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In This Issue

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

This issue of the Fish and Shellfish Program Newsletter generally focuses on the Great Lakes.

Recent Advisory News

Ohio Sport Fish Consumption Advisory Highlights Improvements in Ottawa River

On April 3, 2017, Ohio Environmental Protection Agency (Ohio EPA) Director Craig W. Butler announced the state's new guidelines for eating fish caught from Ohio's lakes, rivers, and streams, reflecting notable improvements in the waters of the state.

The table below lists state waterbodies recognized as improved as or less restrictive than the one fish per week recommendation for certain species. Among the notable improvements from fish data collected last summer, "do not eat" advisories were removed for the Ottawa River (Toledo) for all species and replaced with less strict recommendations – a sign of improved conditions.

Altered Ohio Sport Fish Consumption Advisories		
Waterbody Name	**Species (Advisory Issue Date)**	**Meal Frequency**
Atwood Lake	Common Carp, Largemouth Bass (April 2017)	2/week
	Bluegill Sunfish, Saugeye, White Crappie (April 2017)	Unrestricted
Belmont Lake	Channel Catfish (April 2017)	2/week
	Largemouth Bass, Saugeye (April 2014)	1/month
Lake Loramie	Common Carp, Largemouth Bass (April 2017)	2/week
	Channel Catfish, Saugeye, White Crappie (April 2017)	Unrestricted
Huron River	Channel Catfish, Flathead Catfish, Frewshwater Drum (April 2017)	1/month
	Rock Bass, White Crappie (April 2017)	2/week
Ottawa River (Toledo)	Channel Catfish, Common Carp, Golden Shiner (April 2017)	1/month
	Pumpkinseed Sunfish (April 2017)	1/week
Waldhonding River	Smallmouth Bass (April 2017)	1/month

The state was able to remove the comprehensive "do not eat fish" advisory for the Ottawa River that was put in place in 1991. Fish can be part of a healthy diet and evaluations of fish tissue are showing some places where anglers can eat all of certain varieties of fish that they can legally catch. Unless otherwise notated in the new recommendations, a general advisory is in place that recommends limiting one meal each week of Ohio-caught fish. Some areas in this year's Ohio fish study were evaluated for the first time, and the general advisory was applied as a baseline. Waterbodies recognized as improved or less

restrictive than the one fish per week recommendation for certain species include Atwood, Belmont and Loramie lakes, as well as the Huron, Ottawa and Walhonding rivers.

Ohio EPA partners with Ohio Department of Health and Ohio Department of Natural Resources to develop the Sport Fish Consumption Advisory. Additional information about fish consumption safety for women of child-bearing age, pregnant and nursing mothers, and children under 15 can be found at Women, Infant and Children (WIC) Centers, local health departments, Ohio EPA and the Ohio Department of Natural Resources regional offices. The 2017 fish consumption advisory information is available online. Printed copies can be requested by calling 614-644-2160.

For more information, contact Linda Amer at linda.amer@epa.ohio.gov.

Source:
http://www.epa.state.oh.us/News/OnlineNewsRoom/NewsReleases/TabId/6596/ArticleId/1112/language/en-US/2017-ohio-sport-fish-consumption-advisory.aspx

Updated Illinois Sport Fish Consumption Advisory

On February 8, 2017, the Illinois Department of Public Health (IDPH) announced updated consumption advisories for fish caught in Illinois waters. Changes to the advisories for polychlorinated biphenyls (PCBs), as shown in the table below, are the result of continued sampling by the Fish Contaminant Monitoring Program. The advisories for some Lake Michigan fish, including lake trout, rainbow trout, Coho salmon, and carp were relaxed, and the advisories for largemouth bass were removed for Crab Orchard Lake. A more restrictive "do not eat" advisory was issued for Midlothian Reservoir carp, and a new advisory was established for Powerton Lake.

