The NOAA FISHERIES NAVIGATOR

Fishermen Provide Real-Time Ocean Bottom Temperatures to Increase Understanding of Ecosystem

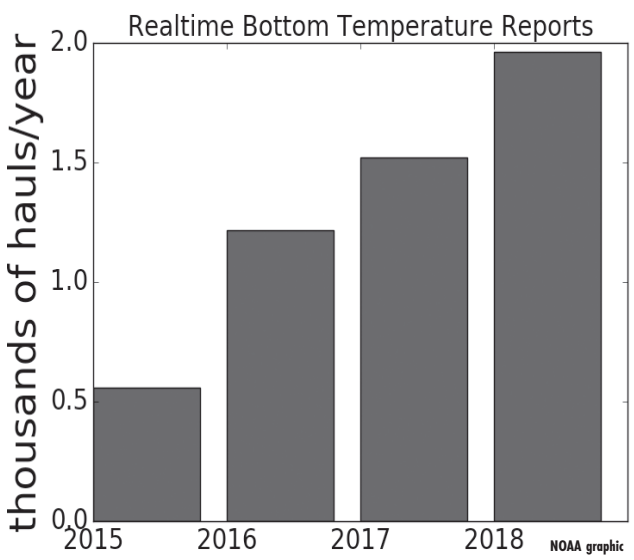
More than a dozen commercial fishing boats, including many participating in the Northeast Fisheries Science Center's (NEFSC) Cooperative Research Study Fleet program, have been reporting ocean bottom temperatures in real-time during the last few years. This project is a collaborative effort with the NEFSC's Oceanography Branch and other partners to develop and refine real-time reporting equipment as a tool to help monitor the physical environment of the Gulf of Maine and Southern New England continental shelf.

These data sets help ocean modelers understand how ecosystem factors such as bottom temperatures influence the distribution, abundance, and productivity of ocean life, in particular the physical and biological processes that control the growth and survival of early life stages of fish and lobster and their prey.

To transfer bottom temperature data in real-time, a wireless temperature-depth probe is attached to fishing gear, which, when hauled back on deck, sends information to a micro-computer in the wheelhouse. The system then automatically transmits the averaged data for each haul to a NOAA computer server in Woods Hole by satellite, all without changing the fishermen's routines. Finally, when the vessel is within range of an available WiFi connection, the full raw data file is transmitted automatically to the Woods Hole computer. A benefit of this system is that data feedback loops enable the fishermen to immediately see how their observations compare to historical records for that time and area.

Since the project began in 2015, the number of hauls reported per year has been increasing steadily, with data from more than 5,000 hauls transmitted to date. With funding now in place from Cooperative Research and the Integrated Ocean Observing Systems "Ocean Technology Transition" program, a few dozen more boats will be outfitted in the near future, which should result in more than 6,000 incoming reports per year.

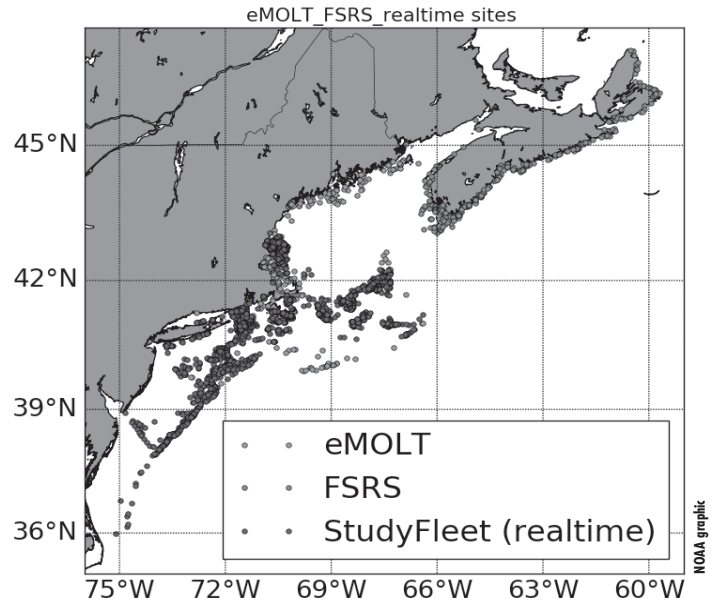
Both fixed and mobile gear fishermen are participating in this effort, with much of the project administration provided by the Gulf of Maine Lobster Foundation. Data partners include the NEFSC's Study Fleet, Commercial Fisheries Research Foundation, Cape Cod Fishermen's Alliance, Massachusetts Lobstermen Association, Maine Lobstermen Association, and Gulf of Maine Research Institute.



