United States Environmental Protection Agency

Fish and Shellfish Program NEWSLETTER

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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 Northeast U.S.

Recent Advisory News

2017 Connecticut Fish Consumption Pamphlet Released

The Connecticut Department of Public Health (CTDPH) released its 2017 update of "If I Catch It, Can I Eat It? A Guide to Eating Fish Safely." The pamphlet gives the public information that will help them avoid chemicals in fish and eat fish safely.

The advisory explains how often fish from Connecticut's waters and from a store or restaurant can safely be eaten. In many cases, separate advice is given for High Risk versus Low Risk Groups.

- High Risk Group: pregnant women, women who could become pregnant, nursing mothers, or children under six.
- Low Risk Group: anyone who does not fit into the High Risk Group.

Advice is given for three different types of fish consumption:

1. Statewide FRESHWATER Fish Advisory: Most freshwater fish in Connecticut contain enough mercury to cause some limit to consumption. The statewide freshwater advice is:
    - High Risk Group: eat no more than one meal per month.
    - Low Risk Group: eat no more than one meal per week.
2. Advisories for SPECIFIC WATERBODIES: Certain waterbodies contain fish with higher levels of contaminants. These waterbodies include the Housatonic River, part of the Quinnipiac River, certain lakes, and certain species from Long Island Sound.
3. Advice for fish purchased from the MARKET: Most fish from the market are healthy to eat and contain important nutrients such as omega-3 fatty acids. However, there are some fish that contain high levels of mercury or polychlorinated biphenyls (PCBs) and so should be eaten less or not at all. The pamphlet points out which fish are healthy to eat and which are not safe to eat.

The table below (included in the pamphlet) lists all advisories issued by CTDPH.

Connecticut Statewide Freshwater Fish Advice				
Waterbody Name	**Fish Species**	**High Risk Group**	**Low Risk Group**	**Contaminant**
All fresh lakes, ponds, rivers, and streams	Trout[a], Sunfish	No limits on consumption	No limits on consumption	–
	All other freshwater fish	1 meal per month	1 meal per week	Mercury
Special Advice for the Housatonic River Area				
Housatonic River above Lake Lillinonah	Trout, Catfish, Eels, Carp, Northern Pike	Do not eat	Do not eat	PCBs
	Bass, White Perch	Do not eat	1 meal per 2 months	PCBs
	Bluegill, Bullheads, Fallfish	1 meal per month	1 meal per month	PCBs
	Yellow Perch, Calico Bass (Crappie), Rock Bass, and Sunfish	1 meal per month	1 meal per month	PCBs
Lakes on Housatonic River (Lillinonah, Zoar, and Housatonic)	Trout, Catfish, Eels, Carp, Northern Pike	Do not eat	Do not eat	PCBs
	White Perch, Fallfish, Bullheads	1 meal per month	1 meal per month	PCBs
	Bass	Do not eat	1 meal per 2 months	PCBs
	Yellow Perch, Calico Bass (Crappie), Rock Bass, Bluegill, and Sunfish	1 meal per month	1 meal per week	PCBs
Furnace Brook (Cornwall)	Trout	1 meal per month	1 meal per month	PCBs
Blackberry River below "Blast Furnace" (North Canaan)	Smallmouth Bass	1 meal per month	1 meal per month	PCBs
Special Advice for other Connecticut Fresh Waterbodies				
Dodge Pond, Lake McDonough, Silver Lake, Wyassup Lake	Largemouth Bass, Smallmouth Bass, Pickerel	Do not eat	1 meal per month	Mercury
Quinnipiac River from Gorge south to Hanover Pond(Meriden)	All species	1 meal per month	1 meal per month	PCBs
Connecticut River	Carp Catfish	Do not eat Do not eat	1 meal per 2 months 1 meal per month	PCBs PCBs
Versailles, Papermill Ponds & attached Little River (Sprague)	All species	Do not eat	Do not eat	Mercury and PCBs
Konkapot River (North Canaan)	White Suckers	Do not eat	1 meal per month	Mercury
Brewster Pond (Stratford)	Catfish & Bullheads	Do not eat	Do not eat	Chlordane
Union Pond (Manchester)	Carp, Catfish, Bass	Do not eat	Do not eat	Chlordane
Special Advice for Long Island Sound				
Long Island Sound and connected rivers	Striped Bass Bluefish over 25 inches Bluefish 13-25 inches[b] Weakfish	Do not eat Do not eat 1 meal per month 1 meal per month	1 meal per month 1 meal per month 1 meal per month 1 meal per month	PCBs PCBs PCBs PCBs
Mill River (Fairfield, excluding Southport Harbor)	Blue Crab	Do not eat	Do not eat	Lead

a. Most trout are not part of the advisory and are safe to eat. However, the High Risk Group should eat no more than one meal of large trout (over 15 inches) per month and should not eat trout from the Housatonic River. b. Snappers (Bluefish under 13 inches) are not on the advisory because they have very low contamination.

More specific fact sheets can be obtained by calling 1-877-458-FISH (3474), or by going to the CTDPH website: www.ct.gov/dph/fish.

For health questions, call CTDPH toll-free at 1-877-458-FISH (3474).

For questions about fishing in Connecticut, call Connecticut Department of Energy and Environmental Protection at 860-424-3474 or visit www.ct.gov/deep/fishing.

Source: https://portal.ct.gov/DPH/Environmental-Health/Environmental-and-Occupational-Health-Assessment/CT-Fish-Consumption-Advisory-and-the-Safe-Eating-of-Fish-Caught-in-Connecticut#47464

Massachusetts Freshwater Fish Consumption Advisory List and Map

The Environmental Toxicology Program in the Massachusetts Department of Public Health's (MDPH) Bureau of Environmental Health uses its Fish Advisories website to provide notice of current fish consumption advisories. Links from the website include a Freshwater Fish Consumption Advisory Database Lookup, a list of Freshwater Fish Consumption Advisories by waterbody, and a map of these waterbodies.

For questions about the consumption of fish from waterbodies not on the Freshwater Fish Consumption Advisory List, contact the Environmental Toxicology Program at 617-624-5757.

Source: https://www.mass.gov/lists/fish-consumption-advisories

A Guide to Eating Fish Safely in Massachusetts

Revised in 2017, the MDPH brochure "A Guide to Eating Fish Safely in Massachusetts" provides guidelines for eating fish caught in Massachusetts waters.

While fish are an important part of a nutritious and varied diet, pregnant women should be aware of the possible dangers of eating fish caught in Massachusetts streams, rivers, lakes, ponds, and some coastal waters.

MDPH guidelines for pregnant women, women who may become pregnant, nursing mothers, and children under 12 years old:

> **Do Not Eat:** Freshwater fish caught in streams, rivers, lakes, and ponds in Massachusetts (More specific consumption advice is available for certain freshwater bodies that have been tested at: http://www.mass.gov/dph/fishadvisories or by calling 617-624-5757.).
>
> **Safe To Eat:** Fish that are stocked in streams, rivers, lakes, and ponds in Massachusetts.
>
> **Do Not Eat:** Bluefish caught off the Massachusetts coast.
>
> **Do Not Eat:** Lobsters, flounder, soft-shell clams, and bivalves from Boston Harbor.

MDPH guidelines for everyone, including the groups listed above:

Do Not Eat: Fish, shellfish, or lobsters from Area I of New Bedford Harbor.

Lobsters or bottom feeding fish from Area II of New Bedford Harbor.

Lobsters from Area III of New Bedford Harbor.

Do Not Eat: Lobster tomalley.

For more information, contact the MDPH Bureau of Environmental Health at 617-624-5757.