Updated Illinois Fish Consumption Advisories for PCBs

Waterbody Name	Species (Size)	Meal Frequency
Crab Orchard Lake (East of Wolf Creek Road)	Carp (All sizes)	1 meal/week
	Channel Catfish (All sizes)	1 meal/week
Crab Orchard Lake (West of Wolf Creek Road)	Channel Catfish (All sizes)	1 meal/week
Lake Michigan	Carp (All sizes)	1 meal/week
	Coho Salmon (<24")	1 meal/week
	Coho Salmon (>24")	1 meal/month
	Lake Trout (<30")	1 meal/month
	Lake Trout (>30")	Do not eat
	Rainbow Trout (<28")	1 meal/week
	Rainbow Trout (>28")	1 meal/month
Midlothian Reservoir	Carp (<20")	1 meal/week
	Carp (>20")	Do not eat
Powerton Lake	Channel Catfish (15" to 19")	1 meal/week
	Channel Catfish (>19")	1 meal/month

"The advisories are not meant to discourage people from eating fish, but should be used as a guideline to help anglers and their families decide the types of fish to eat, how frequently, and how to prepare fish for cooking to reduce possible contaminants," said IDPH Director Nirav D. Shah, M.D., J.D.

There is no known immediate health hazard from eating contaminated fish from any body of water in Illinois. The main concern for regularly eating fish listed on the advisories is the effect of long-term exposure to low levels of pesticides and chemicals, such as PCBs, dioxins, chlordane, and methylmercury.

The program is a joint effort of the Illinois Environmental Protection Agency (IEPA), IDPH, and the Illinois Department of Natural Resources (IDNR). The fish are collected by IDNR and tested by IEPA. The IDPH issues fish consumption advisories based on the IEPA test results. The updated advisory and detailed information can be found on the IDPH website: http://dph.illinois.gov/topics-services/environmental-health-protection/toxicology/fish-advisories.

For more information, call the IDPH at 217-782-5830.

Source: https://www.illinois.gov/IISNews/17-0096-IDPH_Fish_Advisory.pdf

Illinois Special Mercury Advisories

The IDPH has established a statewide methylmercury advisory for women who are or could someday become pregnant, nursing mothers, and children younger than 15 years of age. The groups included in the advisory may eat up to one meal per week of fish from any Illinois water body (in other words, up to 52 meals per year), unless special mercury advisories have been issued. Special mercury advisories are based on site-specific sampling data so they can be more restrictive than the statewide advisory. In some cases, special mercury advisories also apply to men and to women beyond childbearing age.

Changes to this year's advisory are listed in the table below and included the addition of largemouth bass to the special mercury advisories for eight Illinois lakes, as well as a more restrictive "Do not eat" advisory for Mill Creek Lake in Clark County. Several other sport fish were added to the special mercury advisories for various Illinois lakes as well. Sport fish include all species of black bass (largemouth, smallmouth and spotted), striped bass, white bass, hybrid striped bass, flathead catfish, muskellunge, northern pike, saugeye, sauger, and walleye.

Largemouth bass (*Micropterus salmoides) (Image courtesy of USFWS)*

New and Updated Illinois Special Mercury Advisories			
Waterbody Name	**Species (Size*)**	**Meal Frequency for women beyond childbearing age and males more than 15 years old**	**Meal Frequency for pregnant or nursing women, women of childbearing age, and children less than 15 years old**
Anna State Pond	Largemouth Bass	1/week	1/month
Bangs Lake	Northern Pike	1/week	1/month
	Black Crappie	Unlimited	1/week
Cache River Basin	Carp	1/week	1/month
Crystal Lake	Largemouth Bass	1/week	1/month
East Fork Lake	Walleye (>21")	1/week	1/month
Gillespie Old City Lake	Largemouth Bass	1/week	1/month
Kinkaid Lake	Black and White Crappie	Unlimited	1/week
Lake Michigan	Rock Bass (<8")	Unlimited	Unlimited
	Rock Bass (>8")	Unlimited	1/week
Lincoln Trail Lake	Largemouth Bass	Do not eat	Do not eat
Little Grassy Lake	Black Crappie	1/week	1/month
	Channel Catfish	1/week	1/month
Lusk Creek	Black Bass	1/week	1/month
Mary's River	Carp	Unlimited	1/month
Mill Creek Lake	Largemouth Bass (<19")	1/week	1/month
	Largemouth Bass (>19")	Do not eat	Do not eat
	Channel Catfish	1/week	1/month
	Black and White Crappie	1/week	1/month
Ohio River	Sauger (<14")	1/week	1/month
Pinckneyville City Lake	Largemouth Bass (>18")	1/week	1/month
Red Hills Lake	Largemouth Bass	1/week	1/month
Siloam Springs Lake	White Crappie	1/week	1/month
	Bluegill	1/week	1/month
Thompson Lake	Largemouth Bass	1/week	1/month
	Carp	Unlimited	1/week

*** All sizes unless noted otherwise.**

For more information, contact the IDPH at 217-782-5830 or visit http://dph.illinois.gov and search for "fish advisories." The current methylmercury advisories are available for downloading. You can also search for specific Illinois waters with the Current Fish Advisory Map.