While the majority of the reported hauls have been from Massachusetts waters and south, additional partners such as the Maine Center for Coastal Fisheries, Island Institute, and Nova Scotia's Fishermen Scientists Research Society (FSRS) are expected to join the project in order to provide more real-time observations from the Gulf of Maine region.

Project goals for the coming year are to fill in more real-time data in the Gulf of Maine, and to start feeding the data to local ocean modelers so they can better refine hindcast and forecast simulations of the oceanographic conditions on the entire Northeast Continental Shelf. Improved modeling for this area will benefit fishermen by giving them access to real-time ecosystem data to incorporate into their fishing practices. It will also help scientists understand the drift of fish and lobster larvae and the fate of any particle matter, such as harmful algal blooms.

For more information on this real-time bottom temperature project, contact james.manning@noaa.gov.



Approximate locations of real-time reports to date, along with the locations where long-term bottom temperature time data is available from a related project (EMOLT - the Environmental Monitors on Lobster Trap Program) and FSRS lobstermen.

Reaching Out to a Vital but Little Understood Fishing Asset: The Crew

Social scientists from NOAA's Northeast Fisheries Science Center are visiting major fishing ports in the region to talk face-to-face with crew members on commercial fishing vessels. The researchers go where crew are likely to be, at times when they might have a few moments to talk about themselves and their work.

Crew are among the least understood workers in commercial fishing operations. The information being gathered will help build a more complete picture of what is actually happening among fishing people and their communities.

Small teams of 2 to 4 interviewers were deployed beginning in August for an effort that will continue into early 2019. The goal is to collect 450 responses, distributed across major ports and fisheries.

Staff completed more than 220 surveys by mid-October in 33 ports. In August and September, the team surveyed crew in New Bedford, Gloucester, and Fairhaven, MA; Point Judith, RI; and Stonington, Portland, Rockland, Owl's Head, and Kennebunkport, ME. In October, the team visited ports in New York and New Jersey, and in November they plan to head to Virginia and North Carolina.

The information collected in this survey is anonymous – none of the information collected can be used to identify an individual taking the survey, such as names or contact information, or names of employers or vessels. Instead, questions focus on topics such as recent work, typical fishing activity in a year, availability of work, types of work, fishing income, perceptions of fishery management and ability to participate in those decisions, job satisfaction, and well-being. It also gathers demographic information.

This survey is one piece of a larger Northeast Fisheries Science Center effort to gather information about people whose livelihoods are supported by commercial fishing. It is the second to focus on crew, including captains. The first was conducted in 2012 and 2013.Based on that work, the 2018-2019 survey was revised and has fewer questions, needing only about ten minutes to complete. The number of ports on the list is greater, about 50, but effort in each port is proportional to the social and economic level of engagement in commercial fishing there.

For more information, contact Matthew Cutler at 508-495-4731 or email at matthew.cutler@noaa.gov, or Lisa Colburn at 401-782-3253 or email at lisa.colburn@noaa.gov

THIS SUPPLEMENT PROVIDED BY NOAA FISHERIES SERVICE'S GREATER ATLANTIC REGIONAL OFFICE

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The NOAA FISHERIES NAVIGATOR

Small fish. Big change.

