EPA United States Environmental Protection Agency

Fish and Shellfish Program NEWSLETTER

September 2023
EPA 823N23005

In This Issue

https://www.epa.gov/fish-tech

Recent Advisory News

The North Carolina Department of Health and Human Services (NCDHHS) Recommends Limiting Fish Consumption from the Middle and Lower Cape Fear River Due to Contamination With "Forever Chemicals"

NCDHHS is recommending limits on consumption of certain freshwater fish from the middle and lower Cape Fear River based on concerns about exposure to perfluorooctane sulfonic acid (PFOS) found in fish sampled from that area.

On July 13, 2023, NCDHHS recommended limits on consumption of certain freshwater fish from the middle and lower Cape Fear River based on concerns about exposure to PFOS found in fish sampled from that area. PFOS is part of a group of chemicals called per- and polyfluoroalkyl substances (PFAS), often called "forever chemicals" because they do not break down in the environment. The recommendations are based on newly available data and information from the U.S. Environmental Protection Agency (EPA). Many states provide recommendations to limit or avoid eating certain fish due to PFAS.

Fish advisories are issued to help people weigh for themselves the value of eating fish with the risks of pollutants fish absorb from their environment. Fish are an important source of nutrition for many North Carolinians and a good way to get lean, high-quality protein as well as healthy fats, vitamins, and minerals. Some of those benefits include supporting brain development in children and improved heart health.

PFAS are an emerging public health concern with multiple potential sources of exposure, including contaminated drinking water and food, indoor dust, some consumer products, and workplaces. Exposure to PFAS from fish may be higher among communities that catch and eat fish frequently. Studies have linked PFAS to several health effects, particularly after long-term exposure. These include negative effects on growth, learning and behavior in children; reduced chances of getting pregnant; impaired thyroid function; increased cholesterol levels; decreased immune system response; and increased risk of certain types of cancer, including testicular and kidney cancer; increased cholesterol levels; decreased immune system response; and increased risk of certain types of cancer, including testicular and kidney cancer.

"Studies have documented the many benefits of eating fish," said Dr. Elizabeth Cuervo Tilson, State Health Director and NCDHHS Chief Medical Officer. "We want residents to have these recommendations so they can make informed decisions about fish consumption, particularly if they regularly catch and eat fish from this part of the Cape Fear River."

Advisories for specific fish species and groups of people are listed in the table below. Advisory limits are lower for women of childbearing age, pregnant women, nursing mothers, and children since these groups may be more sensitive to health effects from PFAS exposure.

Freshwater Species	Advisory for Women of Childbearing Age (15 to 44 years), Pregnant Women, Nursing Mothers and Children
American Shad, Blue Catfish, Channel Catfish	**No more than 1 meal per year,** combined across all species.
Bluegill, Flathead Catfish, Largemouth Bass, Striped Bass, Redear	**Do not eat**

Freshwater Species	Advisory for All Other Individuals
American Shad, Blue Catfish, Channel Catfish	**No more than 7 meals per year,** combined across all species.
Bluegill, Flathead Catfish, Largemouth Bass, Striped Bass, Redear	**No more than 1 meal per year,** combined across all species.

To better understand the levels of PFAS in fish in the middle and lower Cape Fear River, the North Carolina Department of Environmental Quality (NCDEQ) and the North Carolina Wildlife Resources Commission (NCWRC) collected and tested fish from the species that are most frequently caught and consumed in North Carolina based on surveys by the NCWRC.

PFAS were found in all species tested. Levels of PFOS were higher in Bluegill, Flathead Catfish, Largemouth Bass, Striped Bass, and Redear. Levels were lower in American Shad, Blue Catfish and Channel Catfish. The PFOS concentrations were similar to those measured in fish from other states, based on recent data from the EPA. North Carolina also has existing fish advisories related to mercury and other contaminants.

Other states, like Michigan, Wisconsin, and Pennsylvania, also have site-specific PFAS fish advisories. These advisories range from "do not eat" to one meal per week. The new North Carolina advisories are lower than many other states.

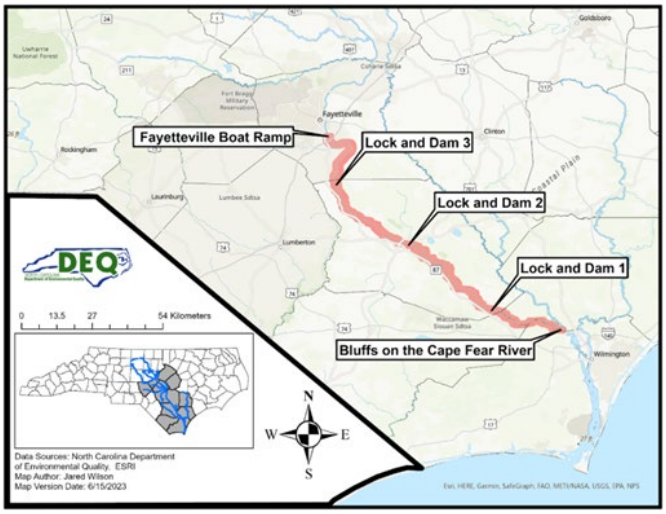
"Communities in the middle and lower Cape Fear Region have been requesting information about PFAS in fish since GenX was found in the river," said Dr. Zack Moore, NCDHHS State Epidemiologist. "There are no easy answers, but we hope this information will help residents make the best decisions for themselves and their families."

People with concerns about possible health effects of PFAS exposures can use the NCDHHS Clinician Memo to discuss these concerns with their health care provider. Since PFAS are present at low levels in many food products

and in the environment, you probably cannot prevent PFAS exposure altogether. However, you can take steps to reduce your risk of exposure. See more information here: https://www.atsdr.cdc.gov/pfas/resources/pfas-faqs.html.

NCDHHS works with local health departments and community-based organizations to help share information about PFAS in fish. This information is posted on the NCDHHS fish consumption advisories webpage, along with information about the sampling plan and the levels of PFAS that were found. This information will be updated as additional data becomes available.

Across the country, scientists are working to learn more about PFAS and their impact on health. NCDHHS will continue working with NCDEQ, local health departments, academic researchers, community partners, and others to respond to community concerns about PFAS. For more information regarding state efforts to address PFAS, please visit the NCDHHS PFAS webpage and the NCDEQ PFAS webpage.



A map of the middle and lower regions of the Cape Fear River, N.C., annotated to highlight the region covered by the PFOS fish consumption advisory, which is bounded by the Fayetteville Boat Ramp and the Bluffs on the Cape Fear. The map was created by Jared Wilson (NCDEQ) using ArcPro (ESRI). *(Photo courtesy of NCDHHS)*

FAQs about these recommendations can be found here: **English**, **Spanish**.

For more information, contact Crystal Lee at Crystal.LeePow@dhhs.nc.gov.

Source: https://www.ncdhhs.gov/news/press-releases/2023/07/13/ncdhhs-recommends-limiting-fish-consumption-middle-and-lower-cape-fear-river-due-contamination

State Updates Fish Consumption Guidance for Two Twin Cities Metro Water Bodies

On July 31, 2023, the Minnesota Department of Health (MDH), with support from the Minnesota Department of Natural Resources (MDNR) and the Minnesota Pollution Control Agency (MPCA), recommended that certain people avoid eating fish caught in two water bodies in the Twin Cities metro area, due to new data showing a mixture of pollutants including per- and polyfluoroalkyl substances (PFAS) in the fish.

