EPA United States Environmental Protection Agency

Fish and Shellfish Program NEWSLETTER

November/
December 2017
EPA 823-N-17-011

In This Issue

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

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

Recent Advisory News

Louisiana Department of Health Reopens New Orleans Area Oyster Waters

The Louisiana Department of Health (LDH) reopened New Orleans-area oyster growing waters, Areas 1-13, effective 30 minutes before sunrise on Friday, October 13, 2017. The areas had previously been closed as a precaution due to adverse weather conditions from Tropical System Nate.

LDH conducted water and oyster meat testing in the affected areas following the passing of Tropical System Nate, and found that the environmental conditions were within the requirements specified by the National Shellfish Sanitation Program. The affected parishes included Orleans, St. Bernard, Plaquemines, Jefferson, and Lafourche.

LDH has notified local oyster harvesters who work in the affected area, as well as the Louisiana Oyster Task Force and the U.S. Food and Drug Administration (FDA).

Click here to view the reopening order, signed by State Health Officer Dr. Jimmy Guidry and LDH Secretary Dr. Rebekah Gee. More information about LDH's Molluscan Shellfish Program can be found here.

To learn more about LDH, visit www.ldh.la.gov. For up-to-date health information, news and emergency updates, follow LDH's Twitter account, Facebook and blog.

Source: http://www.dhh.louisiana.gov/index.cfm/newsroom/detail/4391

Public Notice of the Re-Opening of Waters to Shellfish Harvest

On September 26, 2017, the New Jersey Department of Environmental Protection (DEP) immediately suspended harvest in areas that were impacted by degraded water quality resulting from the release of sewage from a broken sewer line into the waters of Beach Thorofare in Atlantic County. At that time, DEP closed all the Approved waters of Risley Channel, Dock Thorofare, Whirlpool Channel, Shelter Island Bay, and Lakes Bay North of

the Margate Bridge. The reported sewage discharge was 4-6 million gallons per day. The discharge was terminated on September 28,2017.

Water samples were collected daily both north and south of the discharge to monitor for impacts. On October 6, 2017, DEP determined through monitoring of water quality and shellfish tissue that the Approved waters of Risley Channel, Dock Thorofare, Whirlpool Channel, Shelter Island Bay, and Lakes Bay North of the Margate Bridge were once again safe for the harvesting of shellfish in accordance with New Jersey Administrative Code Title 7 Chapter 12, et seq. The prohibition was lifted and the waters returned to their prior classification, effective immediately.

For more information, contact the New Jersey Bureau of Marine Water Monitoring at 609-748-2000.

Source: http://www.nj.gov/dep/bmw/news.html

Sport-Harvested Mussel Quarantine Lifted Along the California Coast

California Department of Public Health (CDPH) Director and State Public Health Officer Dr. Karen Smith announced the statewide annual quarantine on mussels gathered by sport harvesters was lifted at midnight on Tuesday, October 31, 2017, for all coastal counties except for Sonoma County.

Dangerous levels of paralytic shellfish poisoning (PSP) toxins have been detected in mussels from Sonoma County, making them unsafe to consume. PSP is a form of nervous system poisoning. Concentrated levels of the toxins can develop in mussels and other bivalve shellfish when they feed on certain naturally occurring marine plankton that can increase during favorable environmental conditions.

PSP toxins remain at low or undetectable levels along all other portions of the California coast.

The annual quarantine on sport-harvested mussels, which typically runs May 1 through October 31, is intended to protect the public from shellfish poisoning caused by marine biotoxins. There have been no reports of shellfish-related poisonings in California during this quarantine period.

CDPH's shellfish sampling and testing programs issue warnings or quarantines when needed. Local health departments, various state, federal and tribal agencies, community groups, and others participate in the monitoring program. Residents and community groups interested in volunteering to assist with the testing program should email RedTide@cdph.ca.gov or call (800) 553-4133.

Updated information about current conditions is available by calling the Shellfish Information Line at (800) 553-4133. More information can be found on the CDPH Marine Biotoxin Monitoring Web page or the CDPH Annual Mussel Quarantine - Frequently Asked Questions (FAQ) Web page.

Due to the persistent presence of domoic acid in razor clams from beaches in Humboldt and Del Norte counties, the California Department of Fish and Wildlife (CDFW) closure of the razor clam fishery remains in effect at those

locations. More information about the razor clam fishery closure can be found on the CDFW Ocean Health Advisories Web page.

