Report to the Technical Advisory Committee of the
Surface Water Ambient Toxics (SWAT) Monitoring Program

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Five Year Conceptual Plan (2024-2028)

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Maine's Surface Water Ambient Toxics (SWAT) Monitoring Program

Established in 1993 (38 MRSA §420-B), Maine's Surface Water Ambient Toxics (SWAT) monitoring program directs the Department of Environmental Protection (DEP) to determine the nature, scope, and severity of toxic contamination in the surface waters and fisheries of the State. The authorizing statute states that the program must comprehensively monitor the lakes, rivers and streams, and marine and estuarine waters of the State on an ongoing basis. The program must incorporate testing for suspected toxic contamination in biological tissue and sediment; may include testing of the water column; and must include biomonitoring and the monitoring of the health of individual organisms that may serve as indicators of toxic contamination. The program must collect data sufficient to support assessment of the risks to human and ecological health posed by the direct and indirect discharge of toxic contaminants.

The Commissioner of the DEP must prepare a five-year conceptual work plan in addition to annual work plans which are each reviewed by a Technical Advisory Group (TAG). The TAG is composed of 12 individuals, including two representatives with scientific backgrounds representing each of five various interests (business, municipal, conservation, public health and academic), and two legislators. The following people are members of the 2024 TAG:

Academic:	Dr. Rebecca Van Beneden, School of Marine Sciences, University of Maine Dr. Dianne Kopec, Department of Wildlife, Fisheries, and Conservation Biology, University of Maine
Business & Industry:	Patrick Gwinn, Integral Consulting Inc. James Brooks, Sappi
Conservation:	Susan Gallo, Maine Lakes Society Nick Bennett, Natural Resources Council of Maine
Municipal:	Janet Robinson, Woodard and Curran Inc. Ashley Charleson, Town of Brunswick
Public Health:	Breana Bennett, Maine CDC Dan Kusnierz, Penobscot Indian Nation
Legislators:	Senate – Sen. Stacy Brenner House of Representatives – Rep. Allison Hepler

SWAT Reports

Reports summarizing the results of past SWAT monitoring are available on the SWAT website: https://www.maine.gov/dep/water/monitoring/toxics/swat/ . The website includes annual reports from 2011 to 2014. In 2015, there was a switch to writing reports every 2 years. The website also includes reports for 2015-16, 2017-18, 2019-20, and 2021-22. The 2023-24 report will be published in April 2025. For more information, please contact Tom Danielson (thomas.j.danielson@maine.gov).

Five-Year Conceptual Plan (2024-2028)

DEP recognizes that the need for the monitoring and assessment of toxic contamination of fresh and marine surface waters far exceeds current funding capacity. Therefore, DEP must prioritize and target monitoring efforts. Like the previous five-years (2019-2023), DEP intends to focus monitoring in 2024-2028 to answer the following four questions:

Is it safe to eat fish from Maine's lakes, ponds, streams, and rivers?

Is it safe to eat Maine's marine fish and shellfish?

Is it safe to swim and recreate in Maine's lakes and ponds?

Are Maine's freshwater resources sufficiently clean to support healthy aquatic life communities?

DEP staff will investigate the nature, scope, severity, and spatial patterns of toxic pollutants associated with each of the four areas. In addition to routine monitoring, DEP staff will support monitoring and assessment associated with wastewater discharge licenses, dam licenses, dam removals, toxic chemical and oil spills, fish kills, algal blooms, floods, and remediation of contaminated sites. Further, DEP is committed to incorporating environmental justice practices into its monitoring to ensure that underserved communities are not overlooked.

Is it safe to eat fish from Maine's lakes, ponds, streams, and rivers?

