United States Environmental Protection Agency

Fish and Shellfish Program NEWSLETTER

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In This Issue

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

Recent Advisory News

Mercury and Fish Consumption Advisories Issued for Six Louisiana Waterways

On May 21, 2021, the Louisiana Departments of Health (LDH), Environmental Quality (LDEQ), and Wildlife and Fisheries (LDWF) issued a series of fish consumption advisories for six bodies of water. These most recent advisories include one new warning and updates to five previously issued warnings.

The state issues precautionary advisories when unacceptable levels of mercury are detected in fish or shellfish.

LDEQ conducted fish sampling, and LDH then used this data to determine the need for additional advisories or to modify existing advisories. Each advisory lists the specific fish, makes consumption recommendations, and outlines the geographic boundaries of the affected waterways.

Bayou Chene and Bayou Lacassine

- *Includes Bayou Chene from its headwaters near Jennings to its confluence with Bayou Lacassine, and Bayou Lacassine from its headwaters near Lacassine to its confluence with Bayou Misere.*

- Women of childbearing age and children less than seven years of age should consume no more than one meal per month* of largemouth bass and bowfin (choupique, grinnel) combined from the advisory area; or should consume no more than two meals per month of crappie, freshwater drum (gaspergou), smallmouth buffalo and warmouth combined from the advisory area.

- Other adults and children seven years of age and older: no advisory

Bayou Nezpique

- *From the headwaters of Bayou Nezpique to its confluence with the Mermentau River.*

** A meal is considered to be half a pound of fish for adults*

- Women of childbearing age and children less than seven years of age should consume no more than one meal per month of largemouth bass and bowfin (choupique, grinnel) combined from the advisory area; or should consume no more than two meals per month of freshwater drum (gaspergou), crappie, and warmouth combined from the advisory area.

- Other adults and children seven years of age and older should consume no more than three meals per month of bowfin.

Big Alabama Bayou

- *Includes the Big Alabama Bayou for its entire length from the boat landing at Highway 975 to its southern end near the Atchafalaya River Pilot Channel.*

- Women of childbearing age and children less than seven years of age should not consume flathead catfish. Do not consume more than one meal per month of any other species from the advisory area.

- Other adults and children seven years of age and older should consume no more than two meals per month of flathead catfish from the advisory area.

Little Alabama Bayou**

- *Includes Little Alabama Bayou from its headwaters near East Krotz Springs to its confluence with Big Alabama Bayou.*

- Women of childbearing age and children less than seven years of age should consume no more than one meal per month of bowfin (choupique, grinnel) and largemouth bass combined from the advisory area; or should consume no more than three meals per month of black crappie and freshwater drum (gaspergou) combined from the advisory area.

- Other adults and children seven years of age and older: no advisory.

Calcasieu River Drainage Basin

- *Includes the Calcasieu River from Highway 26 to the Saltwater barrier north of Lake Charles, the West Fork Calcasieu River, Houston River, Hickory Creek, Beckwith Creek, English Bayou and Little River.*

- Women of childbearing age and children less than seven years of age should consume no more than one meal per month of black crappie, largemouth bass, bowfin (choupique, grinnel), freshwater drum (gaspergou), spotted bass, and flathead catfish combined; or should consume no more than two meals per month of other species caught from the advisory area.

** *New advisory*

- Other adults and children seven years of age and older should consume no more than three meals per month of largemouth bass, freshwater drum (gaspergou), and bowfin (choupique, grinnel) combined from the advisory area.

Old River (Niblett Bluff in Calcasieu Parish)

- *Includes the Old River from its headwaters to the confluence with the Sabine River.*

- Women of childbearing age and children less than seven years of age should not consume bowfin (choupique, grinnel) or freshwater drum (gaspergou); and should consume no more than one meal per month of any other species from the advisory area.

- Other adults and children seven years of age and older should consume no more than two meals per month of freshwater drum (gaspergou) and bowfin (choupique, grinnel) combined.

Because of mercury contamination, there are now fish consumption advisories for 49 waterways in Louisiana and one for the Gulf of Mexico.

Louisiana fish consumption advisories are based on the estimate that the average resident eats four meals of fish per month. Consuming more than this amount from local water bodies may increase health risks.

Mercury is an element that occurs naturally in the environment. Consequently, there are small amounts of mercury in the sediments of streams, lakes, rivers, and oceans. Nearly all fish contain trace amounts of mercury. They absorb mercury as they feed on aquatic organisms. Larger predator fish contain more mercury than smaller fish. To minimize exposure to mercury, LDH recommends that smaller fish be consumed instead of larger ones.