For more information, contact Corey Egel at 916-440-7259 or CDPHpress@cdph.ca.gov.

Source: https://www.cdph.ca.gov/Programs/OPA/Pages/NR17-078.aspx

EPA News

EPA Region 10 Awards Environmental Justice Small Grants to Local Communities and Tribes in Alaska and Oregon

On October 20, 2017, the U.S. Environmental Protection Agency (EPA) awarded Environmental Justice Small Grants to the Sitka Tribe in Alaska (STA); Three Degrees Warmer in Anchorage, Alaska; and Trash for Peace in Portland, Oregon. EPA's Environmental Justice Small Grants program provides funding for non-profit and tribal organizations to partner with stakeholders in industry, government, and academia.

The $30,000 Environmental Justice Small Grant awarded to STA supports the project "Microplastics in Tribal Subsistence Foods in Southeast Alaska," which includes a focus on fish- and shellfish-related issues. Project partners include University of Alaska, Mount Edgecumbe High School, Southeast Alaska Watershed Coalition, and the Sitka Conservation Society. The body of research about microplastics in the ocean and their effect on marine and terrestrial animals has increased substantially in the past ten years. Over the course of one year, STA will collect water and subsistence food samples from four locations within STA's traditional territory to test for the presence of microplastics and associated toxins. Local students will assist in sampling of local food and water, and samples will be analyzed by the University of Alaska. These results will be compared to commercially purchased foods and safety standards. STA will share these results with the public so people can make informed decisions about harvesting traditional foods. Proposed outputs include: 72 subsistence food samples, 18 commercial food samples, and 12 water samples collected and tested.

A woman subsistence fishing with a siene net *(Image courtesy of the National Park Service)*

EPA's Environmental Justice Small Grants Program is designed to help communities understand and address exposure to multiple environmental harms and risks, and funds projects up to $30,000 a year.

For 2017 Environmental Justice Small Grant recipients and project descriptions: https://www.epa.gov/environmentaljustice/environmental-justice-small-grants-program-project-descriptions-2017

For more information on the Environmental Justice Small Grants Program, including descriptions of previously funded grants: https://www.epa.gov/environmentaljustice/environmental-justice-small-grants-program.

Source: https://www.epa.gov/newsreleases/epa-awards-environmental-justice-small-grants-local-communities-and-tribes-alaska-and

Other News

Pacific Shellfish Institute Final Report to ISSC: "Techniques and Practices for Vibrio Reduction"

On January 9, 2017, the Pacific Shellfish Institute (PSI) gave the final report to the Interstate Shellfish Sanitation Conference (ISSC), which contained a summary of PSI's studies funded by the ISSC between October 1, 2014 and August 31, 2016. One study was conducted at a location near Lilliwaup, Washington. Preliminary conclusions indicate that *Vibrio parahaemolyticus* (*V.p.*) levels in intertidal cultivated shellfish could be decreased if exposed to the ambient water. If *V.p.* infected oysters are submerged in deeper water at lower temperatures, in theory the rate of *V.p.* infection and its development are suppressed. These conditions can cause the bacteria to be removed from oysters that are infected. The study's results will aid farm-based *V.p.* reduction/avoidance techniques. Additionally, the PSI tested a procedure to reduce oyster saxitoxin levels that cause Paralytic Shellfish Poisoning.

To read PSI's final report, please visit http://www.issc.org/Data/Sites/1/media/00-2017executiveboardmeeting/psi-vibrio-research-hama-hama-2016-final-report.pdf.