The affected water bodies are the Mississippi River from the Ford Dam in St. Paul to Hastings Dam (known as Pool 2) and Lake Rebecca near Hastings. People who should avoid eating fish from these locations include children under age 15, people who are or could become pregnant and those who are breastfeeding or plan to breastfeed.

Prior guidance for these water bodies recommended not eating certain types of fish due to polychlorinated biphenyls (PCBs) and mercury (see Waterbody Specific Safe-Eating Guidelines on the Fish Consumption Guidance page). Mercury and PCBs have been detected in fish in Minnesota for decades, but new data on the presence of many types of PFAS prompted state officials to update the guidance.

"The updated fish consumption guidance for Lake Rebecca and Pool 2 applies only to higher risk populations at this time," MDH Assistant Commissioner Dan Huff said. "It's important to note that with PFAS, the risk is based on long-term exposure, not the kind of short-term exposure you might have from a few meals."

PFAS are a family of human-made chemicals that have been widely used for decades and do not break down in the environment. Over time, PFAS can build up in a person's body. Children's immune systems are most sensitive. Exposure to some PFAS is associated with certain types of cancer.

Huff noted fish are a source of low-fat protein, and the omega-3 fatty acids found in fish may promote heart and overall health. While there are health benefits to eating fish, there can be risks associated with eating certain amounts of fish from certain lakes and waterways. Minnesota's fish consumption guidance helps people lower their exposure to contaminants in fish while still getting the health benefits of eating fish.

"Even with the new recommendations, fishing can still be enjoyed at Lake Rebecca and Pool 2 on a catch-and-release basis," said MDNR Regional Fisheries Manager Brian Nerbonne. "Here in the land of 10,000 lakes, there are plenty of places to fish, so people who do want to eat the fish they catch can find alternative water bodies. Our Fishing in the Neighborhood guide lists opportunities in the surrounding area where people can fish close to where they live."

A few alternative places to fish in the metro area include the Lower St. Croix River (south of Stillwater), Lake Nokomis, Rogers Lake, Bald Eagle Lake, and White Bear Lake.

In 2023 the Minnesota Legislature passed, and Governor Tim Walz signed a comprehensive ban on PFAS in products Minnesotans use. It bans all non-essential use of PFAS and requires manufacturers selling products in Minnesota to disclose if PFAS are present.

MDH, MDNR, and MPCA work together on efforts to monitor water quality and chemicals in fish tissues statewide and update fish consumption and other guidance as new data becomes available. The state's goal is to provide Minnesotans with the information they need to make informed choices for the health and safety of their family.

For more information, see MDH's Fish Consumption Guidance, the MDNR's LakeFinder, or Fishing in the Neighborhood guide.

For more information, contact Amy Barrett at amy.barrett@state.mn.us.

Source: https://www.health.state.mn.us/news/pressrel/2023/fish073123.html

EPA News

EPA Proposed to Establish First-Time Clean Water Act Protections for Over 250 Tribes

EPA's proposed baseline water quality standards (WQSs) would usher in new Clean Water Act (CWA) protections for Tribal Nation waterways.

On May 3, 2023, EPA announced proposed federal baseline WQSs for waterbodies on Indian reservations that do not have Clean Water Act standards, ensuring protections for over half a million people living on Indian reservations as well as critical aquatic ecosystems.

Fifty years ago, Congress established a goal in the CWA that waters should support fishing and swimming wherever attainable. All states and 47 Tribes have established standards consistent with that goal. However, the majority of U.S. Tribes with Indian reservations lack such WQSs. This proposal would extend the same framework of water quality protection that currently exists for most other waters of the United States to waters of over 250 Tribes and is the result of decades of coordination and partnership with Tribes.

"President Biden has made it clear; all people deserve access to clean, safe water. Today's proposal is a monumental step forward in our work with Tribal governments to ensure precious water resources are protected," **said EPA Administrator Michael S. Regan**. "Establishing federal baseline WQSs, and implementing them in consultation with Tribal governments, will help support Tribes' interests in protecting and improving waters that are essential to thriving communities, vibrant ecosystems, and sustainable economic growth."

If finalized, this proposal would safeguard water quality on Indian reservations until Tribes are able to adopt their own CWA standards for their water bodies. EPA estimates this proposed WQS will increase protections for 76,000 miles of rivers and streams and 1.9 million acres of lakes, reservoirs, and other open surface waters within Indian reservations, protecting aquatic life and the health of over half-a-million residents living within reservation boundaries.

WQSs define the goals for the condition of a water body by (1) designating its uses, such as fishing and swimming, (2) establishing maximum levels (or water quality "criteria") for pollutants that protect those uses, and (3) outlining policies that protect water quality from degradation. The proposed baseline WQS would provide a common set of designated uses, criteria, and antidegradation policies for Tribal waters, with certain built-in flexibilities to enable EPA to tailor the standards where needed to best protect local circumstances.

This proposal carries out the commitments to honor the federal trust responsibility and protect Tribal water resources outlined in EPA's 2021 action plan, Strengthening the Nation-to-Nation Relationship with Tribes to Secure a Sustainable Water Future. It also delivers on the Biden-Harris Administration's commitment to uphold the United States' treaty and trust responsibilities to the 574 federally recognized Tribes.

"The National Tribal Water Council fully supports federal baseline WQS for all of Indian country not already covered by tribal WQS (TWQS)," **said Ken Norton, Chairman for the National Tribal Water Council**.

"While the Council advocates for tribal environmental self-determination through TWQS, we endorse EPA's proposed rule that discharges the federal government's trust responsibility to tribes by filling longstanding regulatory gaps in Indian country, using standards that support the unique traditional and cultural uses indigenous peoples make of aquatic ecosystems."

"We, the tribal representatives of the National Tribal Caucus, are charged with identifying and addressing regional and national environmental issues that affect Tribal Nations and Alaskan Native Villages," **said Gerald Wagner, National Tribal Caucus Chairman**. "As one of the four elements of life, it is critical that Tribes and Alaskan Native Villages are provided a reasonable means to protect their water resources and ensure the protection of tribal environmental health, aquatic ecosystems, and tribal beneficial use waters. We recognize that the national baseline WQSs is one important step in ensuring the gap is closed for impaired waters to be protected, while providing the opportunity for Tribes to gain status toward establishing their own WQSs. The National Tribal Caucus welcomes this unique start in recognizing the importance of water quality in the livelihood of tribal communities and we hope to see further meaningful advancements that integrate tribal identities."

"The Navajo Nation has water quality standards that were approved under both the Navajo and federal Clean Water Acts and are supported by EPA," **said Yolanda Barney, Environmental Department Manager, Surface and Ground Water Protection Department, Navajo Nation Environmental Protection Agency**. "It is imperative that EPA continue to support tribal efforts to protect tribal waters. Working with neighboring states Arizona, New Mexico, and Utah, as well as EPA, the Navajo Nation ensures that its waters are protected from pollution to the greatest extent possible.

"The promulgation of Tribal Baseline WQS is necessary to protect tribes without federal standards from transboundary pollution released from off-reservation polluters and addresses EPA's duty to fill the regulatory water quality protection gaps in Indian country," **said Michael Bolt, Vice-Chair of the National Tribal Water Council and Water Quality Section Supervisor, Eastern Band of Cherokee Indians**.