People are exposed to low levels of mercury throughout their lives. Eating contaminated fish is one way we are exposed to mercury. Health effects from harmful levels of mercury can include nervous system and kidney damage. Young children and developing fetuses are more sensitive to the toxic effects of mercury. Therefore, consumption advisories are issued at lower fish tissue concentrations for women of childbearing age and children under seven years of age.

The full text for each advisory is posted online at www.ldh.la.gov/EatSafeFish or by calling toll-free 1-888-293-7020. You may also access the information by downloading the LDEQ's new app which is available through Google Play (LDEQ Fish Advisories) and the App Store (LA Fish Advisories).

For more information, contact Shannon Soileau at shannon.soileau@la.gov.

Source: https://ldh.la.gov/index.cfm/newsroom/detail/6171

EPA News

Cyanotoxins Preparedness and Response Toolkit

On May 28, 2021, the U.S. Environmental Protection Agency (EPA) released an online Cyanotoxins Preparedness and Response Toolkit (CPRT) to help state and tribal partners prepare for potential harmful algal blooms (HABs) in freshwater bodies and to respond to HABs by protecting public health. The CPRT follows the EPA's *National Response Framework (NRF)*, a consistent nationwide framework built on the Department of Homeland Security's National Incident Management System (NIMS). As such, the CPRT includes the essential components to prevent and respond to cyanotoxins events in drinking and recreational waters, and to update and improve preparedness and response for future cyanotoxin events.

CPRT Framework.

Among other things, the toolkit includes templates, worksheets, and checklists to assist before and during a bloom event; frequently asked questions on HABs, links to tools for developing a cyanotoxins management plan, tools for effective risk communication during cyanotoxin events, and questionnaires used to confirm and evaluate a cyanotoxins event and the effectiveness of the response. The resources in the toolkit can be completed electronically, downloaded, and shared.

For more information, contact Dr. Lesley D'Anglada at DAnglada.Lesley@epa.gov.

Source: https://www.epa.gov/cyanohabs/cyanotoxins-preparedness-and-response-toolkit-cprt

Other News

Dragonfly Larvae are Effective Bioindicators of Mercury Exposure in Fish and Amphibians—Results of Citizen Science in 100 National Parks and Protected Places

On July 7, 2020, a study was published about a national-scale assessment of mercury bioaccumulation in national parks, using dragonfly larvae as biosentinels, through a citizen-science framework.

Environmental mercury in its organic form (methylmercury) biomagnifies through food webs, posing potential health risks to fish, wildlife, and humans. Methylmercury in fish tissue is a leading cause of fish consumption advisories in North America. Mercury trend detection in environmental media is needed for understanding the success of mitigation efforts to reduce mercury exposure. Mercury measurements made in air, water, sediment, and soil help document environmental sources and emissions, but are either poor or inconsistent predictors of mercury concentrations within biota of associated food webs.

Therefore, the U.S. Geological Survey (USGS) Ecologically-Driven Exposure Pathways Science Team implemented a national scale study, supported by the USGS's Environmental Health Programs (Contaminant Biology and Toxic Substances Hydrology), the National Park Service (NPS), University of Maine, and more than 4,000 citizen scientists, to determine if dragonfly larvae could be useful bioindicators to help predict and understand wildlife mercury exposure.

Dragonfly at Bowman Lake, Glacier National Park, Montana. Dragonfly larvae were selected as bioindicators because they are widely distributed and abundant, are key components of aquatic food web energetic pathways, are relatively long-lived, and show high site fidelity. (*Photo courtesy of NPS*)

Dragonflies were selected as bioindicators because they address many of the challenges associated with mercury measurements in other wildlife (including the lack of consistency in species among sites; movements and migratory behavior; and variations in factors such as body size, trophic position, and growth rates), which can contribute to variation and uncertainty. Samples were collected from 450 sites in 100 national parks and other protected places by citizen scientists paired with trained NPS staff.

Variation in mercury concentrations among various families of dragonfly larvae necessitated a conversion of concentrations to one common unit. The scientists developed *Aeshnid*-equivalent concentrations using the relation between mercury concentrations in *Aeshnidae* (the most commonly collected dragonfly family in the study) and other dragonfly families. The *Aeshnid*-equivalent mercury concentrations were positively correlated with mercury concentrations in four different fish guilds (groups of species that exploit the same resources) and two types of amphibians (frogs and salamanders).