Big changes may be ahead for the Atlantic herring fishery. We recently reduced the Atlantic herring annual catch limit by 55% for 2018 in response to a new stock assessment. The New England Fishery Management Council recommended a new method to set catch limits and requested us to reduce catch limits even further for 2019. Additionally, the Council recommended industry-funded monitoring for the Atlantic herring fishery and new measures to prohibit midwater trawling.


NOAA photo

Specifications	Reduced 2018 Catch Limits	Council-Recommended 2019 Catch Limits
Acceptable Biological Catch	*111,000 mt*	*21,266 mt*
Annual Catch Limit	*49,900 mt*	*15,065 mt*

Source: NA Division of Marine Fisheries

Reduced catch in the Atlantic herring fishery?

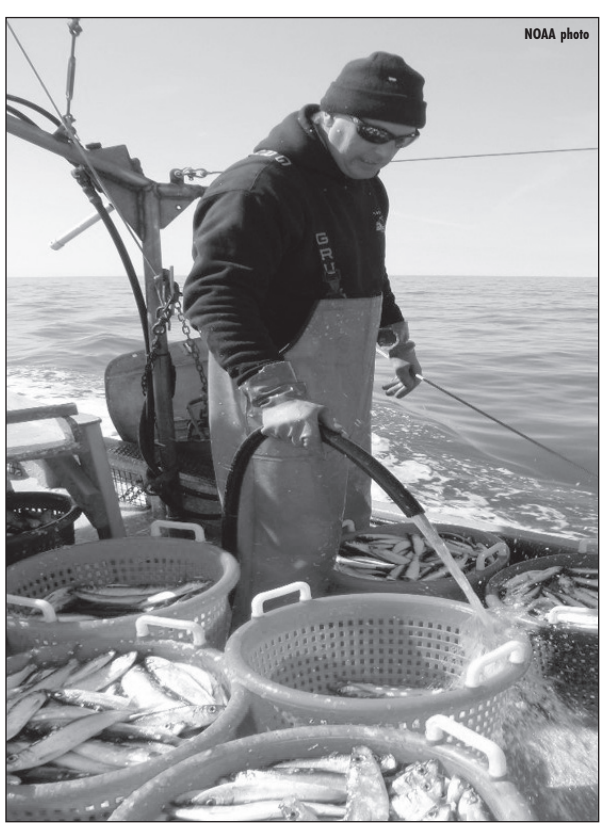
We completed the new assessment of the Atlantic herring stock in June. It showed that recruitment has been historically low since 2013 and that biomass is lower than expected. Reducing Atlantic herring catch for the next few years is necessary to reduce the chance of overfishing and the stock becoming overfished.

Atlantic herring biomass could increase after 2019 if recruitment returns to average levels. We do not yet fully understand the reasons for this low recruitment. While fishing is a source of mortality, it has historically been a relatively low percentage of overall mortality.

The reductions we made to Atlantic herring catch limits for 2018 will remain effective in 2019 unless replaced, but those limits are not low enough to prevent overfishing in 2019.

At its September 2018 meeting, the Council adopted a new method to set the Atlantic herring acceptable biological catch (ABC). The Council developed this new ABC control rule in Amendment 8 to the Atlantic Herring Fishery Management Plan. This control rule is intended to account for Atlantic herring's role in the ecosystem and allow the fishery to achieve optimum yield.

Also in September, the Council requested we use an in-season adjustment to reduce 2019 catch limits from 2018 levels to prevent overfishing. The Council's recommended catch limits for 2019 were based on the new ABC control rule. The reduced 2018 annual catch limit is not a big change from total Atlantic herring catch in 2017 (50,000 metric tons), but the Council-recommended catch limits for 2019 would be much lower than the 2018 limits that would have remained in effect for 2019.


NOAA photo

We are currently considering the Council's request that we reduce catch limits for 2019 from 2018 catch levels. We expect to propose 2019 catch limits in November so that the Council can consider them at its December 4-6, 2018, meeting. Lower Atlantic herring catch limits have the potential to prevent overfishing. Lower limits also have the potential to negatively impact participants in the Atlantic herring and Atlantic mackerel fisheries, as well as limit the availability of Atlantic herring for lobster bait.