Sources: https://www.ifishillinois.org/regulations/special-mercury-advisory-2016-121216.pdf and http://dph.illinois.gov/topics-services/environmental-health-protection/toxicology/fish-advisories/map

EPA News

EPA Presents Great Lakes Restoration Initiative Report to Congress and the President

On August 7, 2017, the U.S. Environmental Protection Agency (EPA) Office of Water announced, as leader of the of Great Lakes Interagency Task Force, it has submitted a report to Congress and the President, which summarizes

progress under the Great Lakes Restoration Initiative (GLRI) during 2016. As required, the report provides detailed information on GLRI accomplishments and funding allocations for participating federal agencies on a yearly basis.

"I'm proud that through the Great Lakes Restoration Initiative, we are fulfilling our mission to restore the health of the water that so many of our communities depend on," said EPA Administrator and Great Lakes Interagency Task Force Chair Scott Pruitt. "As we now understand more than ever, we don't have to choose between the health of our environment and the health of our economy – we can have both."

The GLRI was launched in 2010 to accelerate efforts to protect and restore the Great Lakes. With more than $2.3 billion in GLRI investments and strong bipartisan support, 11 federal departments and partners from states, tribes, academia, and businesses are working together to produce unprecedented results, including:

- increasing property values and property tax bases by cleaning up "Areas of Concern"(AOCs), 43 highly contaminated sites targeted for cleanup by the United States and Canada;
- preventing the introduction of silver and bighead carp, species that threaten the region's economy and ecology; and
- working with the agricultural community to reduce nutrient runoff to sensitive waterways.

Since 2010, the GLRI has helped fund more than 3,500 projects to improve water quality, protect and restore native habitats and species, prevent and control invasive species, and address other Great Lakes environmental problems. In 2014, the Great Lakes Interagency Task Force developed a five-year plan to strategically guide GLRI actions from 2015-2019 and to target resources to address the biggest threats to the Great Lakes ecosystem. More information about the GLRI, including an interactive project map, is available at www.glri.us.

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

Source: https://www.epa.gov/newsreleases/epa-presents-great-lakes-restoration-initiative-report-congress-and-president

Other News

Overview of the Great Lakes Consortium for Fish Consumption Advisories

The Great Lakes Consortium for Fish Consumption Advisories (Consortium) is a collaboration of fish advisory program managers from U.S. federal and state (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin) governmental health, water quality, and fisheries agencies bordering the Great Lakes. The Ministry of the Environment and Climate Change of Ontario, Canada, participates as does the Great Lakes Indian Fish and Wildlife Commission.

History

In the early 1980s, the Consortium began as an ad hoc task force. In 1986, as a part of the Great Lakes Toxic Substances Control Agreement, the group was formally established as the Council of Great Lakes Governors' Great Lakes Sport Fish Consumption Advisory Task Force (Task Force). The Task Force was charged by the Council of Great Lakes Governors (Council) with developing common fish advisories for important sport fish species that range widely in open waters of the Great Lakes (Lakes Superior, Michigan, Huron, Erie and Ontario). In response to the Council's charge, the Task Force developed a method for assessing risks and issuing fish consumption advice so that advice issued by each Great Lakes state would be consistent in protecting the health of people who consume Great Lakes fish.

Goals guiding the Consortium's work:

- Use, share, and advance credible data and science;
- Evaluate the risks and benefits of consuming Great Lakes fish to develop a shared understanding among Consortium members and incorporate these messages into fish consumption advice;
- Establish and utilize best practices for communicating risks and benefits and influencing the behavior of fish consumers; and
- Maintain a strong focus in all activities on developing and disseminating consistent advice for shared waters.

