



# Fish and Shellfish Program

## NEWSLETTER

March 2022  
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### In This Issue

Recent Advisory News.....	1
EPA News .....	6
Other News .....	7
Recently Awarded Research...	10
Tech and Tools .....	11
Recent Publications .....	12
Upcoming Meetings and Conferences.....	13



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

### Recent Advisory News

#### Kansas Issues Fish Consumption Advisories for 2022

On January 3, 2022, the Kansas Department of Health and Environment (KDHE) and the Kansas Department of Wildlife and Parks (KDWP) issued fish consumption advisories for 2022. The advisories identify types of fish or other aquatic animals that should be eaten in limited quantities or, in some cases, avoided altogether because of contamination. General advice and internet resources are provided to aid the public in making informed decisions regarding the benefits and the risks associated with eating locally caught fish from Kansas waters.

#### Definitions

**Bottom-feeding fish:** buffaloes, carps, catfishes, sturgeons, and suckers.

**Shellfish:** mussels, clams, and crayfish.

#### Serving size (skinless fish fillets before cooking):

- Adults and children age 13 and older = 8 ounces
- Children age 6 to 12 = 4 ounces
- Children younger than 6 = 2 ounces

#### Statewide mercury advisories for fish

Getting outside to catch fish and eating fish has many health benefits, but all fish contain some amount of mercury. Anyone who routinely eats fish or serves fish to their children should carefully consider the types and amounts they eat, including store-bought fish. Too much dietary mercury can harm the development of fetuses, nursing babies, and growing children. Therefore, mercury-sensitive individuals (women who are pregnant, nursing, or may become pregnant, and children younger than 17 years old) should follow the guidelines presented below for eating fish caught in Kansas.

#### Fishing and eating guidelines

- Eat smaller portions – a fillet about the size of your palm.
- Eat types of fish with less mercury (Preferred Choice Fish in the table below).

- If you don't know the type or size of fish you are eating, wait at least a week before eating fish again.
- When fishing, keep fish shorter than your forearm (fingertips to elbow) or less than 20 inches as regulations allow.

Preferred Choice Fish	Servings
Blue and Channel Catfish	1 or 2 per week
Common Carp	
Crappies	
White Bass, White Perch, Wiper, Striped Bass	
Walleye, Sauger, Saugeye	
Bullhead Catfish	
Drum	
Sunfish (Bluegill, Green, Redear, etc.)	
Second Choice Fish	Servings
Buffaloes (Black, Bigmouth, and Smallmouth)	1 or 2 per month
Flathead Catfish	
Bass (Largemouth, Smallmouth, and Spotted)	

Reduce the recommendations above if you tend to keep fish larger than about 20 inches to:

- Preferred Choice Fish – not more than 1 serving per week
- Second Choice Fish – not more than 1 serving per month

For specific questions or concerns about mercury in Kansas fish, please contact KDHE. For information about mercury in fish caught in other states, in store bought fish, and in other types of seafood please visit the [U.S. EPA](#) and [U.S. FDA](#) websites.

### Waterbody specific advisories for all consumers

Kansas recommends restricting consumption of bottom-feeding fish and catfishes to 1 serving per week from the following locations because of polychlorinated biphenyls (PCBs):

- Cow Creek in Hutchinson and downstream to the confluence with the Arkansas River (Reno County).
- Kansas River from Lawrence (below Bowersock Dam) downstream to Eudora at the confluence of the Wakarusa River (Douglas and Leavenworth counties).
- Little Arkansas River from the Main Street Bridge immediately west of Valley Center to the confluence with the Arkansas River in Wichita (Sedgwick County).

Kansas recommends restricting consumption of bottom-feeding fish and catfishes to 1 serving per month from the following location because of PCBs:

- K-96 Lake in Wichita (Sedgwick County).