As an additional step, the team developed a tool (Integrated Risk Impairment Index) to inform potential wildlife health risks using *Aeshnid*-equivalent mercury concentrations and published information on mercury toxicity. Based on this exercise, 10 percent of sites were below any of the estimated impairment categories, whereas 22, 56, 11, and 1 percent of sites exceeded low, moderate, high, and severe estimated impairment categories, respectively.

This study demonstrates the use of dragonfly larvae as effective bioindicators of mercury exposure in several freshwater taxa and established a sampling network for mercury on protected lands across the U.S. These findings highlight the efficacy of carefully designed citizen science efforts to facilitate studies that would be otherwise difficult to conduct because of large resource requirements. More information on this study can be found in an associated geo-narrative.

The USGS **Ecologically-Driven Exposure Pathways Science Team** and their collaborators are continuing to develop predictive tools to understand the environmental pathways of contaminant exposure and to understand the effects of exposure on individuals, populations, communities, and entire ecosystems. Future applications of dragonfly larvae monitoring could be useful for understanding the drivers of contaminant availability to aquatic food webs; predicting the potential risk to vertebrates; and evaluating the effectiveness of mitigation actions to reduce contaminant exposure.

The Environmental Health Program (Contaminants Biology and Toxic Substances Hydrology) of the USGS Ecosystems Mission Area supported this study.

For more information, contact:

- Collin Eagles-Smith, Supervisory Research Ecologist, Forest and Rangeland Ecosystem Science Center, at 541-750-0949 or ceagles-smith@usgs.gov

- Colleen Flanagan Pritz, Ecologist, National Park Service – Air Resources Division, at 303-969-2806 or colleen_flanagan_pritz@nps.gov.

Source: https://www.usgs.gov/ecosystems/environmental-health-program/science/dragonfly-larvae-are-effective-bioindicators-mercury?utm_source=Newsletter&utm_medium=Email&utm_campaign=geohealthusgs-newsletter-april-2021&utm_term=Title&qt-science_center_objects=0#qt-science_center_objects

Hawaiian Fishponds: Providing Physical and Cultural Sustenance

Once, nearly 500 fishponds provided local Hawaiian communities with aquacultured seafood. Fishponds served as a unique part of an integrated agricultural and ecosystem management regime today known as the ahupua'a system. A societal move toward more centralized governance and economics, time, natural disasters, development, and cultural-economic changes led to only four working fishponds by the dawn of the 21st century. These fishponds offer the opportunity to provide physical and cultural sustenance. An effort is underway to restore the pond structures and reconnect communities to their aquaculture past. KUA, an innovative community-based initiative, supports network efforts to build capacity to restore and care for these traditional fishponds.

"KUA means backbone, and the organization serves as the backbone that connects multiple communities working to restore Hawaiian bio-cultural resources, including efforts to restore fishponds," said Kevin Chang, Executive Director of KUA. "The organization is about more than the physical restoration, it also connects our communities to each other, their history, cultural foundation, and future." In a culture that honors sustainability, fishponds symbolized the connection between communities, the `aina (land), and mo'omeheu (culture).

KUA has a dedicated fishpond collective known as Hui Mālama Loko I'a, meaning network that cares for fishponds. It has worked since 2013 to foster fishpond restoration efforts. "Through our network we provide resources and in-person meetings that host two staff members from each fishpond site, that is about 80–120 people gathering annually to share lessons learned, opportunities, and research," said Brenda Asuncion, Hui Mālama Loko I'a Coordinator.

"Today we have around 40 fishpond sites across the islands in different stages of restoration," added Asuncion. "There are no site standards or requirements for the Hui; each site has different goals according to their watershed and community structure."

Restoration Through Old and New Technologies

To restore and improve fishponds, Hawaiian aquaculture practitioners are combining contemporary science with traditional practices and knowledge to adapt to today's sustainability challenges. Restoration of neglected sites still involves communities lending a hand and sometimes leading efforts. "Building pond walls today, much like it did hundreds of years ago, still involves community members coming together to remove sediment and constructing

rock walls by hand," said Asuncion. She notes they are also a common site for modern research with agencies and organizations studying environmental conditions like water quality, climate impacts, and chemistry in the fishponds.