Protocols and Papers Issued

1993 - "Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory." (PCB Protocol)
http://www.health.state.mn.us/divs/eh/fish/consortium/pastprojects/pcbprotocol.pdf

Three sets of facts were important in the development of the PCB Protocol. First, PCB concentrations found in fish from the Great Lakes region were and remain higher than many other locations in the United States. However, PCB contamination ranges widely and is not an issue for all fish species or locations. Second, surveys found that anglers and many others living in the Great Lakes region eat fish at rates far greater than national averages. Third, the Consortium recognized that anglers tend to concentrate their fishing in specific geographical locations. Based on these facts and the health risks posed by PCBs, the Consortium concluded that the PCB Protocol should result in adequate health protection and accommodate people's desire and the health benefits of eating fish. Note: many Great Lakes fish species are caught, harvested, and sold in commercial fish markets (e.g. Lake Trout, Walleye, Catfish, Smelt, Perch, Buffalo, and Common Carp).

2007 - A Protocol for Mercury-based Fish Consumption Advice
(http://www.health.state.mn.us/divs/eh/fish/consortium/pastprojects/mercuryprot.pdf), an addendum to the PCB Protocol.

This mercury protocol was developed to address all Great Lakes and other Great Lakes region waters. Like the PCB Protocol, this addendum recommends a Health Protection Value and provides guidelines for deriving consumption advice for mercury-based advisories. Merging advice for purchased fish with advice for locally caught fish on a state or local scale is addressed in mercury-based advisories. The resulting mercury advice may differ between waters and among states due to differences among mercury concentrations in different species, differences in mercury concentrations among geographical areas, and other factors including implementation issues and differences in risk evaluations.

2015 – "Discussion Paper for a Chlordane Health Protection Value (HPV)"
http://www.health.state.mn.us/divs/eh/fish/consortium/pastprojects/chlordaneprot.pdf

2015 - "Potential for Human Exposure to Toxaphene through Consumption of Great Lakes Fish"
http://www.health.state.mn.us/divs/eh/fish/consortium/pastprojects/toxaphenepdf.pdf

Current Mission and Activities

The Consortium's mission is to provide the primary forum for collaboration on data and guidance for Great Lakes fish consumption advisories. The Consortium shares and reviews data on fish contaminants, evaluates health risks and benefits of locally caught fish consumption, shares and coordinates approaches for health education and community engagement, and conducts evaluations of the effectiveness of fish consumption advisories that have been issued by Consortium States.

Since 2010, the Consortium has received several GLRI grants, funded by the EPA Great Lakes National Program Office through the Minnesota Department of Health (MDH). The goals of these grants were to enhance fish consumption advisory programs in the Great Lakes Basin, improve the public's understanding of risks and benefits of consuming fish, improve fish monitoring programs, evaluate risks and benefits of consuming fish, and establish health collaborations to reduce toxics exposures.

Through the GLRI, the Consortium conducts regular teleconferences to discuss topics of interest and invite experts to present their research. Topics have included:

- Fish sampling and analysis
- Risk assessments for contaminants in fish
- EPA Program updates
- Risk communication research
- Risks and benefits analysis for fish consumption
- Microplastics in the Great Lakes
- Brominated diphenyl ether compounds (BDEs)
- Perfluorinated compounds (PFCs)
- Fish consumption beneficial use impairments in the Great Lakes AOCs

Juvenile Lake Sturgeon (*Acipenser fulvescens*) *(Image courtesy of USGS)*

The Consortium holds a face-to-face meeting, approximately annually, for members to give updates, present research and data, discuss new and innovative fish consumption advisory communication approaches, and maintain current scientific knowledge on new and emerging bioaccumulating contaminants in the Great Lakes basins. Additionally, Consortium members focus on current science related to health risks, risk communication, and interstate/interagency collaboration for developing credible fish consumption advisories for Great Lakes fish.

For more information, contact James Stahl, Indiana Department of Environmental Management, (jstahl@idem.IN.gov) and Pat McCann, MDH, Co-Chair, Great Lakes Consortium for Fish Consumption Advisories (patricia.mccann@state.mn.us).

Additional information is available at http://www.health.state.mn.us/divs/eh/fish/consortium/index.html, which is hosted by MDH.

