EPA United States Environmental Protection Agency

Fish and Shellfish Program NEWSLETTER

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EPA 823-N-19-001

In This Issue

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

Recent Advisory News

TDEC Issues Precautionary Fish Consumption Advisories for Portions of Pigeon, Nolichucky Rivers

On August 13, 2018, the Tennessee Department of Environment and Conservation (TDEC) announced the issuance of precautionary fish consumption advisories for smallmouth bass and channel catfish in the downstream portions of the Pigeon River and the Nolichucky River.

On the Nolichucky River, the advisory extends from Douglas Reservoir upstream to the mouth of Bent Creek at river mile 14.9. The advisory does not include Douglas Reservoir itself. On the Pigeon River, the advisory extends from the mouth on the French Broad River upstream to Vinson Island where Interstate 40 crosses the river near mile 12.4.

TDEC advises that pregnant or nursing mothers and children avoid eating the fish species included in the advisories and that all others limit consumption to one meal per month. Other recreational activities such as boating, swimming, wading, and catch-and-release fishing carry no risk.

The advisories come as a result of careful tracking of mercury levels for several years by TDEC and the Tennessee Valley Authority. The latest results indicate that in smallmouth bass and channel catfish, mercury trigger points recommended by both the Environmental Protection Agency (EPA) and Food and Drug Administration are now being exceeded.

TDEC was scheduled to do additional fish tissue sampling in the fall of 2018 on the remaining Tennessee portions of each river downstream of the North Carolina state line. Additionally, few data are available for walleye, a popular target for fishermen in the Pigeon River. Walleye would have been specifically targeted in the fall collections. The department will report the results of these surveys to the public when available.

About Fish Consumption Advisories

The Tennessee Water Quality Control Act identifies the Commissioner of TDEC as having the authority and responsibility to issue advisories for either water contact hazards like pathogens or excessive health risks due to the accumulation of contaminants in fish or

shellfish. Tennessee's General Water Quality Criteria provide additional guidance regarding the conditions under which advisories may be warranted.

There are two types of fish consumption advisories issued by TDEC based on the levels of contaminants present in fish tissue. "Do not consume" fishing advisories are issued when levels of contaminants in fish tissue would represent a threat to the general population. Precautionary advisories are issued when contaminant levels are lower but would still pose a risk to sensitive subpopulations such as children, pregnant women, nursing mothers and those who eat fish frequently from the same body of water.

Where new advisories have been issued, TDEC will immediately begin the process of putting up signs at primary public access points. TDEC works in partnership with the Tennessee Wildlife Resources Agency to communicate information about fishing advisories.

For a complete listing of Tennessee's current fishing advisories plus additional information about the advisory issuance process, visit: https://www.tn.gov/content/dam/tn/health/documents/wr_wq_fish-advisories.pdf.

An EPA website has additional information about mercury at http://www2.epa.gov/fish-tech/epa-fda-advisory-mercury-fish-and-shellfish.

For more information, contact Greg Denton at Gregory.denton@tn.gov or (615) 532-0699.

Source: https://www.tn.gov/environment/news/2018/8/13/tdec-issues-precautionary-fish-consumption-advisories-for-portions-of-pigeon--nolichucky-rivers.html

Fish Advisory for Humboldt Bay Offers Safe Eating Advice for Eight Fish Species

On October 9, 2018, the California Environmental Protection Agency Office of Environmental Health Hazard Assessment (OEHHA) issued a state fish advisory for Humboldt Bay, Humboldt County, that provides safe eating advice for Leopard Shark, Lingcod, Pile Perch, Red Rock Crab, Shiner Perch, Speckled Sanddab, Walleye Surfperch, and White Surfperch. OEHHA developed the recommendations based on the levels of mercury and PCBs found in fish caught from the bay.

"Many fish have nutrients that may reduce the risk of heart disease and are excellent sources of protein," said Dr. Lauren Zeise, director of OEHHA. "By following our guidelines for fish caught in Humboldt Bay, people can safely eat fish low in chemical contaminants and enjoy the well-known health benefits of fish consumption."

Humboldt Bay is located along California's northern coast, adjacent to the city of Eureka. The advisory recommends that people of all ages should not eat any Leopard Shark from the bay. Additional guidance for consuming fish caught in Humboldt Bay is listed in the table below.