"The Poarch Band of Creek Indians, the only federally recognized Tribe in Alabama, has developed a robust surface water quality-monitoring program throughout the last decade," **said Stephanie A. Bryan, Tribal Chair and CEO, Poarch Band of Creek Indians**. This program has helped our Tribe defend its lands and waters, but we also recognize not all Tribes have had this same opportunity. The Poarch Band of Creek Indians support any attempt to develop National WQSs to help Tribes safely preserve and protect their water rights now and into the future."

"I appreciate that EPA recognizes that most tribes do not have WQS in place. This baseline will provide protection for fish, wildlife and tribal communities that depend on clean water," **said Russell N. Hepfer, Vice Chairman, Lower Elwha Tribal Community**. "Each tribe is unique, most not having the programs or funding to ensure the baseline is met. Moving forward, EPA should consult with and support tribes with funding for implementation and enforcement."

The Agency will accept comments on this proposal for 90 days. EPA will also hold two online public hearings on this proposal. Learn more about the proposed rule and public hearings.

Background

WQS define the water quality goals for a waterbody and provide a regulatory basis for many actions under the CWA, including developing water quality-based effluent limits in National Pollution Discharge Elimination System (NPDES) permits for point-sources; performing CWA section 401 certifications of federal licenses and permits; and reporting on water quality conditions and designated uses attainment.

For more information, contact the EPA Press Office at press@epa.gov.

Source: https://www.epa.gov/newsreleases/epa-proposes-establish-first-time-clean-water-act-protections-over-250-tribes

One Health Assessment: Fish Returning to the Penobscot River

Penobscot River. (*Photo courtesy of U.S. EPA*)

On November 29, 2022, EPA reported that after nearly 200 years, striped bass, American shad, rainbow smelt, river herring, and other fish species have finally returned to Maine's Penobscot River. In 2004, a collaborative trust formed by Tribal, state, non-governmental organizations and federal partners began an effort to restore fisheries in the river by removing some of the dams that blocked the passage of migratory fish species. The Great Works and Veazie Dams had blocked the river for nearly 200 years before their removal in 2012 and 2013, allowing fish to finally return after centuries. Migratory fish, such as bass, shad, and smelt, that spend most of their lives in saltwater but spawn in freshwater, are known as anadromous fish. Dam removals, along with other river restoration practices, have allowed anadromous fish species to return to Penobscot Reservation waters, home of the Penobscot Indian Nation ("Nation"). However, with the return of the fish came the concern of whether they carry contaminants that may pose various health concerns to tribal members and wildlife.

The Penobscot River is of great importance to members of the Nation, whose culture, livelihood, and traditional ecological knowledge are linked to the Penobscot River watershed, as are their traditional practices such as fishing, hunting, and gathering plants for food and medicine. Over the years, the Nation's ability to continue its traditional practices and exercise its fishing rights has been greatly diminished by the presence of hydroelectric dams and contaminants in local fish species. The removal of these dams and the return of anadromous fish has been of particular importance to the Nation, but there are concerns that the fish may carry harmful contaminants, such as mercury, which can pose a health hazard to Nation members who consume them regularly.

The Agency for Toxic Substances and Disease Registry (ATSDR) issued recommendations to limit consumption of resident fish (i.e., fish that are not anadromous) from Penobscot waters because of elevated contaminant levels of inorganic and organic compounds. However, at the time, contaminant levels of anadromous species had yet to be researched.

EPA researchers collaborated with the ATSDR and the Nation to gain a better understanding of the contaminant levels in anadromous fish. Anadromous fish species do not feed during spawning, which causes their bodily contaminant levels to differ from local fish species. The research team collected American shad, striped bass, alewife, rainbow smelt, blueback herring, and sea lamprey at the Milford Dam fish lift and at downstream locations along the Penobscot River. The team analyzed the fish samples for multiple contaminants, including mercury, dioxin, furan, polybrominated diphenyl ethers (PBDEs), PCBs, and PFAS. Researchers found that the shad, rainbow smelt, striped bass, and sea lamprey samples contained levels of mercury that could pose a health concern for young children and pregnant women and could interfere with a child's cognitive development. Rainbow smelt and striped bass from the Penobscot River could also pose a risk to nervous system health in children and adults who consume them daily. The dioxin, furan, and PCB levels found in the majority of samples pose potential health risks to children and adults, including immune system effects. ATSDR also concluded that levels of PFAS in sea lamprey, striped bass, blueback herring, and shad roe might lead to adverse health effects. Researchers further concluded that Nation members should not eat any of the anadromous fish sampled in this research due to the high levels of different contaminants that may cause harmful effects, including a significantly increased risk for liver cancer.

Fish from the Penobscot River are also consumed by wildlife. The research team implemented a One Health Approach, which not only takes human risk into account, but also considers the interconnectedness with wildlife and environmental health. Several species depend on the Penobscot River for survival. Researchers calculated the impact of the contaminants on wildlife by converting the fish fillet samples to whole fish concentrations and comparing them to wildlife values. The mercury, PCBs, and PFAS levels found in rainbow smelt, striped bass, and sea lamprey put animals who consume them at risk, including mink, otters, and eagles.

Fish advisories aim to reduce the exposure risk of Nation members and also provide information used to assess the sustainability of a traditional Penobscot diet. Acknowledging the impacts of the contaminants studied on wildlife is extremely important in understanding the health of the ecological system. Due to dioxin levels detected in fish, the research team recommended that Nation members not consume any of the anadromous fish described in the assessment. The ATSDR provided the Penobscot Indian Tribal Council with a health consultation containing these recommendations, as well as the complete results of the research. The results of this study are being used by the Nation to update their Wild Foods brochure, fish consumption advisories, their E-newsletter, and website. The findings will also inform the review and/or development of water quality standards that will help protect tribal practices.

EPA Region 1 scientists are conducting ongoing research involving Tribal groups, such as the Nation, to understand their exposure to PCBs in waterbodies. Another project is utilizing eDNA technology to enhance surveillance of tribal aquatic resources in both marine and fresh water.

"Research to determine contaminant levels in fish is a critical effort for the Penobscot Nation, as with other Wabanaki Tribes. Many of our tribal members continue to practice a sustenance lifestyle which includes consumption of fish from our reservation waters. The Penobscot Nation is grateful for the work undertaken by this dedicated team of professionals to help the tribe better understand contaminant levels in our migratory fish populations," said John S. Banks, Director of Department of Natural Resources Penobscot Nation.

For more information, contact U.S. EPA Science Matters at https://www.epa.gov/sciencematters/forms/contact-us-about-science-matters.

Source: https://www.epa.gov/sciencematters/one-health-assessment-fish-returning-penobscot-river

EPA Released IRIS Toxicological Reviews for Multiple PFAS

On July 24, 2023, EPA announced the release of the draft document, IRIS Toxicological Review of Perfluorodecanoic Acid (PFHxS), for a 60-day public comment period, which closed on September 22, 2023. The comments on the Interagency Science Consultation Draft were also released. [Federal Register Notice Jul 24, 2023]

On April 10, 2023, EPA announced the release of the Toxicological Review of Perfluorohexanoic Acid (PFHxA) and Related Salts. EPA has updated the IRIS Database to reflect the release of the finalized assessment. The comments on the Interagency Science Discussion Draft were also released.

On April 10, 2023, EPA also announced the release of the draft document, IRIS Toxicological Review of Perfluorodecanoic Acid (PFDA), for a 60-day public comment period, which closed on June 9, 2023. The comments on the Interagency Science Consultation Draft were also released. [Federal Register Notice Apr 10, 2023] These follow the December 22, 2022, announcement of the release of the IRIS Toxicological Review Perfluorobutanoic Acid (PFBA). The comments on the Interagency Science Discussion Draft were also released. [Press Release, Dec 22, 2022]

For more information, contact IRIS at https://www.epa.gov/iris/forms/contact-us-about-iris.