Source: https://www.mass.gov/files/documents/2016/07/si/fish-eating-guide.pdf

Fish and Waterfowl Consumption Advice for the Housatonic River Area in Massachusetts

MDPH advises that NO ONE should eat the following from the Housatonic River Area:

- Fish, frogs, and turtles from the Housatonic River and tributaries that feed into the main river from Center Pond Dam in Dalton to the Connecticut border.
- Mallards and wood ducks from the Housatonic River and its impoundments from Pittsfield south to Rising Pond in Great Barrington.

Information about the Housatonic River Area

The Housatonic River Area is made up of eight communities in Berkshire County: Lanesborough, Dalton, Pittsfield, Lenox, Stockbridge, Lee, Great Barrington, and Sheffield. There are three main branches of the Housatonic River (the East Branch, West Branch, and Southwest Branch) that combine to make up the main stem of the Housatonic River which flows south from Pittsfield into Connecticut.

Due to releases of chemicals by the General Electric Company from the early 1930s through the late 1970s, PCBs are present in soils, sediment, fish, and certain waterfowl in and around the Housatonic River Area. While some portions of the Housatonic River Area have been cleaned up, PCBs may be present in some fish and waterfowl at levels that could be harmful if eaten. For more information on the Housatonic River clean-up, visit www.epa.gov/ge-housatonic.

Fish and waterfowl in the Housatonic River and its tributaries may be exposed to PCBs

- PCBs are a group of man-made organic chemicals banned in the 1970s.
- PCBs can still be found in our environment and can get into our food due to their widespread use.
- PCBs can enter the bodies of fish and concentrate in their skin fat, internal organs, and sometimes muscles.

- Larger species feed on smaller species. This causes the larger, older fish to concentrate the most chemicals (a process known as biomagnification).
- PCBs can also collect in the tissue of waterfowl.

Effects of PCBs on health

- In studies of workers, PCBs are suspected of causing liver problems, skin lesions or irritations, and some types of cancer.
- In non-workplace settings, children are most affected by PCBs during fetal development, nursing, and early growth.
- Exposure to small amounts of these chemicals can interfere with brain development even before birth (affecting how well children learn, think, behave, and develop later in life).

Tips for recreational fishing in the Housatonic River and its tributaries

- Observe posted warning signs and follow their advice.
- When fishing, release any fish unharmed back into the River.
- Follow the statewide Fish Consumption Advisory for other lakes, rivers, and ponds in the Housatonic River Area in Massachusetts. More specific consumption advice is available for certain bodies of water that have been tested, at www.mass.gov/dph/fishadvisories.
- For information on stocked fish, please contact the MassWildlife Western District Office, Dalton at (413) 684-1646 or visit www.mass.gov/trout. For fishing regulations visit www.mass.gov/masswildlife.

Tips for preparing fish caught from feeder streams to the Housatonic River

- Trim fatty tissue prior to cooking.
- Broil instead of fry.
- Allow as much fat as possible to be drained away.

Fish is good for you! Continue to eat a variety of fish from other sources because fish is low in saturated fat, high in protein, and helps to prevent heart disease.

For more information on how to choose fish and waterfowl that are safe to eat, please contact the Environmental Toxicology Program in the MDPH Bureau of Environmental Health at 617-624-5757. Or visit www.mass.gov/dph/environmental_health.

Source: http://www.mass.gov/eohhs/docs/dph/environmental/investigations/housatonic-river-brochure-2017.pdf

Health Officials Remind Consumers Not to Eat Fish, Lobster, and Shellfish from Area 1 in New Bedford Harbor, MA

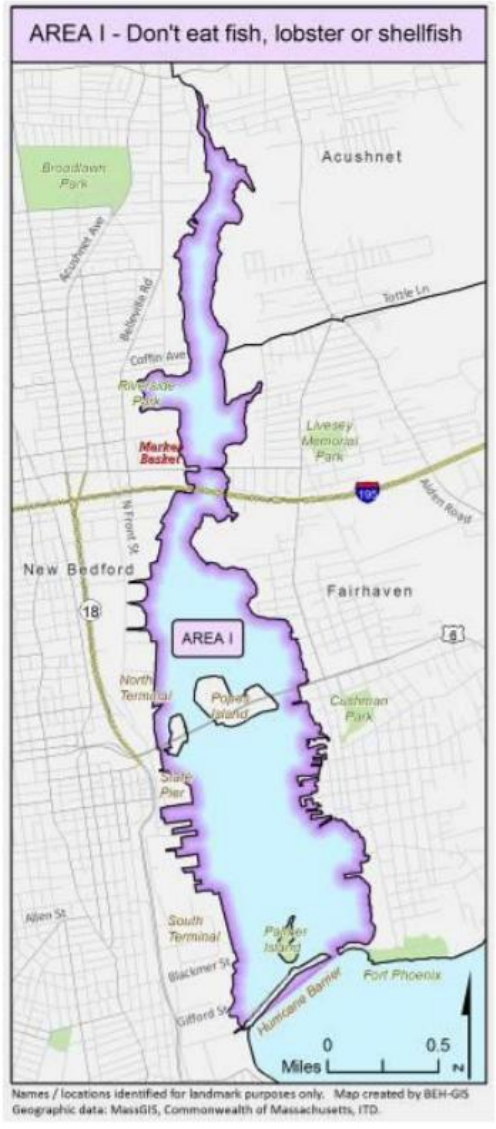
After reports of fishing, MDPH, in partnership with the City of New Bedford and the U.S. Environmental Protection Agency (EPA), re-released its guidance for fish consumption from New Bedford Harbor, Massachusetts. The following is an excerpt from the guidance.

Q: Why are health officials reminding the public to avoid eating fish and other seafood from Area 1 of New Bedford Harbor?

A: In 1979 MDPH promulgated regulations to close Area 1 to all fishing activities due to significant PCB contamination. Recent reports of individuals fishing in that area are prompting health and environmental officials to raise public awareness regarding the health risks associated with consumption of fish, lobster, and shellfish taken from Area 1 and regulatory bans.

Q: Where is Area 1 located and what are the boundaries?

A: Area 1 is bounded by the communities of New Bedford and Fairhaven and includes all areas of the Acushnet River and New Bedford Harbor north of the Hurricane Barrier as shown on the map to the right. The Hurricane Barrier is located near Gifford Street in New Bedford and Fort Phoenix Beach State Reservation in Fairhaven.



Map of Area 1 in New Bedford Harbor. *(Image courtesy of MDPH, City of New Bedford, and EPA)*

Q: What is the concern about Area 1?

A: The Acushnet River estuary, New Bedford Harbor, and parts of Buzzards Bay sediments are contaminated with PCBs. The highest levels of PCBs in seafood are found in fish, lobster, and shellfish in Area 1. Fish, lobster, or shellfish caught from Area 1 should not be consumed.

Q: Where can I find fish that are safe to eat?

A: Local restaurants, fish markets, and other food establishments are a safe source. They are inspected at least annually by the local Board of Health in accordance with 105 Code of Massachusetts Regulations (CMR) 590.000: State Sanitary Code Chapter X –Minimum Sanitation Standards for Food Establishments, also known as the Food Code. Routine inspections help ensure all consumers can safely enjoy the many benefits of our local fishing industry. New Bedford's commercial fishing fleet travels many miles outside of the harbor to fishing grounds hundreds of miles out to sea, and well beyond the area impacted by PCB contamination, so their catch is safe to eat.

Q: The advice provided by MDPH is specific to the area inside of the hurricane barrier in New Bedford Harbor. Are fish outside of the hurricane barrier in the harbor safe to eat?