Next year, the Council will be considering Atlantic herring catch limits based on the new ABC control rule for 2020 and 2021.

Increased monitoring in the Atlantic herring fishery?

The Council also adopted industry-funded monitoring for the Atlantic herring fishery. The objective of the increased monitoring is to help reduce uncertainty around catch in the Atlantic herring fishery, especially catch tracked against haddock and river herring/shad catch caps.

Specifically, the Council recommended a 50% industry-funded monitoring coverage target on vessels with Category A or B Atlantic herring permits. The 50% coverage target would be achieved by combining existing observer coverage (paid by us) with additional coverage (paid by industry). Options recommended by the Council for industry-funded coverage include at-sea monitors for any vessel or electronic monitoring/portside sampling for midwater trawl vessels.

We are currently reviewing the Council's request for increased monitoring in the Atlantic herring fishery as part of the Council's New England Industry-Funded Monitoring Omnibus Amendment. We are accepting public comment on the amendment through November 19, 2018, and will decide whether to approve the amendment by December 19, 2018. Additionally, we

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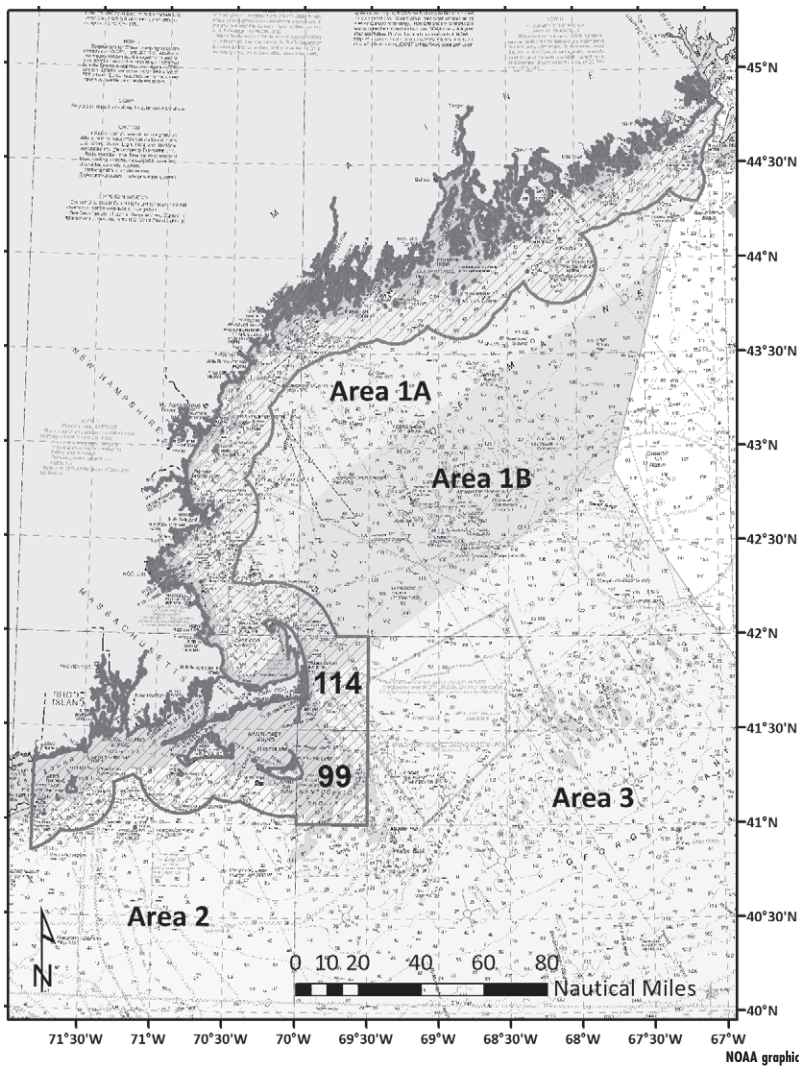
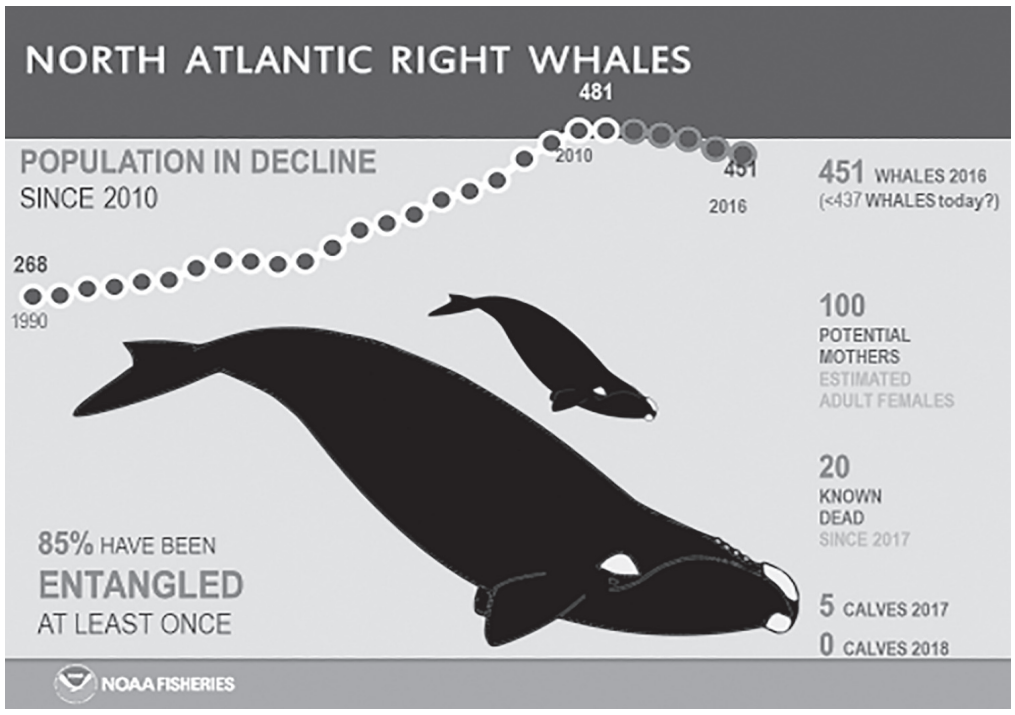