Source: https://www.epa.gov/iris/iris-recent-additions.

Other News

How the Food and Drug Administration's (FDA) Strategy Helps Ensure the Safety of Imported Seafood

On March 21, 2023, the FDA released a new report, "Activities for the Safety of Imported Seafood," which outlines the comprehensive approach that the FDA is taking to help ensure the safety of imported seafood, augmenting existing oversight tools with smarter, more efficient technologies and processes.

About 94% of the volume of seafood sold in the U.S. is imported from other countries. According to recent federal data, the U.S. imports seafood from more than 144 countries or territories and about 10,000 exporting food facilities, as well as aquaculture farms. Shrimp accounts for the greatest percentage of these imports, followed by salmon and tuna. The FDA requires that imported foods meet the same safety standards as those produced by domestic farms and facilities.

The release of the report evolves from the FDA Food Safety Modernization Act (FSMA) which contains provisions to enhance imported food safety, and the New Era of Smarter Food Safety blueprint. Both build on the agency's commitment to ensure that consumers can have confidence in the safety of their foods no matter where in the world they are produced.

Four Goals for Imported Seafood

The new seafood report builds on the FDA's Strategy for the Safety of Imported Food (Import Strategy) that describes the tools and authorities the FDA uses in the foreign food-production arena. The seafood report is shaped by the four goals introduced in the import strategy:

1. Help ensure that imported seafood meets U.S. safety standards by optimizing inspections, ensuring that processors and importers are meeting specific requirements for fish and fishery products, utilizing the results of reliable food safety audits, leveraging the oversight efforts of foreign regulators, and facilitating training and awareness of the FDA's seafood safety requirements.

2. Strengthen the FDA's surveillance at the border to intercept unsafe seafood. A key element of this work involves the use of predictive analytics for import screening and includes a pilot program using artificial intelligence, specifically machine learning, to improve the targeting of unsafe seafood at the border.

3. Respond rapidly and effectively to unsafe imported seafood. Actions the FDA is taking include the efforts of the Coordinated Outbreak Response and Evaluation network, the Foodborne Outbreak Response Improvement Plan, the Prevention Strategies, and the Food Traceability Final Rule and communications with states utilizing networks such as the Interstate Shellfish Sanitation Program.

4. Improve the effectiveness and efficiency of the seafood import program by developing a global inventory of seafood facilities and aquaculture farms and developing new metrics to measure success.

The Complexity of the Global System

The wide range of known and emerging microbiological and chemical hazards that may impact seafood adds to the complexity of oversight. Since many hazards are introduced at the source – in growing areas, in aquaculture farms, and on fishing vessels – this presents a unique challenge and opportunity to prevent seafood contamination.

The report notes that increases in global aquaculture production make oversight more complicated. The National Oceanic and Atmospheric Administration reports that global aquaculture production almost doubled over the past decade. Potential hazards are unique because aquaculture is vulnerable to the impact of changing environmental conditions and stress factors that make fish more susceptible to diseases.

The agency employs a range of tools to ensure the safety of imported seafood. These include inspections of foreign processing facilities, sampling of seafood offered for import, domestic surveillance sampling of imported products, inspections of seafood importers, and assessments of foreign country food safety programs.

Most of the agency's activities outlined in this report focus on prevention. However, the FDA places just as much importance on enhancing the speed, effectiveness, coordination, and communication of outbreak investigations if unsafe seafood enters the United States.

The global food system is constantly evolving, including the production and delivery of imported seafood. The FDA is also evolving, implementing a new vision for the foods program that will help the agency keep pace with the times, supporting improvement and innovation that will benefit consumers while helping to ensure that these advances are producing safe foods for U.S. consumers and around the world.

Source: https://www.fda.gov/news-events/fda-voices/how-fdas-strategy-helps-ensure-safety-imported-seafood

National Oceanic and Atmospheric Administration (NOAA) Fisheries Recommends $106.1 Million in NOAA Pacific Coastal Salmon Recovery Funding to Protect and Restore West Coast Salmon and Steelhead

Funding for 16 new and continuing programs and projects will support conservation efforts in California, Oregon, Washington, Idaho, and Alaska.

To support West Coast salmon and steelhead populations, on August 17, 2023, NOAA Fisheries recommended $106.1 million in funding for 16 new and continuing programs and projects through NOAA's Pacific Coastal Salmon Recovery Fund grant program. NOAA Fisheries distributes funds to states and tribes through this competitive grant program. Eligible projects include all phases of habitat restoration and protection activities to recover Pacific salmon listed under the Endangered Species Act or support Pacific salmon and steelhead species important to tribal treaty and trust fishing rights and native subsistence fishing. Since the program's inception in 2000, the grant program has provided more than $1.7 billion to implement more than 15,000 salmon recovery projects. NOAA partners have protected, restored, and created nearly 1.2 million acres of salmon habitat and have made over 11,800 stream miles accessible to salmon and steelhead.

Wild Chinook Salmon. (*Photo courtesy of the U.S. Fish and Wildlife Service National Digital Library*)

"This targeted funding could not come at a more crucial time," said Jennifer Quan, Regional Administrator in NOAA Fisheries West Coast Region. "With climate change exerting increasing impacts, we are proud to partner with states, tribes and communities to reopen and restore the habitat that affords salmon the resilience they need to survive and thrive. We will work together to make the most of these dollars to do the most good for salmon."

In fiscal year 2023, NOAA recommends $64.2 million in annual appropriation funding, including $34.4 million under the Bipartisan Infrastructure Law and $7.5 million under the Inflation Reduction Act, for 16 new and on-going salmon recovery programs and projects. Recipients include the states of Alaska, Washington, Idaho, Oregon, and California and federally recognized tribes of the Columbia River and Pacific Coast (including Alaska) or their representative tribal commission or consortia. The amount of each recommended award is in parentheses at the end of each paragraph.

“We're very happy to be able to provide more funding to bolster salmon science and management in Alaska,” said NOAA Fisheries Alaska Regional Administrator Jon Kurland. “The additional recommended funding for our state and tribal partners is an important boost that will support sustainable salmon populations and Alaska Native subsistence fishing opportunities.”