Kansas recommends not eating specified fish or aquatic life from the following locations:

- Arkansas River from the Lincoln Street dam in Wichita downstream to the confluence with Cowskin Creek near Belle Plaine (Sedgwick and Sumner counties); bottom-feeding fish and catfishes due to PCBs.
- Shoal Creek from the Missouri/Kansas border to Empire Lake (Cherokee County); shellfish due to lead and cadmium.
- Spring River from the confluence of Center Creek to the Kansas/Oklahoma border (Cherokee County); shellfish due to lead and cadmium.
- Antioch Park Lake South in Antioch Park, Overland Park (Johnson County); all fish due to pesticides dieldrin, heptachlor epoxide, chlordane and dichlorophenyltrichloroethanes (DDTs).
- Arkalon Park Lakes in Liberal (Seward County) – Kansas recommends not eating any aquatic life because the lakes are sustained solely by treated municipal wastewater.

### **Waterbodies affected by harmful algae blooms**

To date, measured algal toxin levels in fish samples collected from waters affected by harmful algal blooms (HABs) suggest the fish are safe to eat. However, please take the following precautions:

- Avoid skin contact with water.
- Wear gloves when handling wet fish and equipment.
- Rinse fish with clean water.
- Remove skin from fillets and rinse with clean water prior to cooking or freezing.
- Eat only skinless fillets.
- Do not eat shellfish.

### **General advice for reducing exposure to chemicals in fish**

- Keep smaller fish to eat and let the big ones go.
- Avoid eating fish parts other than fillets.
- Trim fat from fillets and/or use cooking methods that allows fat to drip away.
- Avoid subsistence fishing (relying on wild-caught fish for daily nutritional needs) in rivers within or immediately downstream of large urban/industrial areas.

- Do not eat fish or aquatic life from wastewater outfalls, waste treatment lagoons, or stormwater retention ponds.

**Other information from KDHE, KDWPT, EPA, and the American Heart Association**

To view the advisories online and for information about KDHE's Fish Tissue Contaminant Monitoring Program please visit the website at <https://www.kdhe.ks.gov/1268/Fish-Tissue-Contaminant-Monitoring-Progr>.

For information about fishing in Kansas including licensing, regulations, fishing reports, and fishing forecasts please visit the KDWPT fishing website <http://ksoutdoors.com/Fishing>.

For information about the health benefits vs. the risks of including fish in your diet please visit this American Heart Association website <https://www.heart.org/en/news/2018/05/25/eating-fish-twice-a-week-reduces-heart-stroke-risk>.

For technical information regarding the U.S. EPA risk assessment methods used to determine advisory consumption limits please visit <http://www2.epa.gov/fish-tech>.

For more information, contact Matthew Lara at [matthew.lara@ks.gov](mailto:matthew.lara@ks.gov).

Source: <https://www.kdhe.ks.gov/CivicAlerts.aspx?AID=77>



## New PFAS Fish Consumption Advisory Issued for Bay of Green Bay and Associated Tributaries

On January 18, 2022, the Wisconsin Department of Natural Resources (DNR) and the Department of Health Services (DHS) announced a [new per- and polyfluoroalkyl substances \(PFAS\)-based consumption advisory](#) for the Bay of Green Bay and its tributaries following results of fish sampling conducted in 2020.

Elevated levels of perfluorooctane sulfonate (PFOS), a type of PFAS, were detected in rock bass sampled from the Peshtigo River. As a result, the DNR and DHS recommend consuming only one meal per week for rock bass from the Bay of Green Bay and its associated tributaries up to the first dam. This includes portions of the Peshtigo, Oconto, and Menominee rivers.

More information and a complete list of consumption advisories can be found in the [Choose Wisely booklet](#) or on the [fish consumption webpage](#).

Additional resources include: [Site Specific Advisory for Green Bay and its Tributaries](#) and [Qhov Chaw Muaj Lus Qhia Tshwj Xeeb Rau Green Bay Thiab Cov Dej Ntws Los Rau Nws](#)

## **Fish consumption and PFAS**

Fishing is an important part of life in Wisconsin and eating fish that you catch can be part of a healthy, balanced diet. Fish are generally high in protein, contain vitamins and minerals, and are the primary food source for healthy omega-3 fats.