Maine has a rich history of recreational fishing in lakes, ponds, streams, and rivers. Fishing is a socially and economically important part of Maine's culture, but are the fish safe to eat? To answer this question, DEP will collect fish and have qualified laboratories analyze samples for contaminants. Also, DEP will collect water and some sediment samples to better understand uptake of contaminants by the fish. During the next five years, the primary focus of the laboratory analysis will be on per- and poly-fluoroalkyl substances (PFAS). This information will build on data collected for PFAS in fish tissue from 2014 to 2023. DEP staff will coordinate with staff from the Maine Center for Disease Control and Maine Department of Inland Fisheries and Wildlife with fish consumption advisories. A secondary monitoring focus will be legacy pollutants, such as DDT, PCBs, dioxins, and mercury. There are currently 14 fish consumption advisories for legacy pollutants and a statewide mercury advisory. When funding allows, fish will be collected to determine if concentrations of legacy chemicals have decreased enough to revise the advisories. Finally, when funding allows, DEP staff will monitor the severity and extent of emerging contaminants, such as microplastics, pharmaceuticals, and personal care products.

In addition to collecting and analyzing samples, DEP staff will support several other projects. The University of Maine is starting research about variation of PFAS in fish, which is funded by the Maine Department of Inland Fisheries and Wildlife. Also, DEP will coordinate with the U.S. Environmental Protection Agency (U.S. EPA) and the Houlton Band of Maliseet Indians (HBMI) to collect and analyze water samples from Maine lakes and the Meduxnekeag River watershed. Addressing environmental justice concerns, DEP will attempt to work with culturally diverse communities in Maine to find out what kinds of fish they catch, where they go fishing, and what parts of the fish they eat. DEP could revise monitoring plans accordingly.

Toxics in freshwater resources (Coordinator: Tom Danielson)

Monitoring	Analytes
Collect fish to determine if they are safe to eat	**PFAS**, DDT, PCBs, dioxins, metals
Collect water and sediment samples to better understand uptake of toxics by fish	**PFAS**, DDT, PCBs, doxins, metals
Collect fish, water, and/or sediment samples to investigate emerging contaminants	Microplastics, pharmaceuticals, personal care products

Cooperative work with U.S. EPA (Coordinators: Tom Danielson and Linda Bacon)

Monitoring	Analytes
Cooperative project to monitor PFAS in watersheds of interest, such as the Meduxnekeag River watershed	**PFAS**
Cooperative project with monitor PFAS in water samples from lakes	**PFAS**

Is it safe to eat Maine's marine fish and shellfish?

The Maine coast and the Gulf of Maine provide economic opportunities including commercial fisheries, aquaculture, recreational fisheries, and a wide variety of tourism activities. Maine has experienced population growth and increased development in recent years, especially in the southwestern portion of the state's coastline. The amount of chemicals discharged into the marine environment may increase with increase because of population growth. Some contaminants can bioaccumulate as they move through the food chain and affect marine organisms and people that eat them. All these factors suggest that the monitoring of chemical contaminants is an important component of assessing the health of the marine environment in Maine.

During the next five years, monitoring will focus on PFAS, PCBs, dioxins, and metals in commercially and recreationally harvested shellfish and finfish. Species sampled during the previous five years included American lobster, blue mussel, softshell clam, striped bass, bluefish, and harbor pollock. Monitoring may expand to include additional marine species considered to be important food species as requested by the Maine Department of Marine Resources. To better understand spatial patterns of PFAS in marine and estuarine systems, samples of Atlantic silversides, banded killifish, other baitfish species, or other organisms will be collected.

When funding allows, DEP staff will collect marine samples to better understand the severity and extent of emerging contaminants, such as microplastics, pharmaceuticals, and personal care products. In addition, DEP staff will provide support and collaborate on other projects, including, such as monitoring of PFAS in Casco Bay by Bigelow Laboratory and the Friends of Casco Bay. DEP staff will help to plan and contract work to accomplish the 2025 National Coastal Condition Assessment (NCCA), which, in part, samples contaminants in water, sediment, and biota at multiple sites on the Maine coast.