A: Although the most contaminated fish are generally found inside the hurricane barrier, MDPH also advises against eating lobster or bottom feeding fish from Area II (the waters generally south of Area I and north of a line extending from Ricketson's Point in South Dartmouth westerly to Wilbur Point on Sconticut Neck), or lobster from Area III (the waters generally south of Area II and north of a line extending from Mishaum Point on Smith Neck in the town of Dartmouth north and west to Gong "3" on Hursett Rock off New Bedford Harbor and continuous north and west to Rocky Point on West Island in the town of Fairhaven).

Q: What is EPA doing to address PCB contamination issues in New Bedford Harbor?

A: The U.S. EPA has been involved with the New Bedford Harbor cleanup since the 1980s, following discovery of PCBs in sediment and fish and designation to the National Priorities List in 1983. In 1998, EPA proposed a dredging remedy for the Upper and Lower Harbors, and full scale dredging started in 2004. From 2004 to 2013 EPA operated with $15 million for approximately 45 days a year to address contaminated material in the harbor. On September 19, 2013, EPA finalized a Settlement with the responsible party, AVX, for $366.25 million. This settlement will accelerate the cleanup of PCBs in the harbor, to be completed in an estimated five to seven years. For more information on the EPA clean-up, or for other site-related questions, please contact EPA at 617-918-1003 or visit www.epa.gov/nbh.

Q: Who should I contact if I have health questions about seafood consumption restrictions for Area 1 or other fish consumption advice?

A: For health-related questions; Area 1 restrictions on fish, lobster, and shellfish; or to learn more about how to choose fish that are safe to eat, please contact the MDPH Bureau of Environmental Health at 617-624-5757 or the New Bedford Health Department at 508-991-6199.

For more information visit the MDPH Bureau of Environmental Health at www.mass.gov/dph/environmental_health.

Source: http://www.mass.gov/eohhs/docs/dph/environmental/exposure/nb-harbor-area1-brochure.pdf

EPA News

New Bedford Harbor Superfund Site Fish Advisory Video

On June 14, 2017, EPA published a video explaining the fish advisory surrounding the New Bedford Harbor Superfund Site in Massachusetts. Since 1979, Massachusetts regulations have prohibited eating fish and/or shellfish caught in certain areas of New Bedford Harbor. A risk assessment conducted on fish/shellfish in the closed areas of the harbor indicates that some species not currently covered by the 1979 state regulations may present health concerns for recreational fishermen and shell fishermen (and/or their families/friends who consume their take). EPA believes it is important that recreational fishermen and shell-fishermen be aware of the potential long-term

health effects of consumption of seafood from the New Bedford Harbor. EPA recommends that recreational fishermen, shell fishermen, and everyone else follow the seafood advisory guidance described in this video.

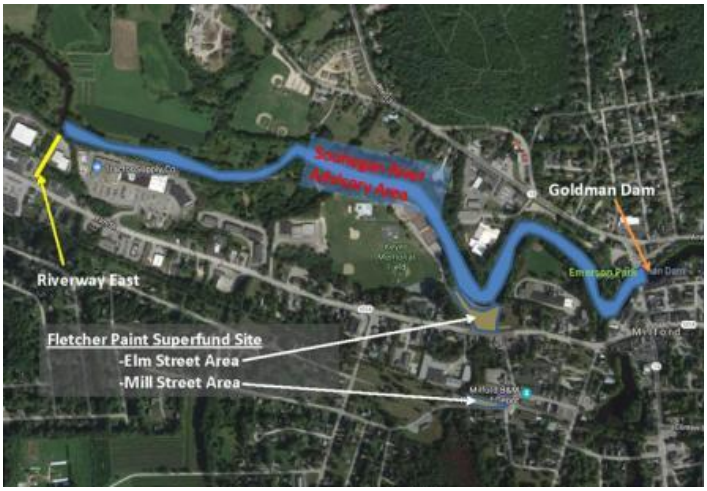
For more information about the New Bedford Harbor Superfund Site go to https://www.epa.gov/new-bedford-harbor and for information regarding EPA seafood consumption recommendations go to https://www.epa.gov/new-bedford-harbor/fish-consumption-regulations-and-recommendations.

Source: https://www.youtube.com/watch?v=sk7smuRs70k

Public Advisory: Avoid Fish Consumption in Souhegan River Near Fletcher's Paint Superfund Site in Milford, New Hampshire

As part of the investigations at the Fletcher's Paint Works and Storage Facility Superfund Site in Milford, New Hampshire, EPA determined that there is an elevated risk to public health from the ingestion of fish contaminated with PCBs in a segment of the Souhegan River.

The river segment with elevated risks, as determined by past fish tissue sampling, starts at the Goldman Dam and ends approximately one-mile upriver near Riverway East, located off Elm Street (see area map to the right). Based on data collected, areas of the Souhegan River outside of the segment identified do not pose an unacceptable risk of exposure to PCBs from the Site.



Location of Fletcher Paint Superfund Site. *(Image courtesy of EPA)*

EPA advises anglers not to eat, but to catch and release unharmed, any fish caught in this one-mile segment of the Souhegan River. Fish advisory signs have been posted along this segment of the river. EPA plans to collect and analyze fish samples from this segment of the river in the future to determine if or when the fish advisory should be ended.

The cleanup required by EPA's decision documents for the Fletcher's Paint Site was completed during the 2016 and 2017 construction seasons. This work included: excavating and off-site disposal of approximately 32,000 cubic yards of contaminated soils and 1,500 cubic yards of contaminated sediments; and construction of a low permeability cover over contaminated soils at the Elm Street area that were not practicable to excavate.

For EPA information on the Fletcher's Paint Works Superfund Site, visit https://www.epa.gov/superfund/fletcher.

For EPA information on PCBs, visit https://www.epa.gov/pcbs.

For site information from the New Hampshire Department of Environmental Services, contact Jim Martin, Public Information Officer, at 603-271-3710.

In EPA Region 1, contact Jim Brown at brown.jim@epa.gov or 617-918-1308.

Source: https://www.epa.gov/newsreleases/public-advisory-avoid-fish-consumption-souhegan-river-near-fletchers-paint-superfund

Other News

Reconstruction of Major North Atlantic Circulation System Shows Weakening

On April 22, 2018, National Oceanic and Atmospheric Administration (NOAA) Fisheries reported that rising levels of carbon dioxide in the atmosphere have affected one of the global ocean's major circulation systems, slowing the redistribution of heat in the North Atlantic Ocean. The resulting changes have been felt along the Northeast U.S. Shelf and in the Gulf of Maine, which has warmed 99% faster than the global ocean over the past ten years, impacting distributions of fish and other species and their prey.

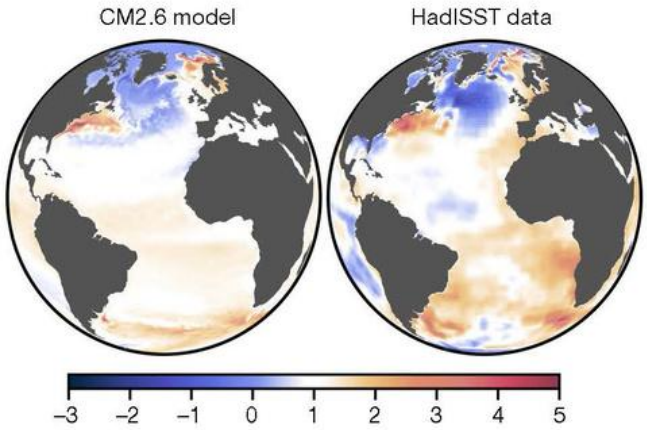
The Atlantic Meridional Overturning Circulation (AMOC) is a large-scale system of ocean currents that circulates warm, salty water from the South Atlantic and tropics via the Gulf Stream to the colder North Atlantic. There, warm salty waters cool, release heat, and eventually sink to the deep ocean and move south. The AMOC plays a key role in the Earth's climate and is a major component of the Global Conveyor Belt.