However, fish may take in pollutants from their environment and their food. In Wisconsin, the DNR regularly tests fish to determine if they contain pollutants and special fish consumption advice is issued for waterbodies where higher levels of pollutants are measured.

For most of Wisconsin's 10,000+ waterbodies, the [general statewide fish consumption advisory](#) should be followed. For the waterbodies where increased levels of pollutants have been measured, [special fish consumption advice](#) should be followed.

In Wisconsin, [mercury and polychlorinated biphenyls \(PCBs\)](#) are the pollutants upon which most fish consumption is based. At some sites, though, elevated levels of other pollutants, including dioxins and PFOS, a type of PFAS, are the basis for special fish consumption advice.

## **Consumption advice**

If you follow fish consumption advisories, you can get the health benefits from eating fish while reducing your risk from contaminants.

- Before going fishing, use the [Choose Wisely guide](#) to determine if your fishing spot has special advice and then follow the consumption advice appropriate for the species and length of fish you'd like to eat.
- You can also search for advice for any waterbody in the state using the online [Find Advice tool](#).

## **Advice for Hmong and Spanish anglers**

- [Noj cov ntsej koj nuv tau - xaiv cov uas zoo rau lub cev](#)
- [Comer lo que se pesca - cómo tomar decisiones saludables](#)

## **Where DNR has sampled fish for PFAS**

The DNR has tested fish for PFAS (including PFOS and perfluorooctanoic acid [PFOA]) in a number of Wisconsin waters. The [map of surface water bodies sampled for PFAS](#) include locations that have been tested since 2006. Efforts are underway to test fish from more locations and to revisit previous locations in order to re-test fish.

For more information, contact Justine Hasz at [Justine.Hasz@wi.gov](mailto:Justine.Hasz@wi.gov).

Source: <https://dnr.wisconsin.gov/topic/PFAS/Advisories.html>

## EPA News

### EPA and Massachusetts Settlements Ensure Company will Pay Nearly \$1.5 Million for 2019 North River Fish Kill

#### **Company will compensate Massachusetts for harms to natural resources and cold water fishery; Ensure safe operation of Colrain, Massachusetts bleaching facility**

On December 7, 2021, Massachusetts Attorney General (AG) Maura Healey, the U.S. Environmental Protection Agency (EPA) and the Baker-Polito Administration announced that Barnhardt Manufacturing Company, a North-Carolina-based cotton bleaching company, has agreed to pay nearly \$1.5 million to settle allegations that it spilled dozens of gallons of concentrated sulfuric acid from its Colrain facility into the North River, killing more than 270,000 fish, including thousands of state-listed rare species.

The state and federal settlements will also require the company to take steps to comply with water pollution, hazard management, and chemical accident prevention laws at their bleaching facility and associated wastewater treatment facility.

According to the AG's complaint, on Sept. 1, 2019, between approximately 53 and 60 gallons of concentrated sulfuric acid sprayed out of an outdoor above-ground storage tank at Barnhardt's Colrain facility directly onto the ground. The AG's Office alleges that Barnhardt knew the storage tank had a leak and neglected to repair it. Dozens of gallons of acid allegedly flowed into a nearby brook and down a three mile stretch of the North River, a pristine river and popular recreational fishery that feeds into the Deerfield River. According to the complaint, the acid dissolved nearly everything in its path, killing more than 270,000 fish and damaging more than 14 acres of protected wetland resource areas and over 12 acres of designated habitat of two state-listed rare species – the Longnose Sucker fish and the Ocellated Darner dragonfly. Barnhardt also allegedly discharged wastewater from its facility in excess of permitted limits on numerous occasions, improperly operated and maintained its wastewater treatment facility, and mismanaged hazardous waste oil.

EPA's administrative settlement alleges, among other things, that the company failed to maintain its sulfuric acid tank in violation of the General Duty Clause of the Clean Air Act, which requires users of extremely hazardous substances to take steps to prevent and mitigate accidental releases.

