue and/or streambed sediments at 14 freshwater tributary sites near the coasts of Maine and Massachusetts. Finally, the Marine Environmental Research Institute has measured mercury in the tissue of two species of seals at several sites in the US portion of the GOM over the past several years.

The mercury example illustrates the wide-ranging approaches that need to be taken for addressing just one contaminant on the regional scale. There are other programs that also address mercury in other species (common loons), in other areas (inland lakes) and at other scales, and even considering these the assessment of mercury in the marine environment of the GOM is not comprehensive. However, scrutiny of the status of regional mercury monitoring also reveals areas of potential overlap, common resource needs and inefficiencies when considering the full complement of mercury monitoring programs that could benefit from cooperation and integration.

There is an effort currently underway to start to identify situations that may benefit from cooperation and to encourage integration and networking of monitoring programs to better serve regional needs. More research is needed to help understand the problems posed by contaminants, how they act and are transported in the environment, the development of conceptual and predictive contaminant models and to develop better technologies for routine use in monitoring programs. Finally, all monitoring programs need to continuously reassess their designs and results to ensure that they remain effective programs that serve to address those issues of most concern to regional environmental and resource managers.