Lobsters are temperature sensitive. *(Image courtesy of NOAA)*

In a study published online in *Nature*, researchers from Europe and the U.S. used computer model simulations to reconstruct changes in AMOC over time. Comparisons of these simulations with recent direct ocean measurements suggest the AMOC has slowed down or weakened by about 15% since the 1950s.

Measuring the AMOC Slowdown

"Our findings show that in recent years the AMOC appears to have reached a new record low, consistent with the record low annual sea surface temperature in the subpolar North Atlantic since observations began in 1870 and reported by NOAA for 2015," the authors report. "The AMOC decline since the mid-20th century is a feature projected by climate models in response to rising carbon dioxide levels."



The image above shows the sea surface temperature trends in the North Atlantic using the NOAA CM2.6 climate model. The image at right shows the observed trends during the period 1870-2016. Regions showing cooling or below-average warming are shown in blue; regions that show above-average warming are shown in red. Image credit: L. Caesar et al. 2018 *(Image courtesy of NOAA)*

"We found a characteristic sea surface temperature fingerprint for an AMOC slowdown or weakening in both a high-resolution global climate model and in temperature trends observed since 1870," said Vincent Saba, a research fishery biologist at NOAA's Northeast Fisheries Science Center and a co-author of the study. Saba works with high-resolution global climate models at NOAA's Geophysical Fluid Dynamics Laboratory at Princeton University. His studies have focused on the impact of changing ocean conditions on fisheries, sea turtles, and other marine life.

"That fingerprint consists of a pattern of cooling in the North Atlantic Ocean's subpolar gyre and a warming in the Gulf Stream region due to reduced northward heat transport and an associated northward shift in the Gulf Stream," Saba said. "In other words, there is warming along the Northeast U.S. Shelf and Gulf Stream region, and at the same time a cooling in the North Atlantic subpolar gyre."

About the Models Used

The researchers used NOAA's CM2.6 global climate model to identify the characteristic sea surface temperature (SST) fingerprint associated with an AMOC weakening in response to rising atmospheric carbon dioxide. The model results were compared to observed SST evolution since the late nineteenth century. The CM2.6 model provides very high resolution, which means the realism of the model is greater than many other models currently in use. For example, the ocean bottom is more accurately represented in the CM2.6 model compared to lower resolution models.

The study authors then used a group of global climate models known as CMIP5 to test and calibrate a revised AMOC index. The reconstruction of the evolution of the AMOC from 1870 to 2016 reveals the record low in the past few years and is consistent with direct measurements since 1995 from a number of AMOC studies using different methods.

NOAA's CM2.6 model is being used for a variety of fisheries studies on the impact of ocean temperatures on lobsters, scallops, various fish species, leatherback sea turtles, and other animals. The model's high spatial resolution enables researchers to look much more closely at ocean features in regions like the Gulf of Maine or

along the Northeast U.S. Shelf than other models, which have a lower ocean resolution and can miss the finer details.

Present and Future Impacts of the Slowdown

The rapid ocean warming observed along the Northeast U.S. Shelf may be associated with the Gulf Stream shifting northwards and closer to shore, a consequence of the AMOC slowdown. In NOAA's high-resolution climate model, enhanced warming of ocean bottom temperatures in the Northeast U.S. Shelf and in the Gulf of Maine is a result of both a poleward retreat of the Labrador Current and a northward shift of the Gulf Stream.

Continued warming is likely to further weaken the AMOC in the long term, through changes to the hydrological cycle, sea-ice loss, and accelerated melting of the Greenland Ice Sheet, all of which are causing the North Atlantic to become fresher and less dense. "If the AMOC continues to weaken," Saba said, "ocean temperature along the Northeast U.S. Shelf is expected to continue its trend of warming faster than the global ocean, which will further impact fisheries and living marine resources in the region."

In addition to NOAA Fisheries, authors of the paper are affiliated with the Potsdam Institute for Climate Impact Research and the Institute of Physics and Astronomy at the University of Potsdam in Potsdam, Germany; the Complutense University of Madrid in Madrid, Spain; the Instituto de Geociencoas, CSIC-UCM in Madrid, Spain; and the National and Kapodistrian University of Athens in Athens, Greece.

For more information visit https://www.nature.com/articles/s41586-018-0006-5.

Source: https://www.fisheries.noaa.gov/feature-story/reconstruction-major-north-atlantic-circulation-system-shows-weakening?utm_medium=email&utm_source=govdelivery

Lobster Shell Disease

Christine Kircun published the following article in the NOAA Fisheries Science Blog on May 9, 2018.

While out here on the NOAA vessel *Henry Bigelow* at the southern edge of the Northeast Channel, we've caught some lobsters, and just in time. Sailing with us is Joe Kunkel, a former professor and now professor emeritus at the University of Massachusetts (UMass) Amherst, who is investigating a shell disease found on some lobsters.

Shell disease is an epizootic, or temporarily prevalent and widespread, disease found on lobsters. Unofficially, it's suggested to be caused by a bacterium called *Aquamarina*. It's denoted by circular lesions on the top part of the carapace. The lesions start out microscopic, but once visible, hundreds of organisms, such as other bacteria, protozoans and nematodes, can be found living in the infected area. During the 1980s, about 1 in 10,000 lobsters may have been seen with shell disease. By the late 1990s, hot spots with up to 70% of the population showing signs of lesions were seen in the Narragansett and Buzzards Bay areas.

Joe suggests that the prevalence of the disease increases as the lobsters' vulnerability to it increases. This means the shell's protective ability plays an important role. Minerals composing the shell include calcium, phosphate, and

magnesium. The chemical reactions between these minerals dissolving in the surrounding sea water create a basic (high pH), 'unstirred layer.' Think of it as a barrier between the lobster and seawater where a lot of mineral mixing is happening. Have you ever noticed that a lobster feels a little slippery? The slippery feeling is that protective barrier.

Healthy lobster shell – no shell disease. *(Photo by Christine Kircun, courtesy of NOAA Fisheries/NEFSC)*

In order to grow, lobsters molt their hard, exterior shell. Leading up to molting, a reserve of calcium carbonate and minerals in the endocuticle, or inner shell layer, are reabsorbed through the epidermal cell layer. A new, soft shell matrix is formed underneath the old shell. Once molted, they eat their old shell, bringing all the rest of the minerals back into their body. They use the reabsorbed and eaten minerals to establish their new shell. It takes about seven days for the shell to feel hard, and it'll be several more weeks until the shell reaches its maximum hardness. But their new shell has to be bigger so they also need to consume more minerals from their diet. This time of shell establishment is the vulnerable phase when shell disease may sneak in.

Lobster with extensive shell disease on its carapace. *(Image courtesy of NOAA)*

If a lobster isn't able to consume enough added minerals, the new shell could be thinner or weaker in some areas. As global warming changes the temperature and chemistry of the ocean, lobsters may find it increasingly difficult to obtain the necessary amount of minerals, added to what they already have stored, and regrow a shell to its maximum thickness and hardness as well as building reserves for its yet bigger shell next year. Possibly, those areas of mineral thinness, or shell weakness, are spots of vulnerability to shell disease. If the protective barrier isn't as effective, the lobsters are rendered more vulnerable, giving the bacteria a chance to establish a lesion.