"EPA's case complements the Commonwealth's by addressing the root cause of the spill," said EPA New England Acting Regional Administrator Deb Szaro. "It's critical that companies handling hazardous chemicals identify hazards and ensure that their facilities are designed and maintained safely. Carefully following the Clean Air Act's chemical accident prevention provisions helps prevent releases from occurring in the first place."

The AG's Office alleges Barnhardt's acid spill and facility operations violated numerous Massachusetts environmental laws and regulations, including the state Wetlands Protection Act, Endangered Species Act, Clean Waters Act, and Hazardous Waste Management Act, and gave rise to significant damages under the Commonwealth's Oil and Hazardous Material Release Prevention and Response Act and Inland Fisheries Statute.

"The sulfuric acid spill caused by this company was devastating for the Colrain community and left long-lasting damage to the North River," AG Healey said. "Today's settlements will hold Barnhardt accountable for harming this rich ecosystem and will provide significant funding to restore nearby natural resources and fisheries."

Under the terms of the settlement with the AG's Office, Barnhardt is required to comply with state regulations to protect water quality and natural resources at and around its facility and undertake additional training, planning, and operations to prevent future releases. Barnhardt will also pay up to \$500,000 in penalties, including \$200,000 to the Commonwealth's Natural Heritage and Endangered Species Fund. Barnhardt will also fund the replacement and/or enhancement of one or more culverts located in the Deerfield River watershed in Colrain, at a cost of \$300,000. Additionally, Barnhardt will pay the state more than \$360,000 to fund environmental restoration projects in the Colrain area, to compensate for the harm to natural resources and fisheries, and to reimburse the costs of assessing natural resource damages.

EPA's settlement requires a civil penalty payment of approximately \$305,000 to the U.S. Treasury and work to ensure that chemical hazards at the plant are identified and addressed.

The state settlement was negotiated in collaboration with the Massachusetts Department of Environmental Protection and the Massachusetts Division of Fisheries and Wildlife. EPA brought its administrative case on a separate but parallel track.

For more information, contact Emily Bender at [Bender.EEmily@epa.gov](mailto:Bender.EEmily@epa.gov).

Source: <https://www.epa.gov/newsreleases/epa-and-massachusetts-settlements-ensure-company-will-pay-nearly-15-million-2019-north>

## Other News

### **Modeling Coastal Contaminant Distribution from Land Use and Demographics**

On January 5, 2022, the National Centers for Coastal Ocean Science (NCCOS) announced two new publications that model coastal ocean contaminant distributions based on land use and demographics. Together, these papers develop and test machine learning models to predict contamination levels based on patterns of humans in the landscape.

In order to answer critical questions about contaminant source and fate, NCCOS is developing new strategies to link chemical contaminants detected in bivalves (e.g., mussels and oysters) and sediments to potential sources of contamination. Through the cross-disciplinary collaborations of sociology, spatial ecology and contaminant detection, NCCOS scientists are exploring modeling and [machine learning](#) techniques to improve the understanding of the complex interactions between the human environment and chemical contaminants.

Since 1986, the National Oceanic and Atmospheric Administration (NOAA) National Status and Trends Program (NST) has monitored and characterized the nation's coastal waters for chemical contaminants and biological indicators of water quality. NST uses a multi-matrix approach that utilizes sediment, fish, bivalves, and macro infauna for contaminant monitoring (national and regional) and site characterization tasks. Contaminants monitored include legacy organic chemicals, such as organochlorine pesticides, industrial contaminants, metals, and fossil fuel combustion byproducts (e.g., polycyclic aromatic hydrocarbons [[PAHs](#)]). In recent years, these programs have added contaminants of emerging concern (CECs) to their analyses including pharmaceuticals and personal care products, alternative flame retardants, and alkylphenol and perfluorinated compounds ([PFAS](#)), nicknamed "forever chemicals."