Guidelines for Eating Fish Caught in Humboldt Bay		
	Species	**Recommended Servings***
Women 18-49 years Children 1-17 years	Speckled Sanddab	7 per week
	Red Rock Crab, Shiner Perch, or White Surfperch	2 per week
	Lingcod, Pile Perch, or Walleye Surfperch	1 per week
	Leopard Shark	Do not eat
Women 50 and older Men 18 and older	Speckled Sanddab	7 per week
	Shiner Perch or White Surfperch	5 per week
	Red Rock Crab	4 per week
	Pile Perch or Walleye Surfperch	3 per week
	Lingcod	2 per week
	Leopard Shark	Do not eat

* One serving is an eight-ounce fish fillet, measured prior to cooking, which is roughly the size and thickness of your hand. Children should be given smaller servings.

For small fish species, several individual fish may make up a single serving. For fish species found in Humboldt Bay that are not included in this advisory, OEHHA recommends following the statewide advisory for eating fish from California coastal locations without site-specific advice.

Mercury is a naturally occurring metal that is released into the environment from activities including mining and burning coal. It accumulates in fish in the form of methylmercury, which can damage the brain and nervous system, especially in developing children and fetuses. Because of this, OEHHA provides a separate set of recommendations specifically for children up to age 17, and women of childbearing age (18-49 years).

PCBs are a group of industrial chemicals. At high levels of exposure they can cause health problems including cancer. Although they were banned in the U.S. in the late 1970s, PCBs persist in the environment from spills, leaks, or improper disposal. PCBs accumulate in the skin, fat, and some internal organs of fish. In order to reduce exposure from PCB contaminated fish, OEHHA recommends eating only the skinless fillet (meat) portion of the fish.

Eating fish in amounts slightly greater than the advisory's recommendations is not likely to cause health problems if it is done occasionally, such as eating fish caught during an annual vacation. The Humboldt Bay advisory recommendations join more than 100 other OEHHA advisories that provide site-specific, health-based fish consumption advice for many of the places where people catch and eat fish in California, including lakes, rivers, bays, reservoirs, and the California coast.

The health advisory and eating advice for Humboldt Bay – as well as eating guidelines for other fish species and California bodies of water – are available on OEHHA's Fish Advisories webpage: http://www.oehha.ca.gov/fish/advisories. The Humboldt Bay poster is available in both English and Spanish.

OEHHA's mission is to protect and enhance the health of Californians and the state's environment through scientific evaluations that inform, support and guide regulatory and other actions.

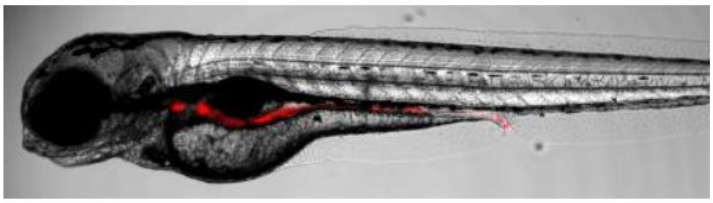
For more information, contact Sam Delson at (916) 324-0955.

Source: https://oehha.ca.gov/media/downloads/fish/advisory-press-release-fish/humboldtbaypressrelease100918.pdf

EPA News

New Research Shows that Exposure to Chemicals like BPA Disrupts Microbial Communities in Zebrafish

Bisphenol A (BPA) is an industrial chemical that has been used to make certain plastics and resins since the 1960s. In recent years, science has shown that exposure to BPA and its alternatives can result in possible human health effects. Adverse effects on neurodevelopment, behavior, metabolism, and the immune and cardiovascular systems have been found in human and animal models. As a result, regulators and researchers are interested in learning more about bisphenol chemicals.



This image shows a microbe-free zebrafish colonized with fluorescent bacteria that prefer to colonize the host zebrafish intestinal tract (bacteria are shown in red). Normally, a diverse array of microbes colonizes the zebrafish. This study shows that microbial communities can be massively disrupted by exposure to widespread environmental contaminants like BPA. Image credit: Tamara Tal. *(Image courtesy of EPA)*

On October 13, 2018, EPA reported that new research by its scientists used zebrafish to examine the effect of several BPA alternatives on two important developmental health indicators — developmental toxicity and microbiota disruption. Developmental toxicity is the study of adverse effects on the development of the organism resulting from exposure to toxic agents. Microbiota are dynamic communities of bacteria, viruses, fungi, archaea, and protozoa that colonize the skin and gut of a host animal (including humans) and play important roles in health and disease. Research has found that these microbial communities help regulate many diverse and complex biological processes including brain development and behavior, lipid metabolism, and immune responses.