Risk of Toxic Shellfish on West Coast Increases with Water Temperature

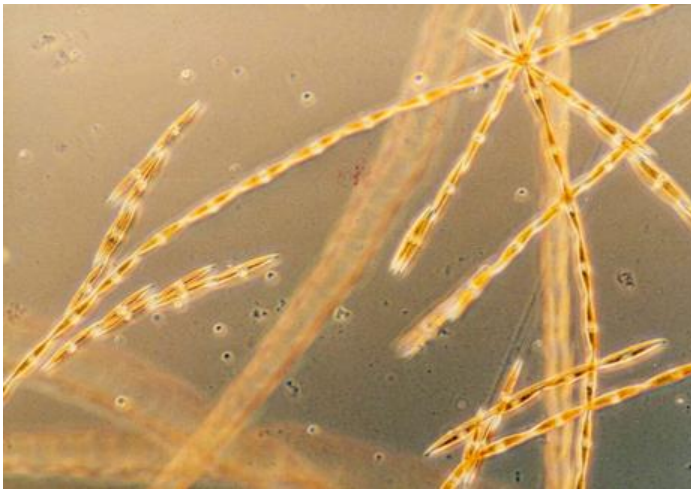
High levels of domoic acid, a shellfish toxin, are correlated with warmer ocean temperatures offshore of Oregon and Washington. A National Oceanic and Atmospheric Administration (NOAA) National Centers for Coastal Ocean Science (NCCOS) supported a research team led by scientists from Oregon State University, the University of Oregon, and the Oregon Department of Fish and Wildlife that found an association between domoic acid levels in shellfish and climate-scale warm ocean conditions that gives a unique, large-scale perspective relative to previous work. The strong connection with anomalously warm ocean conditions, announced by NOAA on January 9, 2017, has implications for greater outbreak occurrence as oceans continue to warm due to climate change.

The team also produced a climate-based model, which predicts the time and location of domoic acid levels in Oregon and Washington shellfish that could exceed public safety limits. This tool, along with the study's findings, are expected to lead to enhanced West Coast Harmful Algal Bloom (HAB) forecasting and will enable targeted fishery closures and openings to avoid economic distress while protecting public health.

These findings came out of a first of its kind Oregon HAB monitoring and research pilot project aimed at demonstrating a viable strategy to address state, regional, and NOAA research and management needs. The

NCCOS-sponsored Monitoring Oregon Coastal Harmful Algae (MOCHA) project was Oregon's first coastal HAB monitoring and research program.

The 5-year project (2007-2012) funded by NOAA's Monitoring and Event Response for Harmful Algal Blooms (MERHAB) collected the first extensive time series database of the Oregon coast's biological, chemical, and physical variables in both the surf zone and offshore habitat over a variety of sampling scales, scientific data necessary to describe both HAB occurrence in Oregon and the underlying ecological mechanisms to inform future HAB monitoring and forecasting.



Pseudo-nitzschia is a marine alga that can cause domoic acid poisoning *(Photo courtesy of NOAA)*

HAB events in Oregon along the West Coast are increasing in frequency, duration, and intensity, and are increasingly threatening to coastal economies, ecosystems, and public health. Two of the major algal toxins of interest along the West Coast are domoic acid, produced by some species of the diatom algal genus *Pseudo-nitzschia*, and saxitoxins that are produced by certain dinoflagellate algae, including some species of *Alexandrium*. Prior to the MOCHA project, these toxins and algae had been understudied along the Oregon coast in comparison to other West Coast states.

Historical shellfish toxin databases (decades long) and more detailed case-study observations of two individual HAB events that occurred during the MOCHA project were compiled to provide the first detailed overview of HAB occurrence in the Oregon coastal region. The case studies investigated the following questions by combining shipboard and coastal HAB monitoring data with concurrent wind and sea surface temperature data: (1) how informative are HAB cell counts at the coast as a proxy of HAB events; (2) what was the spatial extent of these HAB events offshore; and (3) what can be learned regarding HAB initiation and movement from pairing time series wind and sea surface temperature proxies with HAB observations.

MOCHA scientists identified a number of parameters related to HAB formation that can be utilized as precursors of an increased likelihood of HAB events: cell counts of HAB-forming dinoflagellates, concentrations of domoic acid, and downwelling/relaxation events that facilitate onshore transport of HAB species or toxins detected offshore via ship or automated mooring. Additionally, MOCHA research has found warm phases of the Pacific Decadal Oscillation to be a reliable proxy of domoic acid events. All of these measurements should be considered in any saxitoxins- or domoic acid-monitoring program aimed at early detection in the California Current regime.

Preservation and continuation of all vital time-series used by the MOCHA team, including the offshore collection of plankton (including HAB species) by the NOAA Northwest Fisheries Science Center, allow for early detection of nascent HAB events and enhance our composite understanding of long-term changes in planktonic community structure in relation to climate oscillations and large-scale and local environmental forcing.

Learn more about the MOCHA project and their results in the journals *Harmful Algae* and the *Proceedings for the National Academy of Sciences*.

