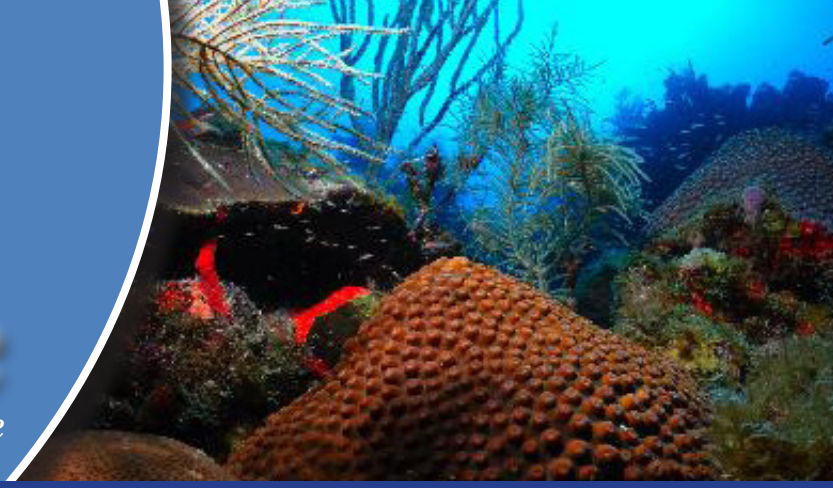
HABITAT HOTLINE Atlantic

2015 Annual Issue



HEALTHY FISHERIES NEED HEALTHY HABITAT

Impacts of Energy Development on Fish Habitats

As I take the reins of the Atlantic States Marine Fisheries Commission (ASMFC) Habitat Committee, I am excited to present the 2015 issue of ***Habitat Hotline Atlantic***. Last year's edition addressed the very real and rising impacts of climate change on fisheries. This year, we consider one of the most important solutions: development of low-carbon energy sources. Wind, waves, tides, natural gas, and other sources present the potential to lessen our dependence on traditional fossil fuels and begin reducing atmospheric CO_2 concentrations, which would benefit fishery resources. However, the facilities required to develop those energy sources can adversely impact or even outright displace important habitats. They also affect the behavior and ecology of fish and invertebrate species directly. Therefore, we must work hard to find the balance between developing new sources of energy and protecting the productivity of fisheries. This will take us in new and challenging scientific and policy directions. Important progress in those new directions is described on the following pages.

Of course, meeting the challenges of sustainable energy development does not represent the only pressing need for fisheries habitat science and stewardship. *Habitat Hotline Atlantic 2015* therefore includes a series of updates from ASMFC members and partners, including the Atlantic coast states, the Atlantic Coastal Fish Habitat Partnership (ACFHP), federal agencies, and the regional fishery management councils. I hope you will agree that the progress reported in this year's edition reflects a clear commitment on behalf of many people to improve the status of fisheries habitat. On behalf of the Habitat Committee, we thank all of our partners and welcome others to join in these critical efforts.

Jake Kritzer, Ph.D.
Habitat Committee Chair

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BOEM's Processes in the Atlantic

Public Engagement with BOEM's Processes in the Atlantic

Brian Hooker, Arie Kaller and John Johnson

The Bureau of Ocean Energy Management (BOEM) promotes energy independence, environmental protection, and economic development through responsible, science-based management of offshore conventional and renewable energy and marine mineral resources in the federal waters of the outer continental shelf (OCS). As stewards of the OCS, BOEM values public input and considers it a critical component of our agency's activities. BOEM engages the public at various times in our environmental review, regulatory programs, and specific projects. The range of BOEM's public involvement includes holding scoping meetings, open houses, environmental studies' meetings, and forums; accepting public comment online; and consulting with stakeholders and partners in state, local, and Tribal governments. We also publish *Ocean Science Magazine* and *Notes to Stakeholders*. Following are examples of BOEM's public outreach regarding current and future activities in the Atlantic.

Geological and Geophysical Proposed Activities

During the development of the Programmatic Environmental Impact Statement (EIS) for geological and geophysical (G&G) activities such as seismic surveys or seafloor sampling in the Atlantic, 15 public meetings and two formal public comment periods were held. BOEM received more than 120,000 public comments. BOEM considered the public input as well as technical information prior to issuing its Record of Decision in July 2014. Changes to the Final Programmatic EIS included updates, additions to existing information, and improvements or modifications to the analyses presented in the Draft Programmatic EIS.

During the G&G application approval process, BOEM held public outreach meetings in March and April 2015 at coastal cities of states in the Area of Interest. During these meetings, BOEM staff discussed the G