For the study, zebrafish were exposed to either BPA or the BPA alternatives Bisphenol AF (BPAF), Bisphenol B (BPB), Bisphenol F (BPF), or Bisphenol S (BPS). Researchers conducted developmental toxicity assessments and each chemical was ranked by its potency for developmental toxicity. Results from these assessments showed that BPAF was the most potent chemical and BPS was the least potent.

EPA researchers also assessed the effect of the bisphenol chemicals on the types and amounts of bacteria – otherwise known as the microbial "community structure" – that colonize the host zebrafish. Scientists found that exposure to BPS, BPA, or BPF produced significant disruption of microbial community structure that was not observed in zebrafish exposed to BPB or BPAF.

These results illustrate a somewhat paradoxical observation that chemicals which cause potent host toxicity are less likely to kill or repress the growth of the microbial communities in the zebrafish. Alternatively, environmental chemicals that are less toxic to the host, meaning zebrafish can tolerate higher concentrations of the chemical, seem to be more likely to affect the types of microbes that can colonize the fish. That means that the BPA alternatives that caused the least developmental toxicity in the host fish generally produced the most significant microbiota

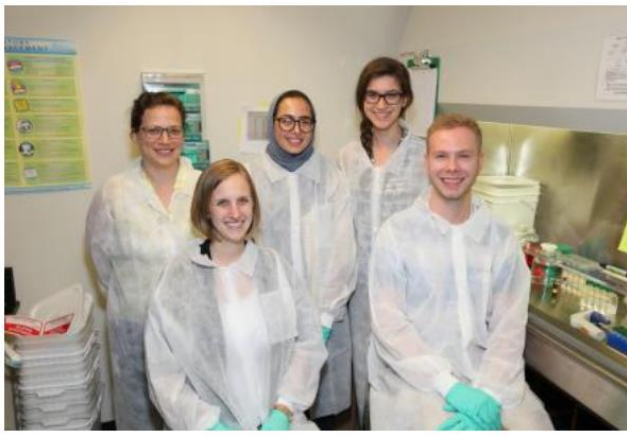
disruption. This is important because disrupted microbial community structure has been observed in humans with gastrointestinal diseases and autism spectrum disorder.

While BPA exposure has been linked to a wide array of adverse health effects, this is the first study to show that BPA and its most commonly-used alternatives disrupt microbial community structure. The National Academy of Sciences recently released a report concluding that current risk assessment strategies used to protect public health do not fully consider the role microbiota may play in mediating adverse health effects stemming from chemical exposures.

This new EPA study verifies that chemical exposures routinely disrupt microbial community structure. This effect suggests that microbiota should be considered when determining the potential hazards that chemical exposures pose to human health and the environment.

Learn More:

- Host developmental toxicity of BPA and BPA alternatives is inversely related to microbiota disruption in zebrafish
- Toxicity screening using zebrafish
- Investigating Chemical-Microbiota Interactions in Zebrafish Webinar Recording



The research team. Front row: Tara Catron, Drake Phelps. Back row: Tamara Tal, Shaza Gaballah, Allison Kvasnicka. Not pictured: Xia Meng Howey, Luísa Becker Bertotto. Image credit: Chuck Gaul *(Image courtesy of EPA)*

For more information, contact the research team lead, Tamara Tal, at (919) 541-0506 or tal.tamara@epa.gov.

Source: https://www.epa.gov/sciencematters/new-research-shows-exposure-chemicals-bpa-disrupts-microbial-communities-zebrafish

Other News

Fish Bones Yield New Tool for Tracking Coal Ash Contamination

A Duke University study shows that trace elements in a fish's ear bones can be used to identify and track coal ash contamination in the waters where the fish lived.

"Calcified structures – or otoliths – found in a fish's inner ear are known to store a lot of life history information, including chemical and physical records of the fish's age, natal habitat and migration patterns," said Jessica Brandt, lead author of the paper and a 2018 PhD graduate of Duke's Nicholas School of the Environment. "We've shown that otoliths also capture the signatures of contaminants that have affected the fish's ecosystems."