This study utilized existing coastal contaminant data from the NOAA Mussel Watch Program (MWP), NST Great Lakes Restoration Initiative and Bioeffects programs, and spatial human dimensions data to further characterize and predict environmental PAH concentrations and characterize the relationship between PAHs and spatial social data. Patterns in PAH data were identified using descriptive statistics and machine learning techniques that are currently being applied to CECs.

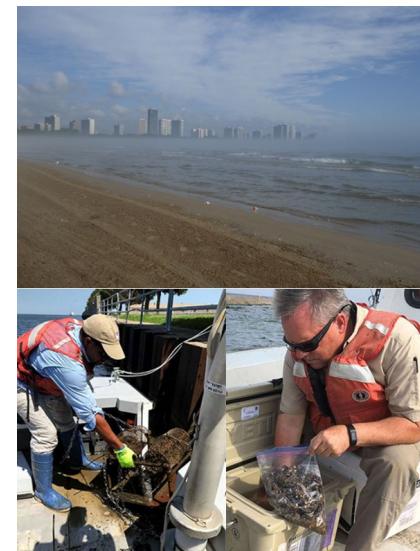
Two publications have resulted so far from this research effort: A NOAA [Technical Memorandum](#) and a peer-reviewed research paper published in the journal in [Environmental Monitoring and Assessment](#).

In the Laurentian Great Lakes, relationships between total PAH concentration in [dreissenid](#) mussel tissue, impervious land surface percentages, and PAH relative concentration were identified and used to build a predictive model for the Great Lakes Basin ([Kimbrough et al., 2021](#)).

Along the coastal continental United States, 3722 sediment samples from 263 sampling sites (derived from multiple studies over more than three decades) were combined and analyzed to gain a better perspective on PAH distribution ([Freitag et al., 2021](#)).

The studies determined the following list of environmental (independent) variables (factors) to test in the model: impervious surface, land use/land cover, boat ramps and marinas, population, parking lot cover, road cover, petroleum industry locations, wastewater treatment facilities, and basic demographics. The three significant variables with the highest  $r^2$  values (correlations) were road density, impervious surface, and high intensity development in a 3 kilometer (km) buffer (as presented in Table 1 in [Freitag et al., 2021](#)).

Using 5 km buffers around each sampling site and existing sampling sites for machine learning training data, the model used [Random Forest](#) predictive capabilities to predict the level of PAH concentration at the center ("centroid" of each sampling site's watershed (based on United States Geological Survey [USGS] Hydrologic Unit Maps).



NCCOS social scientists further characterize and model relationships between contaminants and spatial social data. Top, Chicago skyline and Lake Michigan (Photo courtesy of USGS); Bottom, NOAA NST monitoring in Lake Michigan (Photo courtesy of NOAA)

The predicted high PAH levels are primarily (but not entirely) surrounded by urban land use and present primarily in Southern California and seaside New York, both of which have high commercial vessel port activity (Figure 1 in [Freitag et al., 2021](#)).

This project represents a first attempt to combine data from NCCOS monitoring and assessment programs for analysis using machine learning to assess data patterns and comparing them to a regression analysis. The results can help prioritize testing in areas where human activities indicate there might be reason for concern about contaminants.

For more information, contact Amy Freitag at [Amy.Freitag@noaa.gov](mailto:Amy.Freitag@noaa.gov).

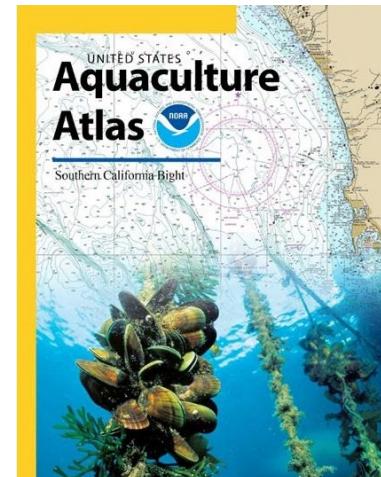
Source: <https://coastalscience.noaa.gov/news/modeling-coastal-contaminant-distribution-from-land-use-and-demographics/>