Great Lakes Health Collaboration to Reduce Toxics Exposures – Final Report

On January 26, 2017, the MDH released the final report of the Great Lakes Health Collaboration to Reduce Toxics Exposure, the result of a partnership with the Human Dimensions Research Unit in the Department of Natural Resources at Cornell University; Minnesota-based healthcare systems HealthPartners Institute and Essentia Health; the Lake County Health and Human Services WIC program; the MDH WIC program; and the Consortium, to protect human health through safer fish consumption. This collaboration of state and local public health, together with health care providers, supported increased protection for Great Lakes fish consumers from toxic substances, such as mercury and PCBs.

The final report notes that mercury in fish is a major cause of fish consumption advisories in the Great Lakes Basin. Although reductions in exposure to other toxic substances in fish are expected to follow, this particular study focused on the reduction in mercury exposure in women of childbearing age.

The study had three major objectives:

1) Develop evidence-based public health education for fish consumption that reduces exposure to toxic substances in women of childbearing age
2) Evaluate effects of public health education on actual behavior using a diary study
3) Expand use of MDH Fiscal Year 2012 GLRI Project Outputs (specifically the Lake County Mercury Screening Project and risk benefit training for health care providers developed as part of the Fish are Important for Superior Health (FISH) Project)

The final report found that increasing the public's understanding of the risks and benefits of eating fish help them make better choices at the market . *(Image courtesy of EPA)*

Conclusions of the study found that the development of evidence-based education that promoted safer fish consumption and the delivery of that education through health care systems resulted in reductions in mercury exposure in women who are or may become pregnant. Two-thirds of the women (all of childbearing age and anglers - who are more likely than other women to eat fish) reported eating less than one meal of fish each week – most of which are reportedly low in mercury. Purchased fish accounted for more than 80% of the fish meals. Two-thirds of these purchased fish consumed are classified as low-mercury fish by the EPA/U.S. Food and Drug Administration. Only 3-5% of women of childbearing age exceeded federal consumption guidelines for purchased fish. Nevertheless, one-quarter of women exceeded state and federal guidelines that include both

purchased and locally caught fish. The number of women exceeding these guidelines varied considerably from state to state. In Ohio, Illinois, and Wisconsin, 12-19% of women exceeded these guidelines. In New York and Indiana, 25-29% of women exceeded these guidelines. In Pennsylvania, Minnesota, and Michigan, 35-42% of women exceeded these guidelines.

Additionally, the study found that using a narrative format for fish consumption guidelines was very effective. Brochures that feature, for instance, a story about how a hypothetical woman learned about which fish she could eat safely increased fish consumption among women who were eating the least amount of fish. Based on these results, estimated projections show that for every 10,000 narrative brochures distributed, 2,797-3,330 women of childbearing age would eat more fish, totaling 14,544-17,316 more fish meals each year. This increase in fish consumption would not result in any more women exceeding fish consumption guidelines. Furthermore, for every 10,000 narrative brochures distributed, 76-90 women of childbearing age who are currently exceeding fish consumption guidelines would eat fewer fish (totaling 1,011-1,197 fewer fish meals each year).

Results from this project, as well as other GLRI funded fish advisory related projects, were shared among members of the Consortium through conference call and face-to-face meetings. These meetings facilitated use of project results by Consortium states to enhance their programs to communicate the risks and benefits of fish consumption.

The final report concludes that this project resulted in reduced chemical exposure to at-risk Great Lakes fish consumers by (1) utilizing successful public health system practices and resources, and (2) partnering with health care and public health professionals, in accordance with the GLRI Action Plan, to “Protect Human Health through Safer Fish Consumption.”

For more information, contact Patricia McCann at patricia.mccann@state.mn.us.

Source: http://www.health.state.mn.us/divs/eh/fish/consortium/2013finalrep.pdf

State of the Great Lakes 2017

On June 19, 2017, the Governments of Canada and the United States released the 2017 State of the Great Lakes reports. Overall, the Great Lakes are assessed as Fair and Unchanging. While progress to restore and protect the Great Lakes has been made, including the reduction of toxic chemicals, challenges remain with issues such as invasive species and nutrients.

The Governments reported that the assessments of the Great Lakes help them to identify current, new, and emerging challenges to Great Lakes water quality and ecosystem health. Assessments also help the Governments evaluate the effectiveness of programs and policies in place to address challenges, and help inform and engage others.