Alaska

The **Alaska Department of Fish and Game’s** Alaska Sustainable Salmon Fund will support projects necessary to maintain healthy salmon populations as well as protect and restore their habitats. Projects funded include the protection of water quantity and quality, land conservation, fish passage improvements, removal of invasive species, instream restoration, and monitoring of salmon populations utilized for native subsistence fishing. ($6,800,000)

The **Arctic-Yukon-Kuskokwim Consortia** which consists of the Association of Village Council Presidents, Tanana Chiefs Conference, and Kawerak, Inc., will support salmon populations within the resource dependent region through the Arctic-Yukon-Kuskokwim Tribal Research and Restoration Program. Information from high-priority monitoring and applied research projects will contribute to an improved understanding by management agencies of the complex relationships between salmon and their freshwater, nearshore, and marine environments; and improved management and recovery of declined salmon populations to better provide sustainable harvest opportunities for subsistence uses. ($2,000,000)

The **Qawalangin Tribe of Unalaska** will monitor sockeye and pink salmon escapement before contamination removal and research methods to remove solid waste from Unalaska Lake and Iliuliuk Creek. The Qawalangin Tribe of Unalaska is a new grant recipient. ($1,382,053)

Washington

Washington's Salmon Recovery Funding Board through the **Washington Recreation and Conservation Office** (WRCO) will continue its efforts to recover federally listed salmon statewide and support the exercise of treaty fishing rights by addressing the state’s highest salmon recovery needs. WRCO anticipates funding up to 110 discrete habitat projects with the Pacific Coastal Salmon Recovery Fund (PCSRF) and non-federal match funding. In addition to habitat restoration projects, WRCO will fund and support the Washington Department of Fish and Wildlife and the Northwest Fisheries Indian Commission hatchery reform efforts, which are a crucial component to salmon recovery and supporting the exercises of tribal treaty fishing rights. Finally, biologists will conduct status and trends monitoring, validation monitoring, and statewide project effectiveness monitoring to track progress and fish response at a watershed scale. ($25,500,000)

The Northwest Fisheries Indian Commission, as a support organization to 20 Puget Sound and Washington coastal treaty tribes, will administer sub-awards to tribes. The sub-awards will address factors limiting viability of the Endangered Species Act-listed salmon and steelhead; restore and protect habitats; conduct essential monitoring; and conduct projects that help fulfill tribal treaty fishing rights and advance recovery and conservation of salmon and steelhead. ($6,300,000)

The Confederated Tribes of the Colville Reservation will study salmon reintroduction upstream of Chief Joseph and Grand Coulee Dams in the Upper Columbia Basin. The objectives include supporting the overall effort to implement Phase 2 feasibility evaluations of trapping and transporting adult salmon to the blocked area of the Upper Columbia Basin and restoring native subsistence fishing in an area deprived of salmon for more than 80 years. ($620,659)

The Cowlitz Indian Tribe will address limiting factors for Lower Columbia fall Chinook (threatened), Columbia River chum (threatened), Lower Columbia coho salmon (threatened) and winter steelhead by providing fish passage to Cabin and Johnson Creeks, within the Grays River watershed. The recovery plan identifies the Grays River subbasin as one of the most promising areas for salmon recovery among Washington coastal subbasins. The Cowlitz Indian Tribe will also increase their Natural Resource Department capacity to engage in regional salmon and steelhead recovery planning and coordination and project development and implementation. ($3,609,081)

Idaho

The Idaho Pacific Coastal Salmon Recovery Program administered by the **Idaho Governor's Office of Species Conservation** will fund projects that are compatible with the Columbia Basin Collaborative sustainability goals including enhancing the availability and quality of salmon habitats, improving management practices, and addressing major habitat limiting factors. The vision for the Idaho Program is to have delisted Snake River salmon and steelhead stocks that indicate clean and abundant water, reliable and clean energy, a robust economy, and vibrant cultural and spiritual traditions—all of which exist within sustainable ecosystems. ($9,000,000)

The Coeur d'Alene Tribe will gather baseline data to inform the full-scale feasibility of salmon reintroductions upstream of Chief Joseph and Grand Coulee dams by studying the downstream movement and survival of juvenile Chinook salmon. ($575,000)

The Shoshone Bannock Tribes will implement two projects:

- The Cultural and Subsistence Fishery Monitoring and Management Program will use PCSRF funds to participate in fishery forecasting and in-season management of tribal fisheries on Snake River spring/summer Chinook salmon.

- The Shoshone Bannock Tribe will restore and enhance Panther Creek, a tributary of the Salmon River, by addressing limiting factors for Snake River spring/summer Chinook salmon. ($440,793)

Oregon

The **Oregon Watershed Enhancement Board** will fund projects that help achieve salmon recovery goals across Oregon by distributing funding to high-priority salmon recovery actions. The board will also provide funding to the

Oregon Department of Fish and Wildlife to support several salmon recovery programs that are integral to the Oregon Plan and that align with the PCSRF program goals. ($20,200,000)

The **Columbia River Inter-Tribal Fish Commission**, as a support organization to the four Columbia River treaty tribes, will administer sub-awards to its member tribes based on high-priority needs for salmon in tribal ceded areas. Funded projects include all aspects of salmon recovery including planning and design, implementation, monitoring, and research. ($5,298,826)

The **Cow Creek Band of Umpqua Tribe of Indians** will restore 2.3 miles of habitat for threatened Oregon Coast coho salmon by replacing a failing culvert and in-stream and riparian habitat restoration in the West Fork of Canyon Creek, a tributary to the Umpqua River. This project will improve habitat complexity and passage on land administered by the Cow Creek Umpqua Tribe for salmon. ($2,269,259)

The **Confederated Tribes of Siletz Indians** will implement Phase 4 of the Siletz River Restoration project constructing large wood structures on 1.5 miles of the lower Siletz River, the Tribe's first efforts to install large wood structures in a tidal zone. The addition of large wood structures will promote habitat complexity that increases the availability and quality of habitat for Oregon Coast coho salmon. ($499,252)

California

The Fisheries Restoration Grant Program through the **California Department of Fish and Wildlife** will fund salmon and steelhead projects throughout California focused on large-scale, process-based habitat restoration projects that sustain natural ecosystem functions and processes. The objectives include the improvement of spawning success of adult salmon and steelhead, and increased the health and survival of all life stages of salmon and steelhead. ($18,600,000)

The **Klamath River Inter-Tribal Fish and Water Commission**, as a support organization to four federally recognized tribes in the Klamath Basin, will administer sub-awards to its member tribes to conduct habitat restoration activities, monitoring, and research. ($2,559,180)

For more information, contact the NOAA West Coast Regional Office at (503)-230-5400.

Source: https://www.fisheries.noaa.gov/feature-story/noaa-fisheries-recommends-1061-million-noaa-pacific-coastal-salmon-recovery-funding

NOAA Fisheries Releases National Seafood Strategy

The strategy highlights the vital services NOAA provides to support the seafood sector and outlines ways NOAA can enhance its resilience in the face of climate change and other stressors.

On August 9, 2023, NOAA Fisheries released its first-ever National Seafood Strategy (PDF, 8 pages) after several rounds of stakeholder input and a public comment period earlier this year. The strategy underscores NOAA's strong commitment to seafood sector resilience and aligns with the Biden-Harris Administration's goals for economic recovery, environmental sustainability, and climate resilience. Further, the White House Conference on Hunger,

Nutrition, and Health points to the need for increased seafood consumption in the United States, which this strategy aims to address.

The strategy also responds to the unprecedented challenges facing the U.S. seafood industry, including climate change, the coronavirus pandemic, new technologies and other ocean uses, significant labor shortages, and aging infrastructure.

NOAA's Vision for Resilience

The National Seafood Strategy outlines NOAA Fisheries' direction for supporting a thriving domestic U.S. seafood economy. It describes our approach to enhancing the resilience of the seafood sector in the face of climate change and other stressors.