## NCCOS Maps Options for Aquaculture Opportunity Areas in Gulf of Mexico and Southern California Bight

On November 16, 2021, the National Centers for Coastal Ocean Science (NCCOS) announced the release of two atlases that compile the best available science to inform the identification of [Aquaculture Opportunity Areas](#) (AOAs) in the Gulf of Mexico and the Southern California Bight. NOAA [previously identified these regions](#) for their potential to host sustainable commercial aquaculture development in the United States (U.S.). Areas in the atlases have characteristics expected to support multiple types of aquaculture industries including finfish, shellfish, seaweed, or some combination of these farming types.

The atlases provide the most comprehensive marine spatial analyses ever developed for any U.S. ocean space. NCCOS developed each atlas using more than 200 data layers accounting for key environmental, economic, social, and cultural considerations, including fishing interests and marine protected areas. The studies identified nine areas in the [Gulf of Mexico](#) and 10 areas in the [Southern California Bight](#) that have the highest potential to support three to five marine aquaculture operations, while also reducing conflicts with other ocean uses.

The atlases do not identify AOAs but are instead an important step to provide peer-reviewed spatial mapping that will inform the selection process for final aquaculture opportunity selections. The decision to identify an AOA will only be made after completion of the [National Environmental Policy Act](#) Programmatic Environmental Impact Statement, which will assess the impacts of siting aquaculture facilities in different potential locations. Proposed aquaculture development must go through the appropriate permitting process.



Aquaculture Opportunity Area Atlas for the Southern California Bight (Photo courtesy of NCCOS)

Though the information delivered in these atlases is tailored to inform the AOA selection process, the method used to conduct these analyses could also benefit other ocean planning and coastal management.

NOAA will continue to work with Fishery Management Councils, Marine Fisheries Commissions, states and tribes, and other stakeholders to identify areas to be considered in further depth for sustainable aquaculture. Public input is vital to shaping an open and transparent AOA process.

For more information, contact Ken Riley at [Ken.Riley@noaa.gov](mailto:Ken.Riley@noaa.gov).

Source: <https://coastalscience.noaa.gov/news/nccos-maps-options-for-aquaculture-opportunity-areas-in-the-gulf-of-mexico-and-southern-california-bight/>

## **Recently Awarded Research**

### **EPA Awards \$16 Million in Great Lakes Restoration Initiative Grants to Central Michigan and Clarkson Universities**

On April 20, 2021, the U.S. Environmental Protection Agency (EPA) awarded two grants totaling \$16 million to continue monitoring coastal wetlands and levels of contaminants in fish throughout the Great Lakes basin. The grants – \$10 million to Central Michigan University (CMU) in Mount Pleasant, Michigan, and approximately \$6 million to Clarkson University in Potsdam, New York – will be funded through the Great Lakes Restoration Initiative (GLRI) and are part of a larger effort to restore and protect the Great Lakes.

Specifically, the funded work supports the GLRI goal of protecting and restoring the chemical, physical and biological integrity of the Great Lakes basin. In 2019, EPA announced the [GLRI Action Plan III](#), an aggressive plan that guides Great Lakes restoration and protection activities by EPA and its many partners for 5 years.

“These grants are great examples of what the GLRI is all about – strong partnerships delivering positive results for the Great Lakes,” said Acting EPA Regional Administrator Cheryl Newton. “EPA looks forward to continued collaboration with Central Michigan and Clarkson universities on this important work to protect the Great Lakes.”

EPA awarded CMU \$10 million in research funding to monitor approximately 1,000 coastal wetlands in the Great Lakes over the next five years in support of EPA’s Great Lakes Coastal Wetland Monitoring Program, which began in 2011. The grant will help CMU monitor the health and trends in plant, invertebrate, amphibian, fish, and bird communities as well as water quality in Great Lakes coastal wetlands. This information provides vital information for Great Lakes coastal wetland restoration and other management efforts.