Brant and her team found that strontium isotope ratios in the otoliths of fish from two North Carolina lakes – both of which had received effluents from coal ash ponds at nearby power plants – matched the strontium isotope ratios in samples collected from sediment at the bottom of the lakes.

"This shows otoliths can be used as biogenic tracers to assess the potential for ecological impacts of coal ash waste streams in affected waters," said Brandt, who is now a postdoctoral researcher with the U.S. Geological Survey. "While strontium behaves differently than the toxic elements in coal ash effluents, it helps us connect high levels of those elements back to the contamination source."

Strontium is a naturally occurring trace element in coal that retains unique isotopic ratios even after the coal is burned and coal ash comes into contact with an aquatic environment.

Past studies have used strontium isotope ratios to track coal ash's impacts on water quality, "but this is the first time we've been able to prove they can also be used as fingerprints to track coal ash's impacts in living organisms," said Avner Vengosh, professor of geochemistry and water quality at Duke's Nicholas School, who coauthored the study.

"This definitely shows the strontium in the fish must be from coal ash contamination," Vengosh said.

The researchers collected surface water and sediment-based pore water samples from two North Carolina lakes – Mayo Lake and Sutton Lake – that were historically impounded to provide cooling water for nearby power plants and to receive their effluents. Sutton Lake was the site of a large coal ash leak into the adjacent Cape Fear River after Hurricane Florence caused flooding in the fall of 2018.

The researchers also collected surface and pore water samples from two sites located upstream from the lakes, and from two other lakes – Lake Tillery and Lake Waccamaw – that are not associated with coal ash waste streams. The samples were then analyzed in the laboratory, along with the otoliths of largemouth bass from each of the lakes.

"Strontium isotope ratios in the largemouth bass otoliths overlapped with ratios in corresponding sediment pore waters at all lakes and reservoirs, which is compelling evidence that otoliths can serve as biogenic tracers of coal ash effluents," said Richard Di Giulio, the Sally Kleberg Professor of Environmental Toxicology at Duke, who co-authored the study.

Strontium isotope ratios in surface water samples from the lakes didn't always match those in the fish otoliths and pore water samples, Di Giulio explained, but this could be because surface water ratios are more variable over time.

"This study's finding demonstrates that otolith studies can add to our existing research efforts," said Brandt. "Water-based strontium isotope tracers only give us information about coal ash impacts at a particular point in time, but because otoliths continuously grow over a fish's lifetime, we could use time-series analyses of otoliths to determine the timing of waste stream discharges or spills going back several years. This represents an emerging and important new direction in environmental toxicology and water-quality research."

Primary funding for the study came from the North Carolina Water Resources Research Institute and the Foundation for the Carolinas. Brandt received additional support from the National Institute of Environmental

Health Sciences (Grant #T32-ES021432) and through an EPA Science to Achieve Results (STAR) Graduate Fellowship (#FP-91780101-1).

Other coauthors of the study were Nancy Lauer and Emily Bernhardt, both of Duke University.

For more information contact Tim Lucas at (919) 613-8084 or tdlucas@duke.edu.

Reference: J.E. Brandt, N.E. Lauer, A. Vengosh, E.S. Bernhardt, and R.T. Di Giulio. 2018. Strontium isotope ratios in fish otoliths as biogenic tracers of coal combustion residual inputs to freshwater ecosystems. *Environmental Science & Technology Letters* 5(12):718-723. DOI: 10.1021/acs.estlett.8b00477.

Source: https://nicholas.duke.edu/about/news/fish-bones-yield-new-tool-tracking-coal-ash-contamination

Mussel Watch Detects New Contaminants in Great Lakes

On December 10, 2018, the National Oceanic and Atmospheric Administration reported that scientists from its National Centers for Coastal Ocean Science (NCCOS) published an assessment of contaminants of emerging concern in the Great Lakes. Of the 237 chemicals the team analyzed, they detected 99 of them in the mussels sampled for the study.

New kinds of chemicals enter the environment every year. Often, they are unregulated, and their toxicological effects on fish and wildlife are poorly understood. These contaminants of emerging concern include pesticides, hormones, flame retardants, pharmaceuticals, personal care products, and chemicals in household and industrial detergents. Runoff, from both urban and agricultural areas, carries these contaminants to coastal waters.

In the U.S. coastal zone, NCCOS is working to assess the magnitude and distribution of these contaminants. The Great Lakes are a concern, because they supply drinking water to 40 million people, and they support a $7 billion fishery and a $52 billion recreational industry.