Since the very first fishponds, the structures have been designed to recruit smaller fish to enter the ponds through a weir-type structure. These weirs are usually an opening in the rock walls covered by stick grates to allow smaller fish to enter the ponds. Once in the pond fish feed on the site's rich vegetation until they reach harvest size. As the environments around the fishpond sites have also changed, getting smaller juvenile fish to enter the pond can be difficult. This is where contemporary science can offer a solution, exploring the idea of partnering with hatcheries or labs to stock native fingerlings.

Nutritional Relevance Then and Now

A historic quote attributed to Samuel Manaiakalani Kamakau described fishponds as "things that beautified the land, and a land with many fishponds was called a 'fat' land." While the exact date of the individual fishpond constructions is unknown, Hawaiians typically built many of their ponds between the years 1200 and 1600. The age of these builds can lead many to think of the sites as relics of a past time. However, restored ponds are as socially, economically, and environmentally important today as they were 800 years ago.

Just as in centuries past, island residents worry about food security due to their isolation in the Pacific Ocean. "We are located 2,500 miles from the mainland U.S.; this means our dependence on food imports is high," said Chang. In fact, nearly 90 percent of Hawaii's food is imported, making it particularly vulnerable to global events that might disrupt shipping and food supplies. "These fishponds were a technology used to leverage the commons to feed the people, but today we also see their potential to restore our commons for the people," added Chang.

These traditional fishponds offer a sustainable way to increase access to local food year round. The ponds also offer community-based economic development opportunities for sites to sell their aquacultured seafood. This would allow fishpond organizations to keep money in the local community and to fund education and outreach activities at the ponds.

Community members come together to restore the walls of a traditional Hawaiian fishpond. *(Photo courtesy of KUA)*

Vision for the Future

Through KUA, the Hui Mālama Loko I'a community will continue to support fishponds. Along with providing sustainable food and economic opportunities, Asuncion and Chang hope these ponds can also restore a sense of place-based management and a relationship with the land.

Source: https://www.fisheries.noaa.gov/feature-story/hawaiian-fishponds-providing-physical-and-cultural-sustenance

Recently Awarded Research

National Fish Habitat Partnership Projects to Enhance Recreational Fishing and Restore Habitat

On May 5, 2021, the National Oceanic and Atmospheric Administration (NOAA) funded four projects designed to enhance recreational fisheries engagement and restore habitat through the coastal National Fish Habitat Partnerships. Saltwater recreational fishing is a part of the fabric of coastal communities, and anglers make critical contributions to the conservation of fish habitat nationwide. NOAA Fisheries is committed to collaborating with the recreational fishing community and supporting access to sustainable saltwater recreational opportunities. These projects will actively involve anglers in habitat restoration efforts that will benefit coastal communities and economies.

Recreational Engagement and Ecological Learning Series in Louisiana

Sponsoring Partnership: Southeast Aquatic Resources Partnership

Anglers Bettering Louisiana's Estuaries, Louisiana Sea Grant, and the Southeast Aquatic Resources Partnership will work with local charter boat captains. They will provide an experiential learning program about Louisiana habitat restoration and coastal planning. The program will include classroom sessions, field days, and time on the water. During the field days, the charter captains will pot, plant, and monitor black mangroves to improve habitat for juvenile fish, shrimp, and crabs. The program will also recruit local high school students to participate in the field days. At the end of the program, the charter boat captains will take these students on two recreational fishing trips. They will teach the students to fish and share what they have learned about Louisiana habitats and their connection to fish.

Outreach and Education at Bill Burton Fishing Pier in Maryland

Sponsoring Partnership: Atlantic Coastal Fish Habitat Partnership

As part of its Living Reef Action Campaign, Coastal Conservation Association (CCA) Maryland will expand outreach and education efforts at the Bill Burton Fishing Pier. The pier is frequently visited by a diverse community in Dorchester County, Maryland, and is an access point to the Choptank River Habitat Focus Area. In 2014 and 2015, oyster reef balls were successfully deployed off the pier to provide habitat for striped bass, drum, shad, blue crab, and other species. In this project, CCA Maryland will host several public oyster reef ball building events to construct and deploy more reef balls at the site. The project will also add six bilingual (English and Spanish) signs to inform recreational anglers of the new and previously deployed reef balls at this site. The signs will describe their purpose, the habitat types along the pier, fishing regulations, gear disposal instructions, and seafood consumption safety. An underwater web camera will be installed at the reef and live video will be displayed at the nearby visitor center. A video about the resources at the pier will also be produced and shared with the local community.