The mineralization is a process that spans multiple years, and the lobsters need an adequate mineral supply to achieve a healthy cuticle that is not vulnerable to infection. We are making it harder for the lobsters by feeding them low calcium bait. We could possibly have a healthier lobster population in the face of ocean acidification if we feed them a higher calcium carbonate bait. Joe Kunkel

But if a lobster has shell disease, not all is lost! If they are able to shed their shell, the disease goes with it, and they are safe. Unfortunately, it's not that simple. First, younger lobsters benefit from multiple molts a year as they are growing very fast. They are rarely killed because shell disease does not have the time to develop to advanced stages. For older lobsters, molting is reduced to once a year in the summer. This means that if the lobster is vulnerable to shell disease due to a compromised shell, it may develop lesions at some point during the year. As a result, the most severe cases are expected right before molting. As long as the infection hasn't made its way through

the epidermal cell layer, the lobster has a chance to molt the shell and have a new beginning, disease free with a new shell. Otherwise, the infection enters the blood stream and kills the lobster.

Females have an added hurdle to overcome because they don't molt while carrying eggs. Molting for these females may be delayed for up to six months! This means any lesions on the shell have six more months to reach the blood stream. Large, healthy, and reproductively successful females are extremely important for sustaining a population, so it's disconcerting to see this condition having an exaggerated effect on females.

But where there are problems, there are people seeking solutions. One idea is to supplement their diets by feeding lobsters in their traps with bait that contains more minerals needed for shell growth. Another idea is to harvest them sooner after they molt. This may decrease the amount of lobsters caught with shell disease as it hasn't had time to establish itself. Lobsters with shell disease are usually either discarded or if abundant they are sent to the cannery. Since the lesions are only on the cuticle, the meat is perfectly fine. Lobsters with shell disease are not desirable for boiling in the shell because the lovely cherry red color is replaced with a rusted-metal look.

For more information contact the NOAA Northeast Fisheries Science Center at 508-495-2000.

Source: https://www.fisheries.noaa.gov/science-blog/lobster-shell-disease?utm_medium=email&utm_source=govdelivery

Recently Awarded Research

EPA Awards Casco Bay with Annual Grant Funding to Improve Water Quality

On September 27, 2017, EPA announced it awarded a $630,000 grant to the Casco Bay Estuary Partnership (CBEP), which is housed at the University of Southern Maine in Portland, Maine. The funds will go toward efforts to reduce nutrient pollution, protect and restore key habitats, and improve resilience and community education around the Casco Bay Watershed.

Casco Bay is part of EPA's National Estuary Program (NEP) to protect and restore the water quality and ecological integrity of estuaries of national significance. Casco Bay borders Maine's largest metropolitan area. Its watershed represents just three percent of the state's total land mass, but holds roughly 18% of its population and includes portions of 48 municipalities. It has 575 miles of shoreline and 785 islands and ledges. Casco Bay is one of 28 NEPs in the U.S. and Puerto Rico that are designated as estuaries of national significance. Each NEP focuses within a study area that includes the estuary and surrounding watershed.

In 2016 CBEP, with its partners, finalized a revised "Comprehensive Conservation and Management Plan," a five-year plan containing actions to address water quality and living resource challenges and priorities. The Casco Bay Plan is focused on four goals:

- Protect, restore, and enhance key habitats such as salt marshes, eelgrass beds, and fish passage.

- Reduce nutrient pollution and its impacts, such as coastal acidification.
- Increase public engagement with the Bay and foster resilient communities as they adapt to climate change.
- Mobilize collective knowledge and resources, including convening groups to address problems such as nutrient pollution.

To that end, this grant will help fund the recently convened Nutrient Council, a high level group that will evaluate options to reduce nutrient loads to the bay. By national standards, Casco Bay is relatively healthy. Yet the Bay is far from pristine. Roadways, lawns, wastewater treatment plants, and air pollution contribute excess nutrients and toxics to marine ecosystems. In the last few years, scientists and CBEP partners have observed possible signs of increased nutrient enrichment, such as algal blooms on mudflats and negative impacts to eelgrass beds.

For more information on EPA's National Estuary Program, visit www.epa.gov/nep.

For more information on the Casco Bay grant award, contact Dave Deegan deegan.dave@epa.gov or at 617-918-1017.

Source: https://www.epa.gov/newsreleases/epa-awards-casco-bay-annual-grant-funding-improve-water-quality

Long Island Sound Futures Fund Awards Grants in Connecticut and New York To Improve the Health and Ecosystem of Long Island Sound

On November 16, 2017, top federal and state environmental officials from EPA Region 1 and the State of Connecticut announced 20 grants totaling $1.29 million to local government and community groups to improve the health and ecosystem of Long Island Sound. Eighteen projects, totaling $1.2 million, benefit communities in Connecticut. Two projects, totaling $83,000, benefit communities in the New England states of Massachusetts, New Hampshire, and Vermont.

On December 4, 2017, top federal and state environmental officials from EPA Region 2 and the State of New York announced 31 grants totaling $2.04 million to local government and community groups to improve the health and ecosystem of Long Island Sound. Fifteen projects, totaling $1.05 million, directly benefit communities New York.

These projects, which are funded through the Long Island Sound Futures Fund (LISFF), will restore 39 acres of habitat for fish and wildlife including coastal forest, grassland, river, and tidal marshes. This grant program combines funds from EPA and the National Fish and Wildlife Foundation (NFWF).

LISFF 2017 grants will reach more than 870,000 residents through environmental and conservation education programs. Water quality improvement projects will treat 439,000 gallons of water runoff, reducing more than 15,600 pounds of nitrogen, and collecting 2,800 pounds of floating trash.

Overall, the grant funds will be matched by $3.3 million from the grantees, resulting in $5.3 million in funding for on-the-ground conservation projects in both states. In New York, the $1.05 million in grant funds will be matched with $2.58 million from the grantees, resulting in $3.63 million in community conservation. In Connecticut, the $1.29 million in grant funds will be matched by $1.1 million from the grantees resulting in $2.45 million in funding for on-the-ground conservation in Connecticut and New England.

The Long Island Sound Study initiated the LISFF in 2005 through EPA's Long Island Sound Office and NFWF. To date, LISFF has invested $17 million in 380 projects. With grantee matches of $33 million, the program has generated $50 million for locally based conservation. The projects have opened up 157 river miles for fish passage, restored 1,090 acres of critical fish and wildlife habitat and open space, treated 202 million gallons of pollution, and educated and engaged 3 million people from communities surrounding the Sound.

Each project contributes to a healthier Long Island Sound for everyone, from nearby area residents to those at the furthest reaches of the Sound. All nine million people who live, work, and play in the watershed impacting the Sound can benefit from and help build on the progress that has already been made.

The Long Island Sound Study, developed under EPA's National Estuary Program, is a cooperative effort between EPA and the states of Connecticut and New York to protect and restore the Sound and its ecosystem. To learn more about the Long Island Sound Study, visit www.longislandsoundstudy.net.

Chartered by Congress in 1984, the NFWF protects and restores the nation's fish, wildlife, plants, and habitats. Working with federal, corporate, and individual partners, NFWF has funded more than 4,500 organizations and committed more than $3.5 billion to conservation projects. Learn more at www.nfwf.org.