Divers from NCCOS and NOAA's Great Lakes Environmental Research Laboratory prepare for mussel collection work in Lake Michigan, off the coast of Muskegon, Michigan, May 2018. *(Image courtesy of NOAA)*

The NCCOS Mussel Watch Program is using invasive zebra and quagga mussels to monitor contaminants of emerging concern in the Great Lakes. These mussels spread rapidly throughout all of the lakes, except Lake Superior, after their unintentional introduction in the mid-1980s from the ballast water of trans-Atlantic ships.

Bivalve mollusks, such as mussels, can serve as ideal indicators of chemical pollution. They tend to bioaccumulate pollutants from the large amounts of water they filter, they have limited mobility, and they are found throughout the U.S. coastal zone.

Given the pervasiveness of invasive mussels in the Great Lakes, the researchers were able to report on contaminants in offshore, nearshore, and river/harbor waters. The frequency of detection was greatest in river/harbor areas with known contaminant sources, such as wastewater treatment outfalls. However, the researchers detected some contaminants at reference sites far from known sources of pollution, suggesting persistence and offshore transport of these contaminants.

Since 1986, at roughly 300 coastal sites nationwide, the NCCOS Mussel Watch Program has monitored U.S. coastal waters for chemical contaminants and biological indicators of water quality.

For more information, contact Kimani Kimbrough at kimani.kimbrough@noaa.gov or Ed Johnson at ed.johnson@noaa.gov.

Source: https://coastalscience.noaa.gov/news/glcecreport

DDT in Alaska Meltwater Poses Cancer Risk for People Who Eat Lots of Fish

Children in Alaska whose diet includes a lot of fish from rivers fed by the Eastern Alaska Mountain Range may have a long-term elevated risk for cancer because of insecticides – including dichlorodiphenyltrichloroethane (DDT) – in the meltwater.

Even with low levels of organochlorine pollutants (OCPs) in glacial meltwater, the risk of cancer for youth and adults who rely on fish as a staple of their diet is above EPA's threshold limit says Kimberley Miner, research assistant professor at the University of Maine Climate Change Institute.

The risk to children exposed to DDT and hexachlorocyclohexane accumulated in fish is significantly higher than it is for adults because of their size and lifetime exposure.

As Alaskan glaciers melt in the warming climate, Miner says the gradual release of these OCPs may continue to elevate watershed concentrations above the current level.

"This secondary impact of climate change will be felt most strongly by children, and needs to be addressed in a comprehensive way," says Miner, who's also a research fellow with the Center for Climate and Security and a physical scientist at the Army Geospatial Research Laboratory in Virginia. The findings are detailed in the article "A screening-level approach to quantifying risk from glacial release of organochlorine pollutants in the Alaskan Arctic" in the *Journal of Exposure Science and Environmental Epidemiology*.

There are 1,655 families in the larger Yukon interior region and 508 families within the Tanana River watershed. Miner recommends that people who eat large amounts of fish (more than 20 pounds per year or six ounces per week) in these and other Arctic areas be a priority for future research about risks from glacial meltwater pollution. Miner found that health risks from drinking Jarvis Glacier meltwater are negligible for adults and children at this time.

Pesticides that contain OCPs have been banned in many countries because exposure to them has been linked to cancer, coma, tremors, confusion, fatigue, headache, nausea, blurry vision, and death.

DDT was used as a pesticide for insect control in the U.S. until EPA banned it in 1972. Hexachlorocyclohexane, commonly called Lindane, has not been produced in the U.S. since 1976, but it is imported for insecticide use and is in prescription creams that combat lice and scabies.

Aerial view of the confluence of Yukon and Tanana Rivers. *(Image courtesy of U.S. Fish and Wildlife Service)*

The OCPs deposited and stored near the surface of Jarvis Glacier in interior Alaska likely were transported there in the atmosphere – attached to snow and rain. In Asia, DDT is still used to try to prevent malaria.

Miner and University of Maine colleagues Karl Kreutz, Shaleen Jain and Seth Campbell, as well as University of Alaska, Fairbanks researcher Anna Liljedahl, conducted this first-ever OCP risk assessment for people in the Arctic.

They analyzed Jarvis Glacier ice cores and meltwater collected in summer 2016 and spring 2017.