Project Products

Publications

- McKibben, S.M., K.S. Watkins-Brand, A.M. Wood, M. Hunter, Z. Forster, A. Hopkins, X. Du, B.T. Eberhart, W.T. Peterson, and A.E. White. 2015. Monitoring Oregon Coastal Harmful Algae: Observations and implications of a harmful algal bloom-monitoring project. *Harmful Algae* 50: 32 -44
- Du, X., W.T. Peterson, J. Fisher, M. Hunter, J. Peterson. Initiation and Development of a Toxic and Persistent Pseudo-nitzschia Bloom off the Oregon Coast in Spring/Summer 2016. *PLoS ONE* 11(10): e0163977
- McKibben, S.M., W.T. Peterson, A. M. Wood, V.L. Trainer, M. Hunter, and A.E. White. Climatic regulation of the neurotoxin domoic acid. 2017. *PNAS* 114 (2) 239-244

For more information, contact MERHAB program manager Marc.Suddleson@noaa.gov.

Source: https://coastalscience.noaa.gov/news/risk-toxic-shellfish-west-coast-increases-water-temperature/

ISSC/FDA National *Vibrio parahaemolyticus* Draft Workshop Report Available

The ISSC/FDA National *V.p.* Workshop was held on September 6-7, 2017 in Baltimore, Maryland. A number of experts gave presentations which covered the following topics:

- National *V.p.* Illness Data
- Massachusetts Department of Public Health's procedures in conducting shellfish illness investigations
- Invasive and Endemic *V.p.* Strains
- Various State *V.p.* Management Strategies
- Recent *V.p.* ISSC and VARB Research
- *V.p.* Risk Assessment and Calculator Development
- State Epidemiological *V.p.* Reporting Procedures
- Shellfish production data from the NOAA Commercial Fisheries Statistics
- Environmental Conditions Associated with Elevated *V.p.* Concentrations
- Ecological Forecasting for Vibrios
- *V.p.* Risk Assessment Updates
- Canadian *V.p.* Management System

The workshop presentations and draft report are available here: http://www.issc.org/issc--fda-national-vibrio-parahaemolyticus-workshop.

Ribbed Mussels Could Help Improve Urban Water Quality

Ribbed mussels can remove nitrogen and other excess nutrients from an urban estuary and could help improve water quality in other urban and coastal locations, according to a study in New York City's Bronx River. NOAA reported on November 21, 2017, that the findings, published in *Environmental Science and Technology*, are part of long-term efforts to improve water quality in the Bronx River Estuary.

Researchers at NOAA Fisheries Milford Laboratory in Milford, Connecticut, began the two-year pilot project in June 2011. They used a 20 x 20-foot raft with mussel growing lines hanging below as their field location in an industrial area near Hunt's Point in the South Bronx, not far from a sewage treatment plant. The waters were closed to shellfish harvesting because of bacterial contamination. Scientists monitored the condition of the ribbed mussels (*Geukensia demissa*) and the water quality over time to see how each responded.

"Ribbed mussels live in estuarine habitats and can filter bacteria, microalgae, nutrients, and contaminants from the water," said Julie Rose, a research ecologist at the Milford Laboratory, part of the Northeast Fisheries Science Center, and co-author of the study. "They are native to the East Coast so there are no concerns about invasive species disturbing the ecosystem, and they are efficient at filtering a variety of particles from the water. Ribbed mussels are not sold commercially, so whatever they eat will not be eaten by humans."

Farming and harvesting shellfish to remove nitrogen and other excess nutrients from rivers, estuaries, and coastal waters is known as nutrient bioextraction, or bioharvesting. Mussels and other shellfish are filter feeders, and as the organisms grow, they take up or assimilate nutrients in algae and other microorganisms filtered from the surrounding waters.

Researchers head for the mussel raft in the Bronx River in April 2012 to check on progress. The mussel growing lines are visible in the center of the raft. *(Image courtesy of NOAA Fisheries/Mark Dixon)*

Nitrogen, phosphorus, and other nutrients occur naturally in the environment and are needed by plants and animals to grow, but too much of any of them is harmful. Excess amounts from human activities often end up in rivers, streams, and coastal environments, causing algal blooms, loss of sea grass, and low oxygen levels in the water, which can kill large numbers of fish and other organisms.

Researchers found that the Bronx River mussels were generally healthy, and their tissues had high amounts of a local nitrogen isotope, indicating that they removed nitrogen from local waters. They also had lower amounts of trace metals and organic contaminants than blue mussels (*Mytilus edulis*) collected from the seafloor nearby. An estimated 138 pounds of nitrogen was removed from the river when the animals were harvested.