NOAA graphic

Teaming Up to Recover North Atlantic Right Whales

Between 1990 and 2010, the North Atlantic right whale population showed slow but steady growth due in part to seasonal fishing closures and gear modifications undertaken by US trap/pot and gillnet fishermen since 1997. However, after nearly two decades of slow recovery, the population is now in decline. The reasons are complex, but appear to be largely related to large ecosystem shifts currently occurring in the Northwest Atlantic.



Why are Right Whales Dying?

Plainly evident to fishermen, the waters in the Gulf of Maine are among the fastest warming bodies of water within the world's oceans. This rapidly changing system is shifting life throughout the Gulf of Maine, including shifts in right whale prey distribution and abundance.

Calanoid copepods and other zooplankton form the basis of the right whale diet. As copepod availability changes, right whales spend more time and energy searching for food. Resulting right whale distribution changes have exposed them to interactions with fishing gear and vessels in areas where, until recently, protective measures were not in place.

Nowhere has this been more catastrophic than in the Gulf of St. Lawrence, Canada. In waters where previously there were no whale take reduction regulations in place, fishing and vessel traffic contributed to the death of 12 North Atlantic right whales in 2017. An additional eight right whales were found dead in US waters since the beginning of 2017, totaling 20 documented deaths in less than two years.

Low Birth Rates and Reduced Fitness

During this period of increased deaths, only five right whale calves were born during the 2016/2017 calving season. No new calves were born in the 2018/2019 calving season - the first season since surveys of the calving grounds began in 1980 that this has happened. Further, the time between when a female gives birth has increased from having a calf every 4 to 5 years to having a calf every ten years.