Reference: K.R. Miner, S. Campbell, C. Gerbi, A. Liljedahl, T. Anderson, L.B. Perkins, S. Bernsen, T. Gatesman, and K.J. Kreutz. 2018. Organochlorine pollutants within a polythermal glacier in the Interior Eastern Alaska Range. *Water* 10(9):1157. DOI: 10.3390/w10091157.

Source: https://www.sciencedaily.com/releases/2018/12/181207112720.htm

How Mussels Handle Microplastic Fiber Pollution

New research shows that mussels readily take in microplastic pollution fibers from the ocean but quickly flush most of them out again, according to a study by researchers from Bigelow Laboratory for Ocean Sciences. The findings were published in December's *Marine Pollution Bulletin*.

Human-made microplastics exist throughout the global ocean, from busy coastal areas to remote regions far from human habitation. They have myriad impacts: microplastics are eaten by tiny animals called zooplankton, play host to bacterial colonies, and can even change how energy and nutrients flow through ocean ecosystems.

"The big pieces of plastic you find on the beach are in your face, but microplastics are everywhere," said Bigelow Laboratory Senior Research Scientist Paty Matrai, one of the study's authors. "We desperately need ways to accurately and precisely measure their numbers in the ocean."

The most abundant type of microplastics are fibers, which shed readily from materials as common as carpets and fleece clothing, and whose small size makes them edible by marine life as small as zooplankton. However, few studies to date have focused on this type of ocean pollution. Matrai worked with Bigelow Laboratory Senior

Research Scientist David Fields and researchers from the Shaw Institute to learn how marine animals handle fibers, which has important implications for understanding how microplastics move up the food web. Plastic can both directly affect the animals that ingest it and accumulate in the animals that feed on them, including humans.

"We know that microfibers can be consumed by shellfish, but at what rate and how long they are retained by the animals remains unclear," Fields said. "The degree to which plastic is impacting the food chain is unknown, but as more plastic make its way into the ocean, the number of organisms containing plastics is sure to increase."

Through a series of laboratory experiments, the team found that the mussels quickly rejected most of the fibers they took up by coating them in mucus and expelling them. This method allowed them to efficiently rid themselves of some of the fibers without taking them fully into their bodies.

Blue mussels. *(Image courtesy of NOAA)*

However, the mussels did ingest nearly one in 10 fibers, accumulating them in their body tissues. Moving those mussels to clean water, the scientists found, allowed them to flush most of the accumulated fibers from their bodies.

"Our work with microplastic fibers emphasizes the need for laboratory studies that accurately mimic an organism's natural environment," said Madelyn Woods, marine research coordinator at the Shaw Institute and lead author on the study. "Detailed studies of individual species and their mechanisms for particle selection will be important for understanding how microplastics affect ecosystems on a larger scale."

The primary experiments used for this research placed mussels into water containing fibers at levels equivalent to those in the ocean. However, measuring the effect of those conditions presented the researchers with a major challenge: how to count the tiny plastic fibers. Most other microplastic experiments have used methods that are exceedingly laborious or do not resemble natural conditions, potentially skewing results. Matrai's team used a FlowCam, an optical instrument originally developed at Bigelow Laboratory, to more easily enumerate the particles. Establishing this new method opens the door for future experiments into microplastic fibers.

"Because the ocean is so vast, microplastics aren't actually that concentrated," Matrai said. "But no one knows the full impact they have. The bottom line is, we need data to help us make informed decisions."

Reference: M.N. Woods, M.E. Stack, D.M. Fields, S.D. Shaw, and P.A. Matrai. 2018. Microplastic fiber uptake, ingestion, and egestion rates in the blue mussel (*Mytilus edulis*). *Marine Pollution Bulletin* 137:638 DOI: 10.1016/j.marpolbul.2018.10.061.

Source: https://www.sciencedaily.com/releases/2018/12/181204131127.htm

Recently Awarded Research

NFWF Announces Nearly $3.8 Million in Grants to Support Electronic Technologies in U.S. Fisheries

On November 15, 2018, the National Fish and Wildlife Foundation (NFWF) announced 15 grants totaling $3.78 million to update fishery data collection and management using electronic technologies in fisheries in 10 U.S. states and Puerto Rico. The grants will generate more than $5 million in matching contributions, which include in-kind and financial support from recipients and industry partners, for a total conservation impact of over $8.8 million.