The researchers estimate that a fully populated 20 x 20 foot mussel raft similar to the one used in this study would clean an average of three million gallons of water and remove about 350 pounds of particulate matter, like dust and

soot, daily. When harvested, the animals could be used for fertilizer or as feed for some animals, recycling nutrients back into the land.

An additional finding of the study related to larvae for mussel growth. The mussel raft was located at the confluence of the East River Tidal Strait and the Bronx River in a high nutrient, low-chlorophyll system, making the site unsuitable for large-scale mussel growth. Future projects using ribbed mussels for nutrient remediation will need spat or larvae from another location or from hatchery production.

"Management programs to reduce the effects of excess nutrients in the water have largely focused on land-based sources, such as human and livestock waste, agriculture, and stormwater runoff," said Gary Wikfors, Milford Laboratory Director and co-author of the study. "They really haven't looked much at recovering the excess in the water itself. Nutrient bioextraction using shellfish is becoming more common, and this study demonstrated that it could be an additional tool for nitrogen management in the coastal environment."

The Bronx study is the first to examine the use of ribbed mussels for nutrient bioextraction in a highly urbanized estuarine environment. A previous study comparing the Bronx River to the more productive Milford Harbor, Connecticut estuary indicated that ribbed mussels were able to adapt in just a few days to low food availability and feed with the same efficiency in the Bronx River site as populations at the Milford River site. That study also supports the use of ribbed mussels as a management tool for nutrient bioextraction in a range of coastal environments.

For more information, contact Shelley Dawicki at shelley.dawicki@noaa.gov.

Source:
https://www.nefsc.noaa.gov/press_release/pr2017/scispot/ss1710/?utm_medium=email&utm_source=govdelivery

NCCOS Helps Shellfish Growers Stay Informed on HAB Mitigation Tools

National Centers for Coastal Ocean Science (NCCOS) organized a special session for the 71st Annual Meeting of the Pacific Coast Shellfish Growers Association that addressed how to mitigate the impacts of HABs on U.S. aquaculture. The session at the September 2017 meeting raised awareness about advances in HAB science, highlighted HAB monitoring and early warning projects that benefit shellfish growers, and previewed plans for operational HAB forecasting along the Pacific Coast.

The Jamestown S'Klallam Tribe Oyster Farm in Sequim, Washington (*Image courtesy of NOAA)*

NOAA expects a 50 percent increase in U.S. marine aquaculture production by 2020. This planned expansion comes at a time when HABs are also on the rise—in frequency, intensity, and variety. The toxins produced by HABs

tax seafood safety programs and disrupt industry operations with recalls and loss of product, at times costing coastal economies tens of millions of dollars.

Speakers from NCCOS, the University of California Santa Cruz, the Oregon Department of Fish and Wildlife, the Washington Department of Health, the Jamestown S'Klallam Tribe, and Washington Sea Grant demonstrated successful science-grower partnerships and discussed how scientists, state managers, and shellfish growers can collaborate to improve our national response to HABs.

For more information, contact Marc Suddleson at marc.suddleson@noaa.gov.

Source: https://coastalscience.noaa.gov/news/helping-shellfish-growers-stay-informed-on-hab-mitigation-tools/

Recently Awarded Research

New Funding to Protect Chesapeake Bay Oyster Aquaculture from Harmful Algal Blooms

On August 17, 2016, NCCOS approved funding for the Virginia Institute of Marine Science and a Virginia commercial oyster grower to examine the impacts of HABs on oyster aquaculture during active blooms of the toxic dinoflagellate algae *Cochlodinium polykrikoides* and *Alexandrium monilatum*.

In late July 2016, a bloom of the two harmful algal species expanded, intensified, and covered nearly the entire York River and nearby Mobjack Bay, north of the river mouth. The project team will identify effective strategies oyster growers can use to minimize oyster mortality during future HAB events.

Dense blooms of *C. polykrikoides*have occurred regularly in Virginia's York River and the lower Chesapeake Bay during late summer for several decades. *A. monilatum* has bloomed in this region since 2007. Growers are primarily concerned with how these algae are affecting oyster health and survival in the region. The Virginia Institute of Marine Science will share project results with members of the shellfish industry.

The project is funded by the NCCOS Harmful Algal Bloom Event Response Program. These efforts complement remote sensing research conducted by NCCOS's Center for Coastal Monitoring and Assessment.