The following are select grant awards:

Partnering for Pollution Prevention: Water Quality Monitoring of Impaired Waterways (CT)
Earthplace - The Nature Discovery Center, Inc.
Project Area: The project will take place on Bruce Brook, Byram River, Comstock Brook, Greenwich Creek, Horseneck Brook, Mianus River, Rippowam River, and Rooster River, Fairfield County, Connecticut
LISFF Funds: $65,363
Matching Funds: $54,383

The project will monitor eight impaired waterways biweekly for water temperature, dissolved oxygen, conductivity, fecal coliform, and bacteria in Fairfield County, Connecticut. The project will provide an update to a dataset of water quality conditions and work towards identifying sources of sewage pollution impacting Long Island Sound.

Planning for Fish Passage at Starr Mill Pond Dam (CT)
The Nature Conservancy-Connecticut
Project Area: Starr Mill dam is the first dam on the Coginchaug River, Middletown, Connecticut
LISFF Funds: $85,482
Matching Funds: $43,676

The project will develop an engineered plan for fish passage at the Starr Mill Pond dam and for restoration of the river corridor and upstream impoundment in Middletown, Connecticut. The project plan goal is to improve connectivity and restore freshwater wetlands, riparian buffer, floodplain, and aquatic habitat, benefitting resident, as well as migratory, species.

Phillips Mill Fish Passage Project (NY)
Connecticut Fund for the Environment, Save the Sound
Project Area: Nissequogue River, Town of Smithtown, New York
LISFF Funds: $99,999
Matching Funds: $110,000

The Connecticut Fund for the Environment and Save the Sound will engineer a fish passage plan at Phillips Mill Pond Dam on the Nissequogue River, Town of Smithtown, New York. The fish passage plan will restore native migratory fish runs from Long Island Sound to upstream spawning habitat in the Nissequogue River for the first time in 300 years.

Coastal Wetland and Forest Restoration Planning Project (NY)
City Parks Foundation
Project Area: Hammond Cove and Harding Park, Bronx River, New York
LISFF Funds: $99,976
Matching Funds: $87,349

City Parks Foundation will produce restoration plans for tidal wetland and coastal forest in Hammond Cove and Harding Park, Bronx, New York. The foundation will identify new restoration and stewardship opportunities at small neglected salt marsh sites as well as at adjacent upland and connected tributaries throughout the western Long Island Sound.

For more information, contact Mike Smith at NFWF at 703-623-3834. At EPA, contact Jennifer May-Reddy for New York projects at may.jennifer@epa.gov or 212-637-3658, or Dave Deegan for Connecticut projects at deegan.dave@epa.gov or 617-918-1017.

Sources: https://www.epa.gov/newsreleases/204-million-grants-will-improve-health-long-island-sound and https://www.epa.gov/newsreleases/129-million-awarded-grants-improve-health-and-ecosystem-long-island-sound

2018-2019 Sea Scallop Research Set-Aside Awards Announced

On May 16, 2018, NOAA Fisheries Northeast Fisheries Science Center (NEFSC) and the New England Fishery Management Council (NEFMC) announced that 15 projects were selected for funding through the Sea Scallop Research Set-Aside (RSA) Program.

"The Scallop RSA Program truly has become one of the flagships of the scallop fishery," said New England Council Chairman Dr. John Quinn. "The collaborative efforts that take place at sea between fishermen and researchers go a long way toward enhancing our understanding of what's happening with the resource. The results of this RSA work funnel back to the Council and support stock assessments. Without a doubt, the Scallop RSA Program helps us better manage our extremely valuable scallop fishery."

Atlantic sea scallops. *(Image courtesy of NOAA Fisheries)*

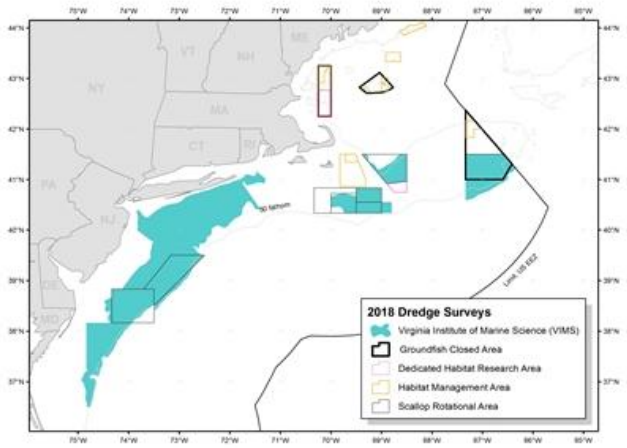
Projects will address research priorities established by the NEFMC, with particular focus on resource surveys. The awards are expected to generate more than $12 million: $3 million to fund research and $9 million to compensate industry partners that harvest set-aside quota."We are excited to be able to work with the New England Fishery Management Council, industry, and scientists to fund sea scallop science through the Research Set-Aside program," said NEFSC Science and Research Director Jon Hare. "The projects funded support surveys, bycatch mitigation, and biological studies, all with the purpose of improving the information used in the management of the sea scallop resource."

The NEFMC established the Sea Scallop RSA Program to address research questions that support management of the sea scallop resource. The Council sets the research priorities and researchers apply for funding through a federal grant competition managed by NOAA Fisheries. No federal funds are provided to support the research. Instead, projects are awarded pounds of scallops, which have been "set-aside" from the annual fishery quota for this purpose. Successful applicants partner with the fishing industry to harvest their set-aside award to generate funds for the research. There are active research set-aside programs for Atlantic sea scallops, Atlantic herring, and monkfish.

2018/2019 Scallop RSA Award Summary

Scallop Surveys

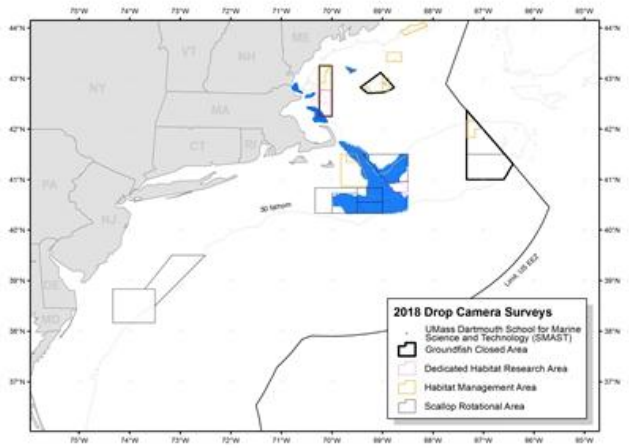
The Virginia Institute of Marine Science (VIMS) received new awards to conduct dredge surveys in Closed Area I Closed Area II, and the Nantucket Lightship, all located off of the coast of Cape Cod, Massachusetts, on Georges Bank. Georges Bank is a plateau along the ocean floor off the New England coast that separates the Gulf of Maine from the Atlantic Ocean. Under an existing award from last year, VIMS also will conduct a dredge survey of the Mid-Atlantic Bight, which runs off the East Coast from Massachusetts to North Carolina. Map 1 above shows the VIMS survey areas. As part of ongoing efforts to better understand scallop survey dredge performance, VIMS investigators



Map 1: 2018 RSA scallop dredge surveys, Virginia Institute of Marine Science. *(Image courtesy of NOAA Fisheries)*

received an award to evaluate the hydrodynamic characteristics of both lined and unlined survey dredges in the largest flume tank in the world, located in St. John's, Newfoundland at Memorial University's Marine Institute.