The grants were awarded through the Electronic Monitoring and Reporting (EMR) Grant Program, a partnership between NFWF, NOAA, and the Kingfisher Foundation. Projects will integrate electronic technology into fisheries data collection and integrate modernized data management systems.

Cameras on a fishing vessel. Credit: Ayla Fox. *(Image courtesy of NFWF)*

"The grants announced today will increase the number of vessels using electronic technologies and will improve management, review and storage of data to support sustainable fisheries," said Jeff Trandahl, executive director and CEO of NFWF. "Supporting projects that work with fishermen across the country to adopt and expand the use of effective electronic technologies will provide long-term benefits for these fisheries."

The 15 grants will address monitoring and data management needs in nine fisheries in Alaska, Maine, Massachusetts, New Hampshire, Rhode Island, Alabama, Florida, Louisiana, Texas, Hawaii, and Puerto Rico. The funded projects will advance development of electronic monitoring and reporting systems, initiate pilot projects in

new fisheries, expand adoption in fisheries already using electronic technology, and modernize data management and review processes to support management of recreational and commercial fisheries.

"We are committed to implementing electronic technologies in collaboration with NFWF, fishermen, partner organizations, and the regional fishery management councils," said Chris Oliver, Assistant Administrator, NOAA Fisheries. "Results from these grants will improve on the water and shoreside use of these technologies in support of our sustainable fisheries management goals."

In the New England groundfish fishery and the Alaska pot cod fishery, grants will advance electronic monitoring and reporting tools to improve data accuracy for commercial fisheries. Pilot projects will test electronic technologies in new fisheries including the Alaska pollock fishery, the Gulf of Mexico highly migratory species fishery, Hawaii longline fisheries, and small-scale fisheries in Puerto Rico. Several projects will address recreational fishery reporting needs in New England and the Gulf of Mexico. Additional projects in New England will improve data management technology.

"Sustainable, prosperous fisheries need timely and reliable data," said Kristine Johnson, executive director of the Kingfisher Foundation. "Electronic technologies are an essential component of systems that efficiently meet the information needs of fishery managers, scientists and fishermen. We are excited to partner with NFWF on supporting innovative projects to collect, use, and manage data empowering fishers and managers to enhance the sustainability of U.S. fisheries."

The EMR Grant Program was established in 2015 to advance NOAA's sustainable fisheries goals to partner with fishermen and other stakeholders, state agencies, and Fishery Information Networks to integrate technology into fisheries data collection and observations. To date, the program has awarded more than $13.8 million to 43 projects in U.S. fisheries. Congress appropriated $3.5 million to NOAA Fisheries for this program in 2018 which was a $500,000 increase over previous years.

A complete list of the 2018 grants made through the EMR Grant Program is available here.

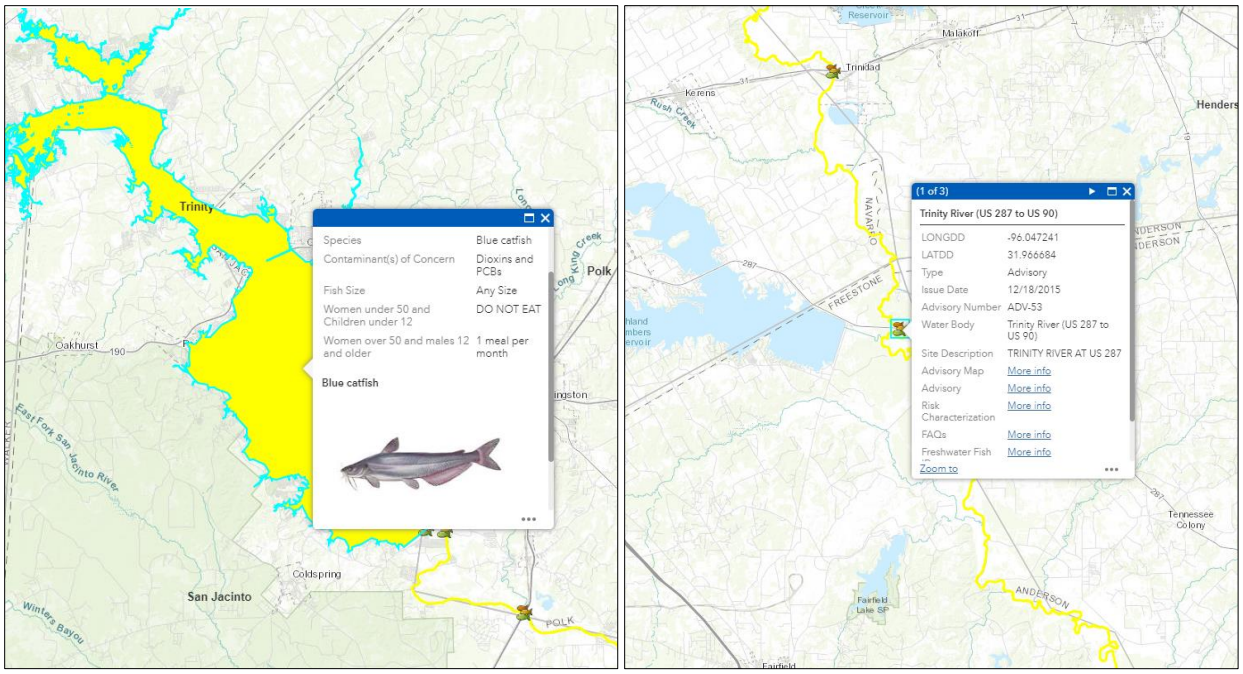
Source: https://www.nfwf.org/whoweare/mediacenter/pr/Pages/nfwf-announces-nearly-3-8-million-in-grants-to-support-electronic-technologies-in-us-fisheries-2018-1115.aspx