For more information, contact Marc Suddleson at Marc.Suddleson@noaa.gov.

Source: https://coastalscience.noaa.gov/news/minimizing-impacts-habs-oyster-aquaculture-lower-chesapeake-region/.

NOAA Awards $5.8 Million in Grants to Support Endangered, Threatened Species Recovery

Earlier this year, NOAA awarded $5.8 million in Species Recovery Grants to states and tribes to promote the recovery of endangered and threatened marine species, ranging from large whales to tiny shellfish.

This year's awards include almost $1.1 million for six new grants to four states and one federally recognized tribe. The remaining $4.7 million will support 22 continuing projects for 20 states and two tribes.

Addressing fish and shellfish resources, the Georgia Department of Natural Resources has been awarded a 3-year (fiscal years 2017-2019) grant totaling $576,335 to develop, evaluate, and implement a practical and reliable methodology for quantifying adult spawning runs of Atlantic sturgeon in Georgia and other coastal rivers. Side-scan sonar and acoustic telemetry will be used in combination to quantify the annual spawning runs in the Altamaha River. Secondary objectives include the documentation, description, and mapping of specific spawning habitats in upper Altamaha system, including both the Oconee and Ocmulgee tributaries where putative spawning runs have only recently been identified.

Atlantic sturgeon *(Acipenser oxyrinchus) (Image courtesy of the U.S. Fish and Wildlife Service)*

Species Recovery Grants provide funding to states and tribes to support management, research, and outreach efforts designed to recover vulnerable species to a point where Endangered Species Act protections are no longer necessary. Funding may also support monitoring of species under consideration for protection or species recently removed from the list of endangered and threatened species.

Both new and continuing projects focus on the recovery of extremely vulnerable species as part of NOAA's Species in the Spotlight initiative, including Cook Inlet beluga whales, Atlantic salmon, white abalone, and Southern resident killer whales.

"Helping these species recover means bringing partners to the table to tackle critical conservation challenges at the local level," said Donna Wieting, director of NOAA Fisheries Office of Protected Resources. "These grants are an effective way for us to support states and tribes in our shared efforts to recover the most vulnerable marine species."

In addition, the 2018 call for proposals is now open, with a continued focus on recovering NOAA's Species in the Spotlight. Tribal applications and state applications were due November 1, 2017.

For more information, contact Kate Brogan at 301-427-8030 or katherine.brogan@noaa.gov.

Source: http://www.nmfs.noaa.gov/mediacenter/2017/08_August/10_08_speciesrecoverygrants.html

Recent Publications

Journal Articles

The list below provides a selection of research articles focusing on shellfish.

- Mussels as bioindicators of diclofenac contamination in coastal environments
  Cunha, S.C., A. Pena, and J.O. Fernandes. 2017. Mussels as bioindicators of diclofenac contamination in coastal environments. *Environmental Pollution* 225:354-360.

- Ecological Forecasting of Vibrio sp. in U.S. Coastal Waters Using an Operational Platform, a Pilot Project of the NOAA Ecological Forecasting Roadmap. Development of Web based Tools and Forecasts to Help the Public Avoid Exposure to Vibrio vulnificus and Shell Fish Harvesters Avoid Dangerous Concentrations of Vibrio parahaemolyticus
  Daniels, R.M., J.M. Jacobs, R. Paranjpye, L.W. Lanerolle. 2016. Ecological Forecasting of Vibrio sp. in U.S. Coastal Waters Using an Operational Platform, a Pilot Project of the NOAA Ecological Forecasting Roadmap. Development of Web based Tools and Forecasts to Help the Public Avoid Exposure to Vibrio vulnificus and Shell Fish Harvesters Avoid Dangerous Concentrations of Vibrio parahaemolyticus. *American Geophysical Union, Ocean Sciences Meeting 2016*, abstract #MM24C-0448.

- Toxicity assessment of five emerging pollutants, alone and in binary or ternary mixtures, towards three aquatic organisms
  Di Poi, C., K. Costil, V. Bouchart, and M.P. Halm-Lemeille. 2017. Toxicity assessment of five emerging pollutants, alone and in binary or ternary mixtures, towards three aquatic organisms. *Environmental Science and Pollution Research* 1-13.