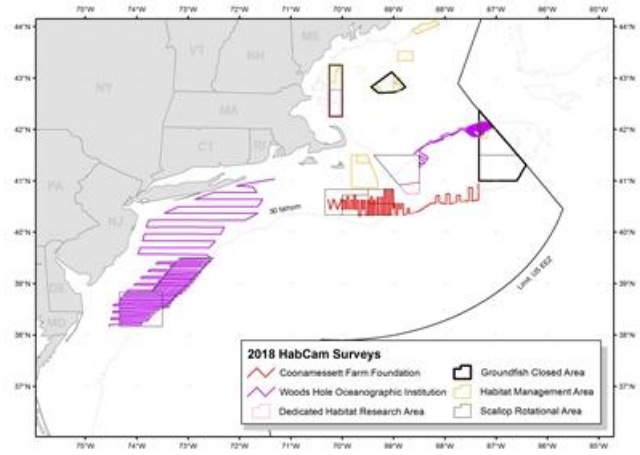
The University of Massachusetts, Dartmouth, School for Marine Science and Technology (SMAST) received three awards to conduct surveys using a drop-camera array. Through these awards, researchers plan to conduct high-resolution surveys of the Nantucket Lightship, Closed Area I, Great South Channel, which runs from Cape Cod to Georges Bank, and select portions of the Northern Gulf of Maine Scallop Management Area, located off the New England coast from northern Massachusetts to Maine. These survey areas are show on Map 2.



Map 2: 2018 RSA scallop drop camera surveys, UMass Dartmouth School for Marine Science and Technology. *(Image courtesy of NOAA Fisheries)*

The Woods Hole Oceanographic Institution (WHOI) will conduct HabCam optical surveys throughout the Mid-Atlantic Bight and on the northern flank of Georges Bank. In addition to these surveys, researchers will continue to evaluate dredge effects on habitat and habitat recovery in the Closed Area II Habitat Area of Particular Concern, located on Georges Bank. The WHOI survey areas are shown on Map 3.

Coonamessett Farm Foundation (CFF) will conduct a HabCam survey of the Nantucket Lightship and southern flank of Georges Bank. These areas are also shown on Map 3.



Map 3: 2018 RSA scallop HabCam surveys, Coonamesset Farm Foundation and Woods Hole Oceanographic Insitution. *(Image courtesy of NOAA Fisheries)*

Bycatch Mitigation

CFF will:

- Continue its seasonal survey on Georges Bank, collecting information on bycatch rates for yellowtail flounder and other species relative to scallop meat yield. These data also will be used to evaluate sea scallop health and meat quality, biological questions about several flounder species, and to examine lobsters for shell disease.
- Continue its loggerhead sea turtle tagging program, receiving funds to tag up to 20 loggerheads with water-activated satellite tags. Tag data will be used to evaluate spatial and temporal overlap between loggerhead sea turtles and the scallop fishery.
- Test a dredge twine-top cover net in an attempt to quantify dredge selectivity characteristics.

Sea Scallop Biology

VIMS will investigate sea scallop density-dependence factors that may be affecting growth, mortality, and reproduction of scallops in the Nantucket Lightship area off of Cape Cod and Elephant Trunk area off of New Jersey. In addition, VIMS will conduct a pilot study to extend the current stock assessment model to better account for sea scallop ages, with a particular focus on the Mid-Atlantic Bight and Nantucket Lightship areas.

WHOI will receive support to determine if a gonadosomatic index (GSI) can be calculated from Light Field 3D images of shucked scallops collected during fishing operations. The GSI is used to assess maturity and spawning events in many species of fish and shellfish, including scallops. If successful, this could improve the ability to collect and quantify scallop maturation and spawning data during the course of routine fishery sampling procedures.

The table below lists the 2018-2019 Sea Scallop RSA Projects and the award amount.

2018-2019 Sea Scallop Research Set-Aside Projects (Set-Aside Award based on $10.50 per pound)		
Institution, Principal Investigator	**Project Title**	**Award**
CFF	Quantifying the selectivity characteristics of an extended link apron using a dredge cover net	83,320 lb scallops Est. value: $874,859 Research cost: $218,715
CFF	An optical assessment of sea scallop abundance, distribution, and growth in the Nantucket Lightship and southern part of Georges Bank	84,134 lb scallops Est. value: $883,405 Research cost: $220,851
CFF	Understanding the impacts of the Atlantic Sea Scallop fishery on Loggerhead Sea Turtles	72,609 lb scallops Est. value: $762,395 Research cost: $190,598.75
CFF	Optimizing the Georges Bank scallop fishery by maximizing meat yield and minimizing bycatch	190,182 lb scallops Est. value: $1,996,912 Research cost: $499,228
SMAST	High-resolution drop camera surveys to track scallop aggregations in Closed Area I and Great South Channel	33,626 lb scallops Est. value: $353,073 Research cost: $84,065
SMAST	High-resolution drop camera survey examining the scallop population and habitat in select portions of the Gulf of Maine	48,922 lb scallops Est. value: $513,680 Research cost: $122,305
SMAST	High resolution drop camera survey examining sea stars dynamics in extremely dense scallop beds of the Nantucket Lightship	38,288 lb scallops Est. value: $402,027 Research cost: $95,721
VIMS	An assessment of sea scallop abundance and distribution in the Nantucket Lightship (2 year project)	59,859 lb scallops Est. value: $628,516 Research cost: $125,703
VIMS	The effect of density on growth, yield and reproduction of the sea scallop, *Placopecten magellanicus* (2 year project)	116,718 lb scallops Est. value: $1,225,538 Research cost: $272,678
VIMS	An assessment of sea scallop abundance and distribution in Closed Area I and Closed Area II (2 year project)	72,216 lb scallops Est. value: $758,266 Research cost: $151,653
VIMS	Age-based assessment in the sea scallop, *Placopecten magellanicu*: A pilot study (2 year project)	65,978 lb scallops Est. value: $692,772 Research cost: $153,630
VIMS	Understanding dredge performance for a lined versus unlined NMFS Sea Scallop Survey Dredge	15,247 lb scallops Est. value: $160,098 Research cost: $40,025
WHOI	High intensity optical survey of the Mid-Atlantic Bight rotational closure areas: Elephant Trunk and Hudson Canyon	129,385 lb scallops Est. value: $1,358,540 Research cost: $339,635
WHOI	Developing a spatially and temporally explicit gonadosomatic index through the Sea Scallop Observer Program: A pilot study	45,019 lb scallops Est. value: $472,696 Research cost: $118,174
WHOI	High intensity optical survey of Closed Area II and northern part of Georges Bank	114,616 lb scallops Est. value: $1,203,468 Research cost: $300,867

For more information about these awards and the Scallop RSA Program, please contact Ryan Silva at ryan.silva@noaa.gov or 978-281-9326, or Cheryl Corbett at cheryl.corbett@noaa.gov or 508-495-2307. At NOAA, contact Teri Frady at teri.frady@noaa.gov.

Source: https://www.nefsc.noaa.gov/coopresearch/news/scallop-rsa-2018-2019/?utm_medium=email&utm_source=govdelivery

Tech and Tools

New York Fishing, Hunting & Wildlife App

The New York Department of Environmental Conservation (DEC), in partnership with ParksByNature Network®, announced the launch of the *New York Fishing, Hunting & Wildlife App* for iPhone and Android.

This free, cutting-edge mobile app gives both novice and seasoned outdoor enthusiasts essential information in the palm of their hands. Powered by Pocket Ranger® technology, this official app for DEC will provide up-to-date information on fishing, hunting, and wildlife watching and serve as an interactive outdoor app using today's leading mobile devices. Using the app's advanced GPS features, users will be able to identify and locate New York's many hunting, fishing, and wildlife watching sites. They will also gain immediate access to species profiles, rules and regulations, and important permits and licensing details.