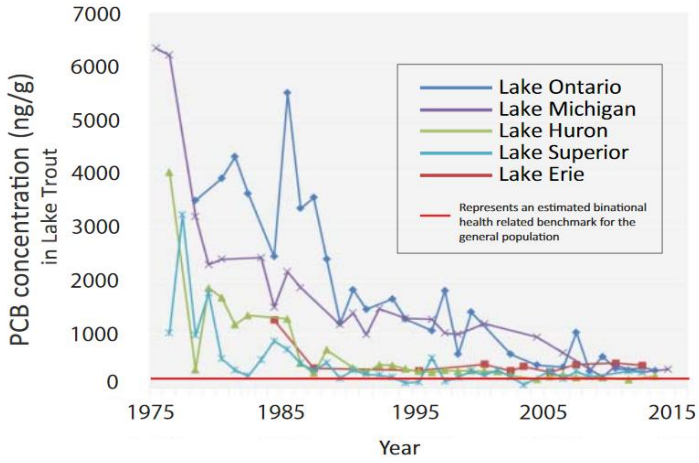
The Governments of Canada and the United States, together with their many partners in protecting the Great Lakes, have agreed on a set of nine indicators of ecosystem health. These indicators are in turn supported by 44 sub-indicators, measuring such things as concentrations of contaminants in water and fish tissue, changes in the quality and abundance of wetland habitat, and the introduction on and spread of invasive species. To create this

report, more than 180 government and non-government Great Lakes scientists and other experts worked to assemble available data to populate the suite of sub-indicators and to agree on what the indicators mean. Each indicator was assessed in relation to both status and trend. Status is defined as Poor, Fair, or Good. Trend is defined as Deteriorating, Unchanging, or Improving.

The **Fish Consumption** sub-indicator reveals that in all the Great Lakes, contaminants in edible portions of fish have declined over time. However, in Lakes Erie and Huron, recent concentrations of PCBs and mercury are stable or slightly increasing.

Sub-Indicators Supporting the Indicator Assessment					
Sub-Indicator	**Lake Superior**	**Lake Michigan**	**Lake Huron**	**Lake Erie**	**Lake Ontario**
Contaminants in Edible Fish	Status: Fair Trend: Unchanging	Status: Fair Trend: Improving	Status: Fair Trend: Unchanging	Status: Fair Trend: Deteriorating	Status: Fair Trend: Improving

Contaminants causing consumption restrictions of Great Lakes fish typically include PCBs, mercury, and dioxins. PCBs drive the majority of fish consumption advice in both the United States and Canada. PCB levels in edible portions of fish tissue have decreased by 90% in some cases, but are all above consumption benchmarks. Mercury levels have generally declined over the last four decades and, depending on the fish species and lake, are lower than most fish consumption advisory benchmarks. However, in Lakes Erie and Huron, PCBs and mercury have remained stable or are slightly increasing. Non-legacy contaminants such as perfluorooctanesulfonic acid (PFOS) continue to be a monitoring priority and will be included in future State of the Great Lakes reporting as necessary.



PCBs in Edible Fish Tissue have Declined But Are Still Above Guidelines (*Image courtesy of the Canada-US Collaboration for Great Lakes Water Quality, State of the Great Lakes 2017 report*)

The results for the studies pertaining to the **Toxic Chemicals** sub-indicator mirror these insights: overall status of toxic chemicals in the Great Lakes is fair and the trend is unchanging to improving since the last report. Some toxic chemicals in the Great Lakes have declined substantially over the past 40 years. While significant progress has been made, the Great Lakes are still experiencing concentrations of some toxic chemicals, such as PCBs, that pose a threat to human health and the environment.

For more information about the State of the Great Lakes reporting and to access the reports, visit the following websites: binational.net, https://www.canada.ca/en/environment-climate-change/services/great-lakes-protection/how-great-lakes-are-doing.html, and www.epa.gov/greatlakes.

Source: https://binational.net/2017/06/19/sogl-edgl-2017/.

Recently Awarded Research

EPA Awards $120,000 to Illinois for Project in Waukegan Harbor

On July 26, 2017, EPA Region 5 announced a $120,000 grant to the IDNR for a project to assess the health of the Waukegan Harbor AOC on Lake Michigan. Waukegan Harbor is one of 43 contaminated sites on the Great Lakes designated as an AOC by the United States and Canada under the 1987 Great Lakes Water Quality Agreement.