Tech and Tools

Texas Fish Consumption Advisory Viewer

The Texas Fish Consumption Advisory Viewer is an interactive map that allows users to identify current water body-specific health advisory information for fish from Texas waters. Users can find a waterbody by panning and zooming in on the map. Clicking on a fish icon or a yellow or red waterbody will open a pop-up window with health advisory information for that specific waterbody, which includes a detailed advisory map, species-specific fish consumption guidance, characterization of potential health effects associated with fish consumption, and Frequently Asked Questions about fish consumption.

Access the Texas Fish Consumption Advisory Viewer here.



Screen-captures of the Texas Fish Consumption Advisory Viewer. Left, waterbody pop-up window. Right, specific location within waterbody pop-up window.

For questions about the Texas Fish Consumption Advisory Viewer, contact Michael Tennant at Michael.Tennant@dshs.texas.gov.

Source: http://www.dshs.texas.gov/seafood/TFCAV.aspx

Recent Publications

Journal Articles

The list below provides a selection of research articles:

- Early life stages of northern shrimp *(Pandalus borealis)* are sensitive to fish feed containing the anti-parasitic drug Diflubenzuron
  Bechmann, R.K., E. Lyng, S. Westerlund, S.Bamber, M. Berry, M. Arnberg, A. Kringstad, P. Calosi, and P. Seear. 2018. Early life stages of northern shrimp (*Pandalus borealis*) are sensitive to fish feed containing the anti-parasitic drug Diflubenzuron. *Aquatic Toxicology* 198:82-91.

- Accumulation and elimination dynamics of the hydroxybenzoate saxitoxin analogues in mussels *Mytilus galloprovincialis* exposed to the toxic marine dinoflagellate *Gymnodinium catenatum*
  Costa, P.R., A. Braga, and A. Turner. 2018. Accumulation and elimination dynamics of the hydroxybenzoate saxitoxin analogues in mussels *Mytilus galloprovincialis* exposed to the toxic marine dinoflagellate *Gymnodinium catenatum*. *Toxins* 10(11): 428.

- Environmental context and contaminant biotransport by Pacific salmon interact to mediate the bioaccumulation of contaminants by stream-resident fish
  Gerig, B.S., D.T. Chaloner, D.J. Janetski, A.H. Moerke, R.R. Rediske, J.P. O'Keefe, D.A. de Alwis Pitts, and G.A. Lamberti. 2018. Environmental context and contaminant biotransport by Pacific salmon interact to mediate the bioaccumulation of contaminants by stream-resident fish. *Journal of Applied Ecology* 55(4):1846-1859.

- Differential mortality of North Atlantic bivalve molluscs during harmful algal blooms caused by the dinoflagellate, *Cochlodinium (a.k.a. Margalefidinium) polykrikoides*
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Upcoming Meetings and Conferences

Atlantic Estuarine Research Society Spring Meeting
April 4-6, 2019
Woodbridge, Virginia

International Conference on Molluscan Shellfish Safety
September 19, 2019
Ensenada, Baja California

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.

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