(Photo courtesy of NOAA Fisheries)

NOAA's vision is to ensure that:

- U.S. seafood continues to be produced sustainably
- The U.S. seafood sector contributes to the nation's climate-ready food production and to meeting critical domestic nutritional needs
- U.S. seafood production increases to support jobs, the economy, and the competitiveness of the U.S. seafood sector
- Supply chains and infrastructure are modernized with more value-added activity in the United States
- Opportunities are expanded for a diverse and growing seafood workforce

NOAA plans to achieve its vision by focusing on four goals:

1. Maintain or increase sustainable U.S. wild capture production
2. Increase sustainable U.S. aquaculture production
3. Foster access to domestic and global markets for the U.S. seafood industry
4. Strengthen the entire U.S. seafood sector

Public Input was Critical

Public comments and stakeholder input were integral to finalizing the strategy and helping guide the direction of NOAA work to support the seafood sector. NOAA received more than 150 separate comments, about a quarter of which were from organizations, including fishing, aquaculture, and seafood associations, non-profits, non-governmental organizations, aquariums, and state agencies. In addition, five regional fishery management councils provided comment letters. Many of the comments were used to strengthen and improve the strategy, particularly to

clarify phrases or context, such as adding descriptions of other agency strategies and policies. One significant change from the draft is the addition of an Equity and Environmental Justice objective under Goal 4.

The National Seafood Strategy will reinforce NOAA Fisheries' critical science and management support to the seafood sector. Stakeholders recognize that the science conducted by the agency to support management of wild capture fisheries and seafood farming is essential for the well-being of the U.S. seafood sector. The industry needs NOAA Fisheries and other federal agencies to provide more support for and attention to adaptation to climate change, changing markets, and new ocean uses; new domestic sources of seafood supply (wild capture and aquaculture); fair trade; workforce development; and recapitalizing and modernizing seafood infrastructure.

Some comments were beyond the scope of this strategy or more relevant to implementation actions for specific programs or regions. These types of comments will be considered as NOAA develops the implementation plan, which is being developed by an internal working group comprising staff from headquarters, regional offices, and science centers.

For more information, contact the NOAA Fisheries Office of Communications at (301)-427-8531 or kate.naughten@noaa.gov.

Source: https://www.fisheries.noaa.gov/feature-story/noaa-fisheries-releases-national-seafood-strategy

PFAS Chemicals Detected in Many Rivers and Streams Across Pennsylvania

U.S. Geological Survey (USGS)-led study also analyzed potential contaminant sources.

On August 22, 2023, water samples from 161 Pennsylvania rivers and streams were tested for 33 different PFAS and 76% of the studied streams contained at least one of these chemicals.

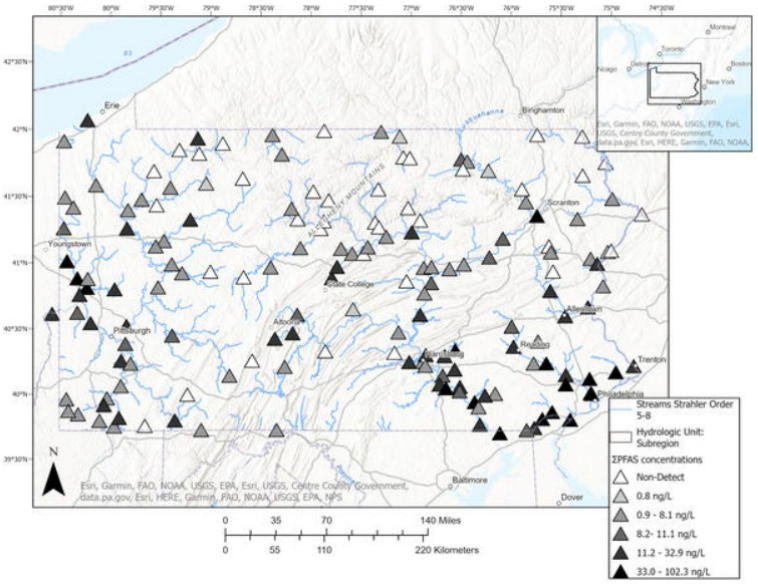
This information comes from a recently published USGS-led study, which was conducted in partnership with the Pennsylvania Department of Environmental Protection. The study can be used by local, state, and federal agencies working to reduce PFAS exposure in wildlife and the public and could benefit millions of Pennsylvanians that use public drinking water sourced from rivers and streams.

Often referred to as "forever chemicals," PFAS are a group of more than 12,000 synthetic chemicals used in a wide variety of common applications, from the linings of fast-food boxes and non-stick cookware to fire-fighting foams and other purposes. High concentrations of some PFAS may lead to adverse health risks in people, according to EPA. Their persistence in the environment and prevalence across the country make them a unique water-quality concern.

The water samples containing PFAS were also analyzed to determine the possible sources of these environmentally persistent chemicals. Authors of the study were able to determine electronics manufacturing and water pollution control facilities were top PFAS sources in urban areas of Pennsylvania, while combined sewage overflows located near oil and gas development were possible sources in rural areas across the state.

"This is the first statewide study that associates electronics manufacturing as a source of PFAS in streams, which is likely an under recognized, but significant source of PFAS contamination," said Sara Breitmeyer, a USGS chemist and lead author of the study.

The study can help inform decision makers of which surface waters in the Keystone State may need further monitoring.



This map shows 161 sites across Pennsylvania that were sampled for PFAS concentrations. The color coding indicates PFAS concentration levels at each site. (*Photo courtesy of USGS*)

"The sources of environmental PFAS contamination are starting to be better understood thanks to studies like this," said Breitmeyer. "Our study contributes new information on PFAS sources to surface water in Pennsylvania, which will help regulatory agencies address the growing concerns of PFAS's ecological and human health impacts across the state."

The full study can be found here: https://www.sciencedirect.com/science/article/pii/S0048969723027821?via%3Dihub.

To learn about ways to help limit PFAS exposure, visit: https://www.epa.gov/pfas/meaningful-and-achievable-steps-you-can-take-reduce-your-risk.

For more information, contact Sara Breitmeyer (Chemist) at sbreitmeyer@usgs.gov or Jason Burton (Public Affairs Specialist) at jburton@usgs.gov.

Source: https://www.usgs.gov/news/state-news-release/pfas-chemicals-detected-many-rivers-and-streams-across-pennsylvania

Recently Awarded Research

Funding to Support Research on How Climate Change Is Affecting Fisheries in the Chesapeake Bay

New NOAA Chesapeake Bay Fisheries Research Program projects will explore how climate change is affecting Bay habitats.

On August 2, 2023, NOAA recommended $1.5 million to support six new projects that will explore the connections among climate change, habitat, and fisheries. Some of the funded projects will quantify how climate change is

affecting the habitats different Chesapeake Bay species need. Other projects will develop ways to evaluate how successful nearshore habitat restoration supports fish species and communities in the face of climate change.

New 2023 Projects

NOAA recommended funding for six new research projects:

- The Virginia Institute of Marine Science will forecast the effects of climate change on Chesapeake Bay fisheries using physiologically informed habitat models.
- The Virginia Institute of Marine Science will estimate fish density and production enhancement that happen due to restored salt marsh edge habitats.
- The Smithsonian Institution will research the migration ecology of river herring in a changing climate.

Blue crabs are just one species dealing with the effects of climate change in the Chesapeake Bay. Scientists are eager to learn more about how Bay species will be affected in the future. (*Photo courtesy of NOAA Fisheries/NOAA Chesapeake Bay Office*)

- The University of Maryland–Eastern Shore will explore the trophic role, energy densities, and fatty acids composition of forage fish—and their prey.
- The University of Maryland Center for Environmental Science will research how climate change affects striped bass recruitment in the Choptank and Patuxent rivers.
- The University of Maryland Center for Environmental Science will use time series analysis of rare events to quantify the effects of climate change on fish and shellfish.