Under normal conditions, a year of pregnancy would be followed by a year of calf rearing. An additional two years would be required for an adult female right whale to build up her body condition sufficiently to support another successful pregnancy. Scientists believe that entanglements, especially those that result in adult females dragging gear for an extended period of time, during periods of low food resources, interrupt and delay the right whale's breeding cycle leading to reduced calf production.

Teamwork to Find a Solution

This grim story was delivered on the first day of the Atlantic Large Whale Take Reduction Team meeting in Providence, Rhode Island the week of October 12 through 15th. The 61-person Atlantic Large Whale Take Reduction Team includes members from a number of groups, including the fishing industry, federal and state managers, conservationists, and scientists. The Team meets when human caused deaths or injuries of marine mammals (in this case right whales) is so high that the population can't sustain itself.

The Team works together to find solutions to decrease the deaths and injuries that result from interactions with fishing gear, particularly trap/pot and gillnet gear. When a whale population is declining, each significant incident has more serious consequences for that population.

What's next for the Team?

The Team discussed project proposals submitted by Take Reduction Team members or groups. The proposals examined potential modifications to the Take Reduction Plan, including ideas ranging from modifying or adding seasonal fishery closures, restricting line strength or diameter, to researching and phasing in ropeless fishing technology particularly for new fisheries that use vertical line.

At the next meeting, anticipated in March 2019, the Team will consider developing recommendations for changes to the Take Reduction Plan that will reduce the probability and severity of interactions with fixed gear fisheries on right whales, while still allowing the successful operation of these trap/pot and other fisheries important to the culture and economy of Atlantic fishing communities.

For more information, contact Colleen Coogan, Protected Resources Division, at 978-281-9181 or Colleen.Coogan@noaa.gov

Herring

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expect to announce proposed monitoring measures very soon and will accept public comment on those measures for 45 days. Industry-funded monitoring has the potential to improve catch data and negatively impact vessels with coverage requirements. If we approve the amendment, owners of vessels with Category A or B Atlantic herring permits may be required to begin paying for increased monitoring sometime in 2019.

Additional details on the Industry-Funded Monitoring Amendment and our review are here: https://www.regulations.gov/document?D=NOAA_FRDOC_0001-4836

Restrictions on midwater trawling in the Atlantic herring fishery?

Also in Amendment 8, the Council developed measures to address localized depletion and the resulting conflict among user groups. These measures are intended to mitigate socioeconomic impacts on other user groups (commercial, recreational, ecotourism) associated with intense, concentrated Atlantic herring fishing.

After considering several localized depletion/user group conflict alternatives at its September meeting, the Council adopted a prohibition on midwater trawling within a 12-nautical mile buffer zone. The Council-recommended buffer zone would extend from Maine to Connecticut and include statistical areas 99 and 114 east of Cape Cod.

Source: New England Council

The Council is currently finalizing Amendment 8, including its ABC control rule and buffer zone recommendations, and will send us the amendment later this year for our review and approval. According to Amendment 8, this buffer zone has the potential to benefit other user groups and negatively impact fishing companies using midwater trawl gear.

Additional details on Amendment 8 are here: https://www.nefmc.org/library/amendment-8-2

For more information, contact Carrie Nordeen, Sustainable Fisheries Division, at 978-281-9272 or Carrie.Nordeen@noaa.gov

The NOAA FISHERIES NAVIGATOR

New Collaborative Study Examines Changes in Flatfish Movements That May Affect Use of Stock Assessment Survey Data

The Gulf of Maine is warming faster than almost any other ecosystem on earth. Ocean circulation patterns and other ocean properties are changing as a result. Recently, fishermen and scientists have observed shifts in distributions of groundfish which may be changing the locations they use as spawning, feeding, and overwintering habitats, as well as their migratory patterns. For example, there may be isolated pockets of cold water in some deep areas in the Gulf of Maine where the seabed is complex. These areas may now provide thermal refuges for some cold water species. Fish may now concentrate in areas that are difficult to sample during the Northeast Fisheries Science Center's (NEFSC) federal bottom trawl survey because the areas are naturally complex or have been made so by human activities such as fixed gear fishing. If this is the case, it could affect the accuracy of any changes in fish populations calculated from the surveys.