The app provides plenty of additional features to maximize any outdoor adventure:

- Real-time calendar of events
- News, advisories, and weather alerts
- Social networking and photo sharing
- Potentially life-saving alert features
- Cacheable map tiles for offline use
- Advanced GPS mapping features including built in compass

Screen-capture of Pocket Range app.
(Image courtesy of NYDEC)

ParksByNature has a YouTube video on using the advanced GPS mapping and friend finder options.

For more information, contact Laurel Remus at laurel.remus@dec.ny.gov.

Source: https://www.dec.ny.gov/outdoor/96470.html

Recent Publications

Journal Articles

The list below provides a selection of research articles focusing on the Northeast U.S.

- The role of dissolved organic carbon concentration and composition on nickel toxicity to early life-stages of the blue mussel *Mytilus edulis* and purple sea urchin *Strongylocentrotus purpuratus*
  Blewett, T.A., E.M. Dow, C.M. Wood, J.C. McGeer, and D.S. Smith. 2018. The role of dissolved organic carbon concentration and composition on nickel toxicity to early life-stages of the blue mussel *Mytilus edulis* and purple sea urchin *Strongylocentrotus purpuratus*. *Ecotoxicology and Environmental Safety* 160: 162-170.

- Methylmercury bioaccumulation in an urban estuary: Delaware River, USA
  Buckman, K., V. Taylor, H. Broadley, D. Hocking, P. Balcom, R. Mason, K. Nislow, and C. Chen. 2017. Methylmercury bioaccumulation in an urban estuary: Delaware River, USA. *Estuaries and Coasts* 40(5): 1358-1370.

- Variation in fish mercury concentrations in streams of the Adirondack region, New York: A simplified screening approach using chemical metrics
  Burns, D.A. and K. Riva-Murray. 2018. Variation in fish mercury concentrations in streams of the Adirondack regions, New York: simplified screening approach using chemical metrics. *Ecological Indicators* 84: 648-661.

- Healthful, cultural foods and safety net use among Cambodian and Brazilian immigrant communities in Massachusetts
  Cordeiro, L.S., L. Sibeko, and J. Nelson-Peterman. 2017. Healthful, cultural foods and safety net use among Cambodian and Brazilian immigrant communities in Massachusetts. *Journal of Immigrant and Minority Health*: 1-9.

- Three decades of change in demersal fish and water quality in a Long Island Sound embayment
  Crosby, S.C., N.L. Cantatore, L.M. Smith, J.R. Cooper, P.J. Fraboni, and R.B. Harris. 2018. Three decades of change in demersal fish and water quality in a Long Island Sound Embayment. *Estuaries and Coasts*: 1-11.

- Six decades of change in pollution and benthic invertebrate biodiversity in a southern New England estuary
  Hale, S.S., H.W. Buffum, and M.M. Hughes. 2018. Six decade of change in pollution and benthic invertebrate biodiversity in a southern New England estuary. *Marine Pollution Bulletin* 133: 77-87.

- Effects of climate change on four New England groundfish species
  Klein, E.S., S.L. Smith, and J.P. Kritzer. 2017. Effects of climate change on four New England groundfish species. *Reviews in Fish Biology and Fisheries* 27(2): 317-338.

- A zero percent plastic ingestion rate by silver hake (*Merluccius bilinearis*) from the south coast of Newfoundland, Canada
  Liboiron, F., J. Ammendolia, J. Saturno, J. Melvin, A. Zahara, N. Richárd, and M. Liboiron. 2018. A zero percent plastic ingestion rate by silver hake (*Merluccius bilinearis*) from the south coast of Newfoundland, Canada. *Marine Pollution Bulletin* 131(A): 267-275.

- Genome-wide scan reveals signatures of selection related to pollution adaptation in non-model estuarine Atlantic killifish (*Fundulus heteroclitus*)
  Osterberg, J.S., K.M. Cammen, T.F. Schultz, B.W. Clark, and R.T. Di Giulio. 2018. Genome-wide scan reveals signatures of selection related to pollution adaptation in non-model estuarine Atlantic killifish (*Fundulus heteroclitus*). *Aquatic Toxicology* 200: 73-82.

- Pathogens of marine bivalves in Maine (USA): A historical perspective
  Robledo, J.A., N.D. Marquis, P.D. Countway, N.R. Record, E.L. Irish, M.M. Schuldt, S.E. Kingston, T.J. Bishop, N.A. Messerman, and T.J. Bowden. 2018. Pathogens of marine bivalves in Maine (USA): A historical perspective. *Aquaculture* 493: 9-17.

- Estimates of recovery of the Penobscot River and estuarine system from mercury contamination in the 1960s
  Santschi, P.H., K.M. Yeager, K.A. Schwehr, and K.J. Schindler. 2017. Estimates of recovery of the Penobscot River and estuarine system from mercury contamination in the 1960s. *Science of The Total Environment* 596-597: 351-359.

- Prioritizing coastal ecosystem stressors in the Northeast United States under increasing climate change
  Smith, S.L., S.E. Cunniff, N.S. Peyronnin, and J.P. Kritzer. 2017. Prioritizing coastal ecosystem stressors in the Northeast United States under increasing climate change. *Environmental Science & Policy* 78: 49-57.

- Declining ambient water phosphorus concentrations in Massachusetts' rivers from 1999 to 2013: Environmental protection works
  Wong, W.H., J.J. Dudula, T. Beaudoin, K. Groff, W. Kimball, and J. Swigor. 2018. Declining ambient water phosphorus concentrations in Massachusetts' rivers from 1999 to 2013: Environmental protection works. *Water Research* 139: 108-117.

- Habitat risk assessment for regional ocean planning in the U.S. Northeast and Mid-Atlantic
  Wyatt, K.H., R. Griffin, A.D. Guerry, M. Ruckelshaus, M. Fogarty, and K.K. Arkema. 2017. Habitat risk assessment for regional ocean planning in the U.S. Northeast and Mid-Atlantic. *PLoS One* 12(12): e0188776.

- Mercury inputs and redistribution in the Penobscot River and estuary, Maine
  Yeager, K.M., K.A. Schwehr, P. Louchouam, R.A. Feagin, K.J. Schindler, and P.H. Santschi. 2018. Mercury inputs and redistribution in the Penobscot River and estuary, Maine. *Science of The Total Environment* 622-623: 172-183.

Upcoming Meetings and Conferences

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

8th International Symposium on Aquatic Animal Health
September 2-6, 2018
Prince Edward Island, Canada

72nd Annual Pacific Coast Shellfish Growers Association Shellfish Conference and Tradeshow
September 18-20, 2018
Blaine, Washington

European Aqua Congress
October 18-19, 2018
Paris, France

Organization of Fish and Wildlife Information Managers Annual Conference and Business Meeting
November 4-8, 2018
Hood River, Oregon

Fish Passage 2018 - International Conference on River Connectivity
December 10-14, 2018
Albury, New South Wales, Australia

International Conference on Food Safety and Health: Accentuating Current and Emerging Food Safety Issues
August 30-31, 2018
Dubai, UAE

9th International Conference on Fisheries and Aquaculture
September 17-18, 2018
Vancouver, British Columbia, Canada

12th World Congress on Aquaculture and Fisheries
September 19-20, 2018
Hong Kong

18th International Conference on Harmful Algae
October 21-26, 2018
Nantes, France

13th World Congress on Aquaculture and Fisheries
November 12-13, 2018
Melbourne, Australia

National Shellfisheries Association 111th Annual Meeting
March 7-11, 2019
New Orleans, Louisiana

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).