“I have worked with the scientists from EPA’s Great Lakes program since the late 1990s and look forward to continuing our partnership to protect and restore Great Lakes coastal wetlands,” said Donald Uzarski, director of CMU’s Institute for Great Lakes Research. “The Great Lakes program ensures that managers can make decisions about these critical ecosystems based on sound science while being proactive rather than reactionary. The success of

the program is vital to both healthy ecosystems and a strong economy. I commend EPA for its dedication to the over 60 million people that rely on healthy Great Lakes."

EPA also awarded Clarkson University approximately \$6 million in GLRI funding to monitor legacy and emerging contaminants in top predator fish in each of the Great Lakes over the next five years as part of the EPA's Great Lakes Fish Monitoring and Surveillance Program, initiated in 1977. This research will evaluate long-term trends in contaminant concentrations in whole fish and assess changes in contaminant transfer through the Great Lakes food web.

"Global commerce, recreation enthusiasts and municipalities within the entire Great Lakes ecosystem rely upon the extraordinary science and innovative solutions from this research team addressing contaminant trends in fish and ensuring healthy water supplies," said Robyn Hannigan, provost of Clarkson University. "Clarkson and its collaborators at the EPA's Great Lakes National Program Office are committed to applying their expertise to the environmental and resilient economic solutions that make a difference for the public good."

For more information on GLRI, visit <https://www.glri.us>.

For more information see Great Lakes Coastal Wetland Monitoring Program, <https://www.epa.gov/great-lakes-monitoring/about-great-lakes-coastal-wetland-monitoring-program-cwmp>.

For more information see Great Lakes Fish Monitoring and Surveillance, visit <https://www.epa.gov/great-lakes-monitoring/great-lakes-fish-monitoring-and-surveillance>.

For more information, contact Taylor Gillespie at [Gillespie.Taylor@epa.gov](mailto:Gillespie.Taylor@epa.gov).

Source: <https://www.epa.gov/newsreleases/epa-awards-16-million-great-lakes-restoration-initiative-grants-central-michigan-and>

## **Tech and Tools**

### **Sailing Drones Collect Data for Great Lakes Fishery Study**

On August 5, 2021, two uncrewed surface vehicles began a 45-day sailing mission through Lakes Michigan and Huron as part of a scientific study.

The U.S. Geological Survey (USGS) and [Saildrone, Inc.](#), launched the vehicles from Macatawa, Michigan, on July 28, 2021. These ocean drones, called [Saildrone Explorers](#), began collecting fishery data on Lake Michigan on August 5, sailing north into Lake Huron through September. Information collected as part of the study will help inform sustainable management of the \$7 billion per year Great Lakes fishing industry.

The Saildrones use acoustic, or sound, technology to gather fish distribution and density data around-the-clock. USGS scientists will use the data to better understand the effects of large vessel engine noise on fish sampling and catchability. This information will be used to sustain important fisheries for states, Tribes and likely the Province of Ontario, Canada.

The 23-foot autonomous vehicles are powered by wind and solar energy and carry no people. The sailboat-like drones have a 15-foot-tall wing sail and weighted keel, and they bear a payload of science sensors and navigational and communications equipment on their hulls.

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.

For information about USGS research on the Great Lakes, please visit the [USGS Great Lakes Science Center website](#).

For more information, contact Marisa Lubeck at [mlubeck@usgs.gov](mailto:mlubeck@usgs.gov).

Source: <https://www.usgs.gov/news/state-news-release/media-advisory-sailing-drones-collect-data-great-lakes-fishery-research#:~:text=These%20ocean%20drones%20called%20Saildrone,year%20Great%20Lakes%20fishing%20industry>

## Recent Publications

### Journal Articles

The list below provides a selection of research articles.