- Municipal wastewater treatment plant effluent-induced effects on freshwater mussel populations and the role of mussel refugia in recolonizing an extirpated reach
  Gillis, P.L., R. McInnis, J. Salerno, S.R. de Solla, M.R. Servos, and E.M. Leonard. 2017. Municipal wastewater treatment plant effluent-induced effects on freshwater mussel populations and the role of mussel refugia in recolonizing an extirpated reach. *Environmental Pollution* 225:460-468.

- Freshwater mussels in an urban watershed: Impacts of anthropogenic inputs and habitat alterations on populations
  Gillis, P.L., R. McInnis, J. Salerno, S.R. de Solla, M.R. Servos, and E.M. Leonard. 2017. Freshwater mussels in an urban watershed: Impacts of anthropogenic inputs and habitat alterations on populations. *Science of The Total Environment* 574:671-679.

- Comparison between resident and caged mussels: Polycyclic aromatic hydrocarbon accumulation and biological response
  Glad, M., N. Bihari, Z. Jakšić, and M. Fafanđel. 2017. Comparison between resident and caged mussels: Polycyclic aromatic hydrocarbon accumulation and biological response. *Marine Environmental Research* 129:195-206.

- Spatial and temporal variability of contaminants within estuarine sediments and native Olympia oysters: A contrast between a developed and an undeveloped estuary
  Granek, E.F., et al. 2016. Spatial and temporal variability of contaminants within estuarine sediments and native Olympia oysters: A contrast between a developed and an undeveloped estuary. *Science of the Total Environment* 557-558:869-879.

- Ecophysiology of the Olympia Oyster, *Ostrea lurida*, and Pacific Oyster, *Crassostrea gigas*
  Gray, M.W. and C.J. Langdon. 2017. Ecophysiology of the Olympia Oyster, *Ostrea lurida*, and Pacific Oyster, *Crassostrea gigas*. *Estuaries and Coasts* 1-15.

- Oxidative Stress in Shellfish *Sinonovacula constricta* Exposed to the Water Accommodated Fraction of Zero Sulfur Diesel Oil and Pinghu Crude Oil
  Jiang, M., L. Li, Y. Li, G. Shen, and X. Shen. 2017. Oxidative Stress in Shellfish *Sinonovacula constricta* Exposed to the Water Accommodated Fraction of Zero Sulfur Diesel Oil and Pinghu Crude Oil. *Archives of Environmental Contamination and Toxicology* 73(2):294-300.

- Adherence of microplastics to soft tissue of mussels: A novel way to uptake microplastics beyond ingestion
  Kolandhasamy, P. L. Su, J. Li. X. Qu, K. Jabeen, and H. Shi. 2018. Adherence of microplastics to soft tissue of mussels: A novel way to uptake microplastics beyond ingestion. *Science of The Total Environment* 610-611:635-640.

- Remote sensing measurements of sea surface temperature as an indicator of *Vibrio parahaemolyticus* in oyster meat and human illness
  Konrad, S., P. Paduraru, P. Romero-Barrios, S.B. Henderson, and E. Galanis. 2017. Remote sensing measurements of sea surface temperature as an indicator of *Vibrio parahaemolyticus* in oyster meat and human illness. *Environmental Health* 16:92.

- Extending the toxicity-testing paradigm for freshwater mussels: Assessing chronic reproductive effects of the synthetic estrogen 17α-ethinylestradiol on the unionid mussel *Elliptio complanata*
  Leonard, J.A., W.G. Cope, E.J. Hammer, M. C. Barnhart, and R.B. Bringolf. 2017. Extending the toxicity-testing paradigm for freshwater mussels: Assessing chronic reproductive effects of the synthetic estrogen 17α-ethinylestradiol on the unionid mussel *Elliptio complanata*. *Comparative Biochemistry and Physiology Part C: Toxicology & Pharmacology* 191:14-25.

- The Degree of Impairment of Foraging in Crayfish (*Orconectes virilis*) due to Insecticide Exposure is Dependent upon Turbulence Dispersion
  Ludington, T.S., P.A. Moore. 2017. The Degree of Impairment of Foraging in Crayfish (*Orconectes virilis*) due to Insecticide Exposure is Dependent upon Turbulence Dispersion. *Archives of Environmental Contamination and Toxicology* 72(2):281-293.