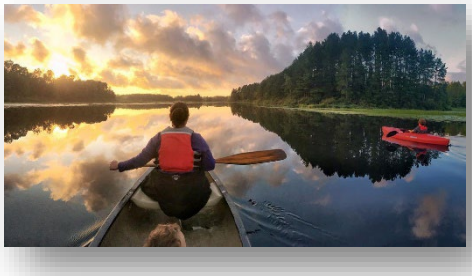
Toxics in marine fish and shellfish (Coordinator: Jim Stahlnecker)

Monitoring	Analytes
Collect marine shellfish and finfish to determine if they are safe to eat	**PFAS**, DDT, PCBs, Dioxins, Metals
Collect species with high site fidelity (typically baitfish) from marine and estuarine waters to determine spatial variation in PFAS	**PFAS**

Is it safe to swim and recreate in Maine's lakes and ponds?

Many people associate swimming and boating in clean lakes as a key part of Maine's image as "Vacationland". Recreating in Maine's lakes is both culturally and economically important. Clean water also ensures healthy populations of fish, loons, and a great diversity of aquatic and terrestrial plants and animals. A major threat to clean lakes is having too much phosphorus and other nutrients in the water. Excessive nutrient enrichment can lead to algal blooms, which not only turn the water green and reduce water quality but can sometimes produce toxins that can harm people and animals.

Under certain conditions, some species and genetic strains of cyanobacteria, formerly known as blue-green algae, can produce toxins that harm the brain, liver, or skin. Collectively, the toxins produced by cyanobacteria are called cyanotoxins. Blooms of the kinds of cyanobacteria that can produce toxins are called Harmful Algal Blooms (HABs). Unfortunately, previous monitoring of HABs has detected cyanotoxins in some Maine lakes. There is a growing concern in Maine that HABs may become more common as lake temperatures reach new highs due to extended growing seasons and warmer air temperatures. In addition, the intense storms are becoming more common and can deliver nutrient-rich stormwater to lakes.



Over the previous decade, the SWAT focus has primarily been on microcystin. Over the next few years, we intend to gather data on other cyanotoxins, including anatoxin, saxitoxin and BMAA, in partnership with EPA Region I's lab (Chelmsford, MA), Bigelow Labs, lake management NGOs and volunteers.

Monitoring HABs (Coordinator: Linda Bacon)

Monitoring	Analytes
Collect and analyze water samples associated with HABs	Cyanotoxins

Are Maine's freshwater resources sufficiently clean to support healthy aquatic life communities?

Maine is fortunate to have many clean and high-quality streams, rivers, lakes, ponds, and wetlands. The primary way that DEP determines if freshwater resources are clean enough to support healthy aquatic life communities is to monitor the aquatic organisms themselves. DEP's Biological Monitoring Unit collects samples of aquatic macroinvertebrates, which are animals without backbones that can be seen without the aid of magnification, such as mayflies, stoneflies, caddisflies, snails, and mussels. Waterbodies impacted by toxics typically have macroinvertebrate assemblages that are distinctly different than assemblages found in clean waterbodies, with less diversity and fewer species that are sensitive to pollution. After identifying waterbodies with potential impacts from toxics, DEP staff may do additional monitoring to diagnose what is harming the macroinvertebrate assemblages. A variety of toxic chemicals can harm aquatic life, such as certain metals, petroleum products, pesticides, and chloride from road salt.

Biological assessments (Coordinator: Jeanne DiFranco)

Monitoring	Taxonomic Group
Biological assessments of streams and rivers with rocky or sandy substrate	Aquatic macroinvertebrates (method: rock bags, baskets, or cones)
Biological assessment of wetlands with marsh habitat, including marshes associated with lakes, ponds, and low-gradient streams	Aquatic macroinvertebrates (method: dip net sweeps)

In addition to directly monitoring aquatic macroinvertebrates, DEP sometimes collects water or sediment samples to screen for toxics that could harm fish and other aquatic life. These monitoring efforts could be in response to a chemical spill or a fish kill. In other circumstances, DEP may collect water samples to screen for emerging contaminants, such as neonicotinoid pesticides or 6PPD-quinone associated with automobile tires.

Monitoring toxics in freshwater systems (Coordinators: Tom Danielson and Linda Bacon)

Monitoring	Analytes
Collect and analyze water samples to determine if concentrations of certain chemicals could harm fish and other aquatic life	6PPD quinone, petroleum products, pesticides, microplastics, metals
Collect water and/or sediment samples in response to chemical spills or fish kills	To be determined