- ▶ [Assessing exposures to per- and polyfluoroalkyl substances in two populations of Great Lakes Basin fish consumers in Western New York State.](#)  
Liu, M., M. Nordstrom, S. Forand, E. Lewis-Michl, W.A. Wattigney, K. Kannan, W. Wang, E. Irvin-Barnwell, and S.-A. Hwang. 2022. Assessing exposures to per- and polyfluoroalkyl substances in two populations of Great Lakes Basin fish consumers in Western New York State. *International Journal of Hygiene and Environmental Health* 240:113902.
- ▶ [Changing Trends in Paralytic Shellfish Poisonings Reflect Increasing Sea Surface Temperatures and Practices of Indigenous and Recreational Harvesters in British Columbia, Canada](#)  
McIntyre, L., A. Miller, and T. Kosatsky. 2021. Changing trends in paralytic shellfish poisonings reflect increasing sea surface temperatures and practices of indigenous and recreational harvesters in British Columbia, Canada. *Marine Drugs* 19(10):568.



These Saildrone Explorers will use acoustic, or sound, technology to gather fish distribution and density data around-the-clock. USGS scientists will use the data to better understand the effects of invasive mussels and nutrient loss in the water. (Photo courtesy of Saildrone, Inc. Permission to use provided by Saildrone, Inc.)

- ▶ [Comparative analyses with conventional surveys reveal the potential for an angler app to contribute to recreational fisheries monitoring](#)  
Johnston, F.D., S. Simmons, B. van Poorten, and P. Venturelli. 2021. Comparative analyses with conventional surveys reveal the potential for an angler app to contribute to recreational fisheries monitoring. *Canadian Journal of Fisheries and Aquatic Sciences* 79(1):31-46.
- ▶ [Consumption of freshwater fish: A variable but significant risk factor for PFOS exposure](#)  
Augustsson, A., T. Lennqvist, C.M.G. Osbeck, P. Tibblin, A. Glynn, M.A. Nguyen, E. Westberg, and R. Vestergren. 2021. Consumption of freshwater fish: A variable but significant risk factor for PFOS exposure. *Environmental Research* 192:110284.
- ▶ [Combined effects of ocean warming and acidification on marine fish and shellfish: A molecule to ecosystem perspective](#)  
Baag, S., and S. Mandal. 2022. Combined effects of ocean warming and acidification on marine fish and shellfish: A molecule to ecosystem perspective. *Science of The Total Environment* 802:149807.
- ▶ [Habitat value of bivalve shellfish and seaweed aquaculture for fish and invertebrates: Pathways, synthesis and next steps](#)  
Theuerkauf, S.J., L.T. Barrett, H.K. Alleway, B.A. Costa-Pierce, A. St. Gelais, and R.C. Jones. 2022. Habitat value of bivalve shellfish and seaweed aquaculture for fish and invertebrates: Pathways, synthesis and next steps. *Reviews in Aquaculture* 14(1):54-72.
- ▶ [PFAS molecules: A major concern for the human health and the environment](#)  
Panieri, E., K. Baralic, D. Djukic-Cosic, A. Buha Djordjevic, and L. Saso. 2022. PFAS molecules: A major concern for the human health and the environment. *Toxics* 10(2):44.
- ▶ [Total blood mercury predicts methylmercury exposure in fish and shellfish consumers](#)  
Wells, E.M., L. Kopylev, R. Nachman, E.G. Radke, J. Congleton, and D. Segal. 2021. Total blood mercury predicts methylmercury exposure in fish and shellfish consumers. *Biological Trace Element Research*.

## Upcoming Meetings and Conferences

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### [Gulf of Mexico Conference](#)

April 25-28, 2022

Baton Rouge, LA

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### [2022 Emerging Contaminants in the Environment Conference](#)

April 27-28, 2022

Champaign, IL and Virtual

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### [12th International Conference on Toxic Cyanobacteria](#)

May 22-27, 2022

Toledo, OH

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### [Small Pelagic Fish: New Frontiers in Science and Sustainable Management](#)

November 7-11, 2022

Lisbon, Portugal

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## Additional Information

This monthly 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](mailto: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>.