Point No Point Estuary Restoration in Washington

Sponsoring Partnership: Pacific Marine and Estuarine Partnership

Mid Sound Fisheries Enhancement Group is working with the Kitsap County Parks Department to develop a project to restore tidal influence to Point No Point Park. The project would remove a malfunctioning tide gate to convert

freshwater wetlands back into salt marsh habitat. Restoring tidal connectivity in this 32-acre area will provide critical nearshore habitat for juvenile Chinook salmon. It will restore ecosystem processes at a key site along migratory salmon routes in and out of Puget Sound. The project will engage the local North Kitsap Puget Sound Anglers and other local fishers to collect data before and after restoration and to help with education and outreach around the project and its importance. This may include conducting interviews with fellow anglers, documenting observed species in the habitat, and collecting post-restoration monitoring data. The project supports the NOAA Fisheries Puget Sound Chinook Recovery Plan and is integrated with regional salmon recovery efforts.

Documenting Coastal Cutthroat Trout Distribution in Alaska

Sponsoring Partnership: Western Native Trout Initiative

The Alaska Department of Fish and Game and the Western Native Trout Initiative will survey potential habitats used by Coastal Cutthroat Trout (CCT) at the edges of the species' range in Alaska. Anglers throughout the region will sample the areas where CCT are predicted to occur—taking genetic and tissue samples, and recording demographic data. Findings of the survey and field sampling will be disseminated to angler and interest groups, and will be used to identify the streams where CCT occur. The identified streams will be submitted to the Alaska Anadromous Waters Catalog, which provides habitat protection under state law. This type of protection will proactively conserve these important habitats at the northern and westernmost edge of the species' range. This area is expected to become more important as the species' range shifts due to climate change.

The projects are funded through NOAA Fisheries' Habitat Protection Division and Recreational Fisheries Initiative, in partnership with:

- Atlantic States Marine Fisheries Commission
- Pacific States Marine Fisheries Commission
- Gulf States Marine Fisheries Commission

This is the third year that this funding opportunity has been offered. Projects were selected based on active engagement of recreational fishing partners in habitat protection, restoration, or monitoring efforts, and the potential to build long-term relationships with those partners.

Source: https://www.fisheries.noaa.gov/feature-story/national-fish-habitat-partnership-projects-enhance-recreational-fishing-and-restore

Tech and Tools

South Carolina Department of Health and Environmental Control's New Fish Consumption Advisory App

Advisories can now be viewed on the new GIS Fish Consumption Advisory App! This app shows up to date advisories, fish tissue sampling sites, and public boat landings across the state. Simply click on a highlighted waterbody to learn more about advisories at that location or use the search feature to locate specific waterbodies on the map. The "About" pop-up provides more guidance on what advisories are as well as additional resources for more information.

Fish consumption advisories are issued by waterbody by the South Carolina Department of Health and Environmental Control (SCDHEC) with support provided by the South Carolina Department of Natural Resources (SCDNR).

For detailed information, please access:

- Fish consumption advisories booklet
- Fish consumption advisories table

Fish is a lean protein that is a good source of omega-3 fatty acids. However, some fish contain chemicals at levels that may be harmful to human health. Fish consumption advisories are recommendations for the consumption of recreational caught fish from South Carolina public waters. A fish consumption advisory is a warning targeted to either the general population or specific at-risk groups such as babies, children under 14, women who are nursing, women who are pregnant and women who plan to become pregnant.

An advisory will list a lake, stream, or river in South Carolina and describe the type and amount of fish safe to eat from that waterbody. Simply click on the waterbody of interest to see the advisory or search by name.

Displayed waterbody boundaries are representative of the resource and not intended to depict exact boundaries. If a waterbody or type of fish is not listed in the tables, it means that SCDHEC has not issued any consumption advice.

Here are the reasons why SCDHEC may not issue an advisory:

- The waterbody may not have been sampled.
- There may not be enough data.
- The waterbody is privately owned.

Advisories help you decide:

- Where to fish
- Which fish to keep
- How much fish to eat

Some lakes, streams, and rivers in South Carolina that have been tested do not have advisories.

For more information, contact Chad Altman at ALTMANKC@dhec.sc.gov or Taylor Shearer at shearetv@dhec.sc.gov. By phone, contact SCDHEC at 1-888-849-7241.

Source: https://scdhec.gov/fish-consumption-advisories and https://gis.dhec.sc.gov/gisportal/apps/webappviewer/index.html?id=c71943bc743b4ca196e0ef0406b1d7ab

Recent Publications

Journal Articles

The list below provides a selection of research articles.