IDNR will use EPA's funding to partner with the University of Illinois to assess populations of phytoplankton and zooplankton at Waukegan Harbor and North Point Marina. Plankton communities are an indicator of water quality and will help determine when Waukegan Harbor has recovered sufficiently to be removed from the binational list of AOCs.

"This funding from the Great Lakes Restoration Initiative is critical to bringing Waukegan Harbor one step closer to delisting as an Area of Concern," said Diane Tecic, coastal management program director at IDNR. "We hope that the sampling and analysis of these micro-organisms will show that the cleanup has been successful, and the aquatic community is returning to normal."

The Waukegan Harbor cleanup was completed in 2014 after more than 20 years of federal, state, and local efforts. EPA, the State of Illinois, and parties responsible for contaminating the harbor spent $150 million to remove or cap PCB-contaminated sediment, clean up the Outboard Marine Superfund Site, and restore habitat in the AOC. EPA continues to monitor the recovery at this site. The work was funded by the GLRI, EPA's Superfund program, and the American Recovery and Reinvestment Act. The City of Waukegan also worked with federal and state agencies to eliminate combined sewer overflows, improve beaches, and create valuable dune and swale habitat. EPA continues to monitor the progress of the ongoing recovery at this AOC.

More information about the Waukegan Harbor AOC can be found at https://www.epa.gov/waukegan-harbor-aoc.

For more information, contact Allison Lippert at lippert.allison@epa.gov.

Source: https://www.epa.gov/newsreleases/epa-awards-120000-illinois-project-waukegan-harbor.

Recent Publications

Journal Articles

The list below provides a selection of research articles focusing on the Great Lakes.

- Selective uptake and bioaccumulation of antidepressants in fish from effluent-impacted Niagara River
  Arnnok, P., R.R. Singh, R. Burakham, A. Pérez-Fuentetaja, and D. S. Aga. 2017. Selective Uptake and Bioaccumulation of Antidepressants in Fish from Effluent-Impacted Niagara River. *Environmental Science & Technology*. 51(18):10652-10662.

- Comprehensive emerging chemical discovery: Novel polyfluorinated compounds in Lake Michigan trout
  Baygi, S.F., B.S. Crimmins, P.K. Hopke and T.M. Holsen. 2016. Comprehensive Emerging Chemical Discovery: Novel Polyfluorinated Compounds in Lake Michigan Trout. *Environmental Science & Technology*. 50(17): 946-9468.

- Mercury levels in herring gulls and fish: 42 years of spatio-temporal trends in the Great Lakes
  Blukacz-Richards, E.A., A. Visha, M.L. Graham, D.L. McGoldrick, S. R. de Solla, D. J. Moore, and G.B. Arhonditsis. 2017. Mercury levels in herring gulls and fish: 42 years of spatio-temporal trends in the Great Lakes. *Chemosphere*. 172:476-487.

- Micronuclei and other erythrocyte nuclear abnormalities in fishes from the Great Lakes Basin, USA
  Braham, R.P., V.S. Blazer, C.H. Shaw, and P.M. Mazik. 2017. Micronuclei and other erythrocyte nuclear abnormalities in fishes from the Great Lakes Basin, USA. *Environmental and Molecular Mutagenesis* 58(8):570-581.

- Consumption of Lake Ontario sport fish and the incidence of colorectal cancer in the New York State Angler Cohort Study (NYSACS)
  Callahan, C.L., J.E. Vena, J. Green, M. Swanson, L. Mu, M.R. Bonner. 2017. Consumption of Lake Ontario sport fish and the incidence of colorectal cancer in the New York State Angler Cohort Study (NYSACS). *Environmental Research*. 154:86-92.

- Climate change as a long-term stressor for the fisheries of the Laurentian Great Lakes of North America
  Collingsworth, P.D., D.B. Bunnell, M. W. Murray, Y.-C. Kao, Z.S. Feiner, R.M. Claramunt, B.M. Lofgren, T.O. Höök, and S. A. Ludsin. 2017. Climate change as a long-term stressor for the fisheries of the Laurentian Great Lakes of North America. *Reviews in Fish Biology and Fisheries*. 27(2):363-391.