Over the past 30 years, the average water temperature in the Chesapeake Bay has increased by 1 degree Celsius (1.8 degrees Fahrenheit). Water temperature changes are expected to affect fish abundance, distributions, spawning areas, and migratory patterns.

Changes in precipitation patterns, including more frequent intense storms, will affect salinity levels. That will affect fish species distribution and diversity. NOAA buoys and satellites provide important data to help researchers track trends, but the effects of these trends are not yet well understood. That's why we need more research on these topics.

Projects receiving these NOAA Chesapeake Bay Office Fisheries Research Program grants were selected through a competitive process. The results of this research will help inform science-based management decisions that are part of protecting and restoring important habitat.

This research will also support NOAA's efforts to advance ecosystem-based fishery management. NOAA used recommendations from fishery and resource managers to develop the request for proposals for these grants. NOAA works to deliver the most up-to-date and relevant science to resource managers and decision makers.

At this point in the selection process, the application approval and obligation of funds is not final. Applications are being "recommended" for funding. This is not an authorization to start the project and is not a guarantee of funding.

For more information, contact the NOAA Chesapeake Bay Office at (301)-427-8600.

Source: https://www.fisheries.noaa.gov/feature-story/funding-support-research-how-climate-change-affecting-fisheries-chesapeake-bay.

Tech and Tools

USGS and Partners Deploy Autonomous Vehicles on Lake Erie to Improve Fishery Assessments

Sailing drone will circumnavigate the lake mid-July through September.

On July 16, 2023, USGS reported their use of an autonomous surface and underwater vehicles on Lake Erie from mid-July through September 2023 to improve fishery surveys across the entire lake in cooperation with several public, private, and non-profit partners in both the U.S. and Canada.

On July 14, 2023, a wind and solar-powered uncrewed surface vehicle called a Saildrone Explorer was launched on Lake Erie out of Erie, Pennsylvania. The vehicle is equipped with several environmental sensors both under and above the water, including a fisheries echosounder that uses sound to detect fish, much like a fish-finder on a fishing boat, and is operated by Saildrone, Inc. The saildrone will operate in Lake Erie's western, central, and eastern basins, circumnavigating the lake in a clockwise direction through the end of September.

"This is the first time a long-range wind powered autonomous surface vehicle will be used on Lake Erie," **said Dr. Mark DuFour, USGS Fishery Biologist**. "USGS is looking forward to working closely with Lake Erie partners on this mission to inform fishery management decisions. We encourage boaters to maintain safe distances from the saildrone to ensure that we can finish the mission."

In addition to the saildrone, a long-range autonomous underwater vehicle (LRAUV) will be deployed near Fairport Harbor, Ohio for one week in mid-September. The LRAUV is operated by the Monterey Bay Aquarium Research Institute (MBARI) and will travel at 5–15 meters depth.

"Lake Erie is home to a world class fishery and millions of lakeside residents and vacationers," **said David Nihart, Fisheries Management Chief for the Pennsylvania Fish and Boat Commission and Chair of the Lake Erie Committee**, which consists of senior fisheries managers on the lake and is organized under the Great Lakes Fishery Commission. "Monitoring Lake Erie fish populations is integral to sustainable management of the

recreational and commercial Lake Erie fishery, but fish community changes and dynamic habitat conditions often create monitoring challenges. We are excited to collaborate with the USGS to explore the use of autonomous vehicles for monitoring Lake Erie fish populations and fisheries."

Fisheries acoustic surveys on Lake Erie are conducted using diesel-powered research vessels that are relatively loud and, as a result, may impact data collected from near-surface and near-bottom fish. The saildrone and the LRAUV provide advantages for fishery research that may address these potential biases in existing fisheries acoustic surveys. Saildrones are quieter and may detect more fish swimming closer to the surface than noisy vessels which may scatter fish. The LRAUV, which operates in the middle of the water column and has sensors looking up and down, may detect bottom-dwelling and surface-dwelling fish more accurately than traditional fishery research vessels or the saildrone. Scientists will compare the data gathered using each platform to address potential sampling biases in existing surveys.

The partners will also use the autonomous vehicles to study a variety of other questions on Lake Erie, including the effect of harmful algal blooms on yellow perch in the western basin, detection of large species such as lake whitefish, burbot and lake trout in the eastern basin, and the effect of low-oxygen zones on bottom-dwelling fish in the central basin.

Partners on these studies include the Ohio Department of Natural Resources, Michigan Department of Natural Resources, The Ohio State University, New York State Department of Environmental Conservation, Ontario Ministry of Natural Resources and Forestry, and the Pennsylvania Fish and Boat Commission.

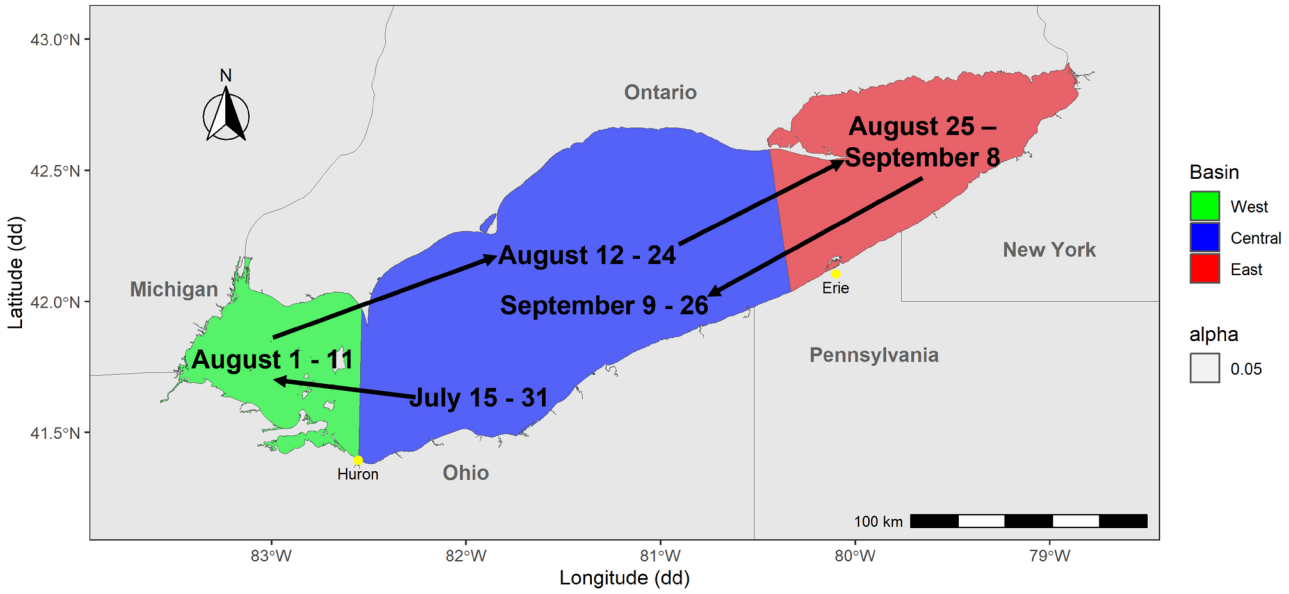
"These experiments using advanced technologies and autonomous vehicles are just one part of a multi-year effort by USGS and fishery management partners across the Great Lakes to improve fishery science in support of the $7 billion Great Lakes fishery," **said Commissioner Jim McKane, chair of the Great Lakes Fishery Commission**. "This is what 21st Century science looks like, and it's happening now here in the Great Lakes thanks to strong collaborative partnerships."