- Advantages and prospective challenges of nanotechnology applications in fish cultures: a comparative review
  Abbas, W.T. 2021. Advantages and prospective challenges of nanotechnology applications in fish cultures: a comparative review. *Environmental Science and Pollution Research* 28:7669-7690.

- Effects of the marine biotoxins okadaic acid and dinophysistoxins on fish
  Corriere, M., L. Soliño, and P.R. Costa. 2021. Effects of the marine biotoxins okadaic acid and dinophysistoxins on fish. *Journal of Marine Science and Engineering* 9(3):293.

- Benthic community assessment of commercial oyster (*Crassostrea virginica*) gear in Delaware inland bays
  Fuoco, M., S. Borsum, Z.M. Kouhanestani, and G. Ozbay. 2021. Benthic community assessment of commercial oyster (*Crassostrea virginica*) gear in Delaware inland bays. *Sustainability* 13(11):6480.

- Black soldier fly, *Hermetia illucens* as an alternative to fishmeal protein and fish oil: Impact on growth, immune response, mucosal barrier status, and flesh quality of juvenile barramundi, *Lates calcarifer* (Bloch, 1790)
  Hender, A., M.A.B. Siddik, J. Howieson, and R. Fotedar. 2021. Black soldier fly, *Hermetia illucens* as an alternative to fishmeal protein and fish oil: Impact on growth, immune response, mucosal barrier status, and flesh quality of juvenile barramundi, *Lates calcarifer* (Bloch, 1790). *Biology* 10(6):505.

- Examining historical mercury sources in the Saint Louis River estuary: How legacy contamination influences biological mercury levels in Great Lakes coastal regions
  Janssen, S.E., J.C. Hoffman, R.F. Lepak, D.P. Krabbenhoft, D. Walters, C.A. Eagles-Smith, G. Peterson, J.M. Ogorek, J.F. DeWild, A. Cotter, M. Pearson, M.T. Tate, R.B. Yeardley, and M.A. Mills. 2021. Examining historical mercury sources in the Saint Louis River estuary: How legacy contamination influences biological mercury levels in Great Lakes coastal regions. *Science of The Total Environment* 779:146284.

- Hiding in plain sight: Shellfish-killing phytoplankton in Washington state
  King, T.L., N. Nguyen, G.J. Doucette, Z. Wang, B.D. Bill, M.B. Peacock, S.L. Madera, R.A. Elston, and V.L. Trainer. 2021. Hiding in plain sight: Shellfish-killing phytoplankton in Washington State. *Harmful Algae* 105:102032.

- ANN-Based integrated risk ranking approach: A case study of contaminants of emerging concern of fish and seafood in Europe
  Kumar V. and S. Kumar. 2021. ANN-Based integrated risk ranking approach: A case study of contaminants of emerging concern of fish and seafood in Europe. *International Journal of Environmental Research and Public Health* 18(4):1598.

- Mercury increase in Lake Champlain fish: Links to fishery dynamics and extreme climatic events
  Swinton, M.W. and S.A.Nierzwicki-Bauer. 2020. Mercury increase in Lake Champlain fish: Links to fishery dynamics and extreme climatic events. *Ecotoxicology* 29:1750–1761.

- Temporal trends in fish mercury concentrations in an Adirondack Lake managed with a continual predator removal program
  Taylor, M.S., C.T. Driscoll, J.M. Lepak, D.C. Josephson, K.J. Jirka, and C.E. Kraft. 2020. Temporal trends in fish mercury concentrations in an Adirondack Lake managed with a continual predator removal program. *Ecotoxicology* 29:1762–1773.

- A novel analytical method for determining total polychlorinated biphenyl concentrations in fish and shellfish using a simple and rapid clean-up followed by GC–MS/MS
  Tsutsumi, T. A. Kawashima, N. Hamada, R. Adachi, and H. Akiyama. 2021. A novel analytical method for determining total polychlorinated biphenyl concentrations in fish and shellfish using a simple and rapid clean-up followed by GC–MS/MS. *Journal of Food Composition and Analysis* 96:103725.

Upcoming Meetings and Conferences

World Fisheries Congress
September 20-24, 2021
Adelaide, South Australia

American Fisheries Society 151st Annual Meeting
November 6-10, 2021
Baltimore, MD

26th Biennial Coastal and Estuarine Research Federation Conference
November 1-4 and 8-11, 2021
Virtual

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, 202-566-1480).

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