- Are women anglers of childbearing age in the Great Lakes region following fish consumption guidelines?
  Connelly, N.A., T.B. Lauber, J. Niederdeppe, and B.A. Knuth. 2017. Are women anglers of childbearing age in the Great Lakes region following fish consumption guidelines? *Journal of Great Lakes Research*. 43(3):187-191.

- Contaminants of emerging concern in tributaries to the Laurentian Great Lakes: I. Patterns of occurrence
  Elliot, S.M., M.E. Brigham, K.E. Lee, J.A. Banda, S.J. Choy, D.J. Gefell, T.A. Minarik, J.N. Moore, and Z. G. Jorgenson. 2017. Contaminants of emerging concern in tributaries to the Laurentian Great Lakes: I. Patterns of occurrence. *Public Library of Science One.* 12(9): e0182868.

- Spatial and temporal dynamics of nearshore fish communities in Lake Michigan and Lake Huron
  Fetzer, W.W., B.M. Roth, D.M. Infante, D.F. Clapp, R.M. Claramunt, D.G. Fielder, D.K. Forsyth, J.X. He, T.J. Newcomb, C.M. Riseng, K.E.Wehrly, and T.G. Zorn. 2017. Spatial and temporal dynamics of nearshore fish communities in Lake Michigan and Lake Huron. *Journal of Great Lakes Research*. 43(2): 319-334.

- Polybrominated diphenyl ethers (PBDEs) in Great Lakes fish: Levels, patterns, trends and implications for human exposure
  Gandhi, N., S.B. Gewurtz, K.G. Drouillard, T. Kolic, K. MacPherson, E.J. Reiner, and S. P. Bhavsar. 2017. Polybrominated diphenyl ethers (PBDEs) in Great Lakes fish: Levels, patterns, trends and implications for human exposure. *Science of The Total Environment*. 575:907-916.

- Retrospective analysis of organophosphate flame retardants in herring gull eggs and relation to the aquatic food web in the Laurentian Great Lakes of North America
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- Congener specific determination of polychlorinated naphthalenes in sediment and biota by gas chromatography high resolution mass spectrometry
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- Concentration and distribution of contaminants in lake trout and walleye from the Laurentian Great Lakes (2008–2012)
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- Polychlorinated biphenyls and polychlorinated dioxins–furans in lake trout and whitefish composite samples from commercial fisheries in Lakes Erie, Huron, and Superior
  Rawn, D.R.K., M. Dowd, M.J.S. Scuby, P.P. Pantazopoulos, and M. Feeley. 2017. Polychlorinated Biphenyls and Polychlorinated Dioxins–Furans in Lake Trout and Whitefish Composite Samples from Commercial Fisheries in Lakes Erie, Huron, and Superior. *Journal of Food Protection*. 80(8): 1228-1238.

- Lake trout spawning habitat suitability at two offshore reefs in Illinois waters of Lake Michigan
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- Vertical distribution of alewife in the Lake Ontario offshore: Implications for resource use
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- Estimation of omega-3 fatty acid (EPA + DHA) intake from Lake Ontario fish based on provincial consumption advisories
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- Contaminants of emerging concern in tributaries to the Laurentian Great Lakes: II. Biological consequences of exposure
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- Deepwater sculpin status and recovery in Lake Ontario
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- Variation in the essential fatty acids EPA and DHA in fillets of fish from the Great Lakes region
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Upcoming Meetings and Conferences

The Society for Integrative & Comparative Biology Annual Meeting 2018
January 3–7, 2018
San Francisco, California

Aquaculture America 2018
February 19-22, 2018
Las Vegas, Nevada

9th International Crustacean Congress (ICC 9)
May 22–25, 2018
Washington, District of Columbia

148th Annual Meeting of the American Fisheries Society – Communicating the Science of Fisheries to Diverse Audiences
August 19–23, 2018
Atlantic City, New Jersey

19th International Conference on Shellfish Restoration & Shellfish Reef Restoration Network Meeting
February 19–21, 2018
Adelaide, Australia

110th Annual National Shellfisheries Association Meeting
March 18–22, 2018
Seattle, Washington

9th International Charr Symposium
June 18–21, 2018
Duluth, Minnesota

International Conference on Engineering and Ecohydrology for Fish Passage
December 10-14, 2018
New South Wales, Australia

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.