- Ecotoxicological risk assessment for the herbicide glyphosate to non-target aquatic species: A case study with the mussel *Mytilus galloprovincialis*
  Maozzo, V., J. Fabrello, L. Masiero, F. Ferraccioli, L. Finos, P. Pastore, I.M. Di Gangi, and S. Bogialli. 2018. Ecotoxicological risk assessment for the herbicide glyphosate to non-target aquatic species: A case study with the mussel *Mytilus galloprovincialis*. *Environmental Pollution* 233:623-632.

- Temperature increases, hypoxia, and changes in food availability affect immunological biomarkers in the marine mussel *Mytilus galloprovincialis*
  Parisi, M.G., M. Mauro, G. Sarà, and M. Cammarata. 2017. Temperature increases, hypoxia, and changes in food availability affect immunological biomarkers in the marine mussel *Mytilus galloprovincialis*. *Journal of Comparative Physiology* B 187(8):1117-1126.

- The impact of expired commercial drugs on non-target marine species: A case study with the use of a battery of biomarkers in hemocytes of mussels
  Politakis, N., A. Belavgeni, I. Efthimiou, N. Charalampous C. Kourkouta, and S. Dailianis. 2018. The impact of expired commercial drugs on non-target marine species: A case study with the use of a battery of biomarkers in hemocytes of mussels. *Ecotoxicology and Environmental Safety* 148:160-168.

- Assessing the toxicity and risk of salt-impacted winter road runoff to the early life stages of freshwater mussels in the Canadian province of Ontario
  Prosser, R.S., Q. Rochfort, R. McInnis, K. Exall, and P.L. Gillis. 2017. Assessing the toxicity and risk of salt-impacted winter road runoff to the early life stages of freshwater mussels in the Canadian province of Ontario. *Environmental Pollution* 230:589-597.

- Effect of substituted phenylamine antioxidants on three life stages of the freshwater mussel *Lampsilis siliquoidea*
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- Comparison of cages and native blue mussels (*Mytilus edulis* spp.) for environmental monitoring of PAH, PCB and trace metals
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- Metal concentrations in American oyster *Crassotrea virginica* and adjacent sediments from harvestable and non-harvestable sites in the Southeastern USA
  Shervette, V.R. and R.F. Van Dolah. 2017. Metal concentrations in American oyster *Crassotrea virginica* and adjacent sediments from harvestable and non-harvestable sites in the Southeastern USA. *Environmental Monitoring and Assessment* 189:481

- A statistical model for monitoring shell disease in inshore lobster fisheries: A case study in Long Island Sound
  Tanaka, K.R., S.L. Belknap, J.J. Homola, and Y. Chen. 2017. A statistical model for monitoring shell disease in inshore lobster fisheries: A case study in Long Island Sound. *PLoS One* 12(2).

- Toxic effects of the antihistamine cetirizine in mussel *Mytilus galloprovincialis*
  Teixeira, M., A. Almeida, V. Calisto, V.I. Esteves, R.J. Schneider, F.J. Wrona, A.M.V.M. Soares, E. Figueira, and R. Freitas. 2017. Toxic effects of the antihistamine cetirizine in mussel *Mytilus galloprovincialis*. *Water Research* 114:316-326.

- The ability of algal organic matter and surface runoff to promote the abundance of pathogenic and non-pathogenic strains of *Vibrio parahaemolyticus* in Long Island Sound, USA
  Thickman, J.D. and C.J. Gobler. 2017. The ability of algal organic matter and surface runoff to promote the abundance of pathogenic and non-pathogenic strains of *Vibrio parahaemolyticus* in Long Island Sound, USA. *PloS One* 12(10):e0185994.

- Suspended solid concentration reduces feeding in freshwater mussels
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- Evaluation of toxicity of Deepwater Horizon slick oil on spat of the oyster *Crassostrea virginica*
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- Freshwater mussel shells (Unionidae) describe anthropogenic changes to trace element cycling within a North American river
  Wilson, A.W., A.K. Fritts, M.W. Fritts, J.M. Unrine, B.N. Tweedy, and A.F. Casper. 2017. Freshwater mussel shells (Unionidae) describe anthropogenic changes to trace element cycling within a North American river. *Science of The Total Environment* (In Press).

Upcoming Meetings and Conferences

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

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

International Association for Great Lakes Research 2018 Conference
June 18–22, 2018
Toronto, Ontario, Canada

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

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

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

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

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

72nd Annual Pacific Coast Shellfish Growers Association Shellfish Conference & Tradeshow
October 14–18, 2018
Blaine, Washington

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.