The LRAUV 'Tethys' upon retrieval after a prior mission in Lake Michigan. The LRAUV will be deployed near Fairport Harbor, Ohio for one week in mid-September, 2023. (*Photo courtesy of Peter Esselman, USGS)*

"Saildrone provides cost-effective and environmentally friendly oceanographic data collection to scientists working to protect and understand Earth's oceans and lakes. With two years of successful data collection missions in lakes Michigan, Huron, and Superior, Saildrone

is proud to continue to support USGS's data needs this year in Lake Erie and Michigan," **said Matt Womble, Sr. Director of Ocean Data Programs at Saildrone.**

Notices regarding both autonomous vehicles have been provided to mariners via the U.S. Coast Guard. The acoustic technology used in the study is not hazardous to people or animals and will not interfere with sonar, communications equipment, or similar electronics. Boaters are asked to maintain a safe distance of 1500 feet from the saildrone.



A map of Lake Erie that includes the rough dates of operation of autonomous and crewed vehicles by USGS, Saildrone, MBARI, and State and Ontario partners throughout Lake Erie during summer 2023. The sailing drone will be in the Central Basin July 15–31, then move to the Western Basin August 1–11, then east again into the Central Basin from August 12–24, then into the Eastern Basin August 25–September 8, then back to the Central Basin September 9–26 to complete the circumnavigation. (*Photo courtesy of USGS)*

For more information, contact Saildrone at jenn.virskus@saildrone.com.

Source: https://www.usgs.gov/news/state-news-release/usgs-and-partners-deploy-autonomous-vehicles-lake-erie-improve-fishery

Recent Publications

Journal Articles

The list below provides a selection of research articles.

- Assessing Awareness and Compliance with Fish Consumption Advisories on the Upper Hudson River: Implications for Risk Management of the Hudson River Superfund Site

  Bolnick, J., S. Roubin, M. Burr, and S. Byrne. 2023. Assessing Awareness and Compliance with Fish Consumption Advisories on the Upper Hudson River: Implications for Risk Management of the Hudson River Superfund Site. Environmental Pollution 334:122125.

- Per-and Polyfluorinated Alkyl Substances (PFAS) in Pennsylvania Surface Waters: A Statewide Assessment, Associated Sources, and Land-use Relations
  Breitmeyer, S.E., A.M. Williams, J.W. Duris, L.W. Eicholtz, D.R. Shull, T.A. Wertz, and E.E. Woodward. 2023. Per-and Polyfluorinated Alkyl Substances (Pfas) in Pennsylvania Surface Waters: A Statewide Assessment, Associated Sources, and Land-use Relations. Science of the Total Environment 888:164161.

- Environmental Factors Influencing Occurrence of *Vibrio parahaemolyticus* and *Vibrio vulnificus*
  Brumfield, K.D., A.J. Chen, M. Gangwar, M. Usmani, N.A. Hasan, A.S. Jutla, A. Huq, and R.R. Colwell. 2023. Environmental Factors Influencing Occurrence of *Vibrio parahaemolyticus* and *Vibrio vulnificus*. Applied and Environmental Microbiology:e00307-00323

- The Fishpath Approach for Fisheries Management in a Data-and Capacity-Limited World
  Dowling, N.A., J.R. Wilson, J.M. Cope, D.T. Dougherty, S. Lomonico, C. Revenga, B.J. Snouffer, N.G. Salinas, F. Torres-Cañete, and R.C. Chick. 2023. The Fishpath Approach for Fisheries Management in a Data-and Capacity-Limited World. Fish and Fisheries 24(2):212-230.

- Harvest Control Rules Used in US Federal Fisheries Management and Implications for Climate Resilience
  Free, C.M., T. Mangin, J. Wiedenmann, C. Smith, H. McVeigh, and S.D. Gaines. 2023. Harvest Control Rules Used in US Federal Fisheries Management and Implications for Climate Resilience. Fish and Fisheries 24(2):248-262.

- Nonlethal Detection of PFAS Bioaccumulation and Biomagnification within Fishes in an Urban-and Wastewater-dominant Great Lakes Watershed
  George, S.E., T.R. Baker, and B.B. Baker. 2023. Nonlethal Detection of PFAS Bioaccumulation and Biomagnification within Fishes in an Urban-and Wastewater-dominant Great Lakes Watershed. Environmental Pollution 321:121123.

- Predicting Sport Fish Mercury Contamination in Heavily Managed Reservoirs: Implications for Human and Ecological Health
  Lepak, J.M., B.M. Johnson, M.B. Hooten, B.A. Wolff, and A.G. Hansen. 2023. Predicting Sport Fish Mercury Contamination in Heavily Managed Reservoirs: Implications for Human and Ecological Health. Plos one 18(8):e0285890.

- Ciguatera Fish Poisoning in the Caribbean Sea and Atlantic Ocean: Reconciling the Multiplicity of Ciguatoxins and Analytical Chemistry Approach for Public Health Safety
  Pottier, I., R.J. Lewis, and J.-P. Vernoux. 2023. Ciguatera Fish Poisoning in the Caribbean Sea and Atlantic Ocean: Reconciling the Multiplicity of Ciguatoxins and Analytical Chemistry Approach for Public Health Safety. Toxins 15(7):453.

- Cyanotoxins Accumulate in Lake St. Clair Fish yet Their Fillets Are Safe to Eat
  Shahmohamadloo, R.S., S.P. Bhavsar, X.O. Almirall, S.A. Marklevitz, S.M. Rudman, and P.K. Sibley. 2023. Cyanotoxins Accumulate in Lake St. Clair Fish yet Their Fillets Are Safe to Eat. Science of the Total Environment 874:162381.

- Evaluating the Trophic Transfer of PCBs from Fish to Humans: Insights from a Synergism of Environmental Monitoring and Physiologically-based Pharmacokinetic Modeling
  Simpson, A.M., S.A. Nutile, O.C. Hodgson, A.E. Russell, J.D. Keyes, C.C. Wood, and R.J. Buckanovich. 2023. Evaluating the Trophic Transfer of PCBs from Fish to Humans: Insights from a Synergism of Environmental Monitoring and Physiologically-based Pharmacokinetic Modeling. Environmental Pollution:122419.

- Integration of Per-and Polyfluoroalkyl Substance (PFAS) Fingerprints in Fish with Machine Learning for PFAS Source Tracking in Surface Water
  Stults, J.F., C.P. Higgins, and D.E. Helbling. 2023. Integration of Per-and Polyfluoroalkyl Substance (PFAS) Fingerprints in Fish with Machine Learning for PFAS Source Tracking in Surface Water. Environmental Science and Technology Letters.

Upcoming Meetings and Conferences

SETAC North America 44th Annual Meeting
November 12–16, 2023
Louisville, KY and Virtual

Freshwater Science: Testing Waters and Fish for Pharmaceuticals and PFAS Contamination On-Site
November 29, 2023
Virtual

9th World Fisheries Congress
March 3–9, 2024
Seattle, WA

Additional Information

This bimonthly newsletter highlights current information about fish and shellfish.

For more information about specific advisories within the state, territory, or tribe, contact the appropriate state agency listed on EPA's National Listing of Fish Advisories website at https://fishadvisoryonline.epa.gov/Contacts.aspx.

For more information about this newsletter, contact Sharon Frey (Frey.Sharon@epa.gov, 202-566-1480).

Additional information about advisories and fish and shellfish consumption can be found at https://www.epa.gov/fish-tech.