Researchers from the NEFSC's Cooperative Research Branch and Climate and Oceans Program, along with the Massachusetts Division of Marine Fisheries, are collaborating with New England groundfish fishermen to investigate changes in movements and habitat use by flatfish in Southern New England and the Gulf of Maine. Flatfish targeted by this study include American plaice, witch flounder, yellowtail flounder, winter flounder, windowpane flounder, and summer flounder. We determined the federal survey's R/V Bigelow sampling net efficiency for these species in an earlier study (https://www.fisheries.noaa.gov/media-release/2017-sweep-efficiency-study-targets-summer-flounder).

Scientists work with fishermen on the F/V Crazy Town to get first-hand observations on flatfish distribution.

Through this new study, we hope to get an estimate of the catchability of flatfish to the NEFSC surveys, which may be changing as a result of changes to habitat use and possible preferences for inaccessible cold-water pockets. To implement this study, we are examining fishermen's observations of the changing behaviors of flatfish and their possible underlying causes.

We are also collecting information about the ways fishery regulations, economic factors, and other social forces have influenced where and when fishermen fish, the species they target or must avoid, and how these may affect their observations of species distribution shifts. The collaborating study team is developing these observations into a set of hypotheses that will be tested in workshops with fishermen using currently available data, and used to design a collaborative industry-science field study.

This project builds off of the earlier trawl net sweep studies developed with the Northeast Trawl Advisory Panel (NTAP) working group (https://www.fisheries.noaa.gov/media-release/2017-sweep-efficiency-study-targets-summer-flounder). It also will help us refine our processes for real-time fisheries analyses, building off the work conducted to incorporate new data sources in the recent butterfish and mackerel benchmark stock assessments.

For more information on this project, please contact John.Manderson@noaa.gov

Deep-See: A New Tool for Ocean Exploration

Northeast Fisheries Science Center and Woods Hole Oceanographic Institution researchers partnered to develop and test a new instrument called Deep-See. We will use this 2,000 pound, 20-foot-long instrument will explore an area of the open ocean just off the edge of the continental shelf known as the Twilight Zone, where light from the surface stops penetrating. Deep-See was built with a grant to WHOI from the National Science Foundation, and the Northeast Fisheries Science Center helped develop the project and provided the ship-time for the testing and evaluation.

The Twilight Zone, also called the mesopelagic zone, ranges from about 200 to 1,000 meters (about 660 to 3,300 feet) in depth. Because of its extreme depth, little is known about this area.

Deep-See is an acoustic, optic, oceanographic, and biological sampling system that uses wideband echosounders, stereo and holographic cameras, environmental and light sensors, and eDNA instruments. The Deep-See platform collects data at unprecedented rates and sends real-time information back to the surface for researchers to see and monitor.

During August, the first test cruise to evaluate the new platform took place aboard NOAA's ship *Henry B. Bigelow*. Researchers wanted to see how all the instruments and sensors worked together and adapted to pressure under water at the depth of the Twilight Zone. The researchers also trawled for fish and other marine life. Elusive beaked whales and other whale species studied by Center scientists are known to dive to these depths.

Deep-See being recovered to FSV Henry B. Bigelow after its first deployment.

Deep-See's many instruments and sensors communicate with the Bigelow through a 4,000 meter (roughly 3,000 foot) 0.681-inch fiber optic cable. The *Henry B.* Bigelow is the first NOAA Fisheries research vessel to have this fiber optic technology aboard, which greatly expands its capabilities for scientific monitoring and research.

For more information, contact Michael Jech at the Northeast Fisheries Science Center at 508-495-2353 or email Michael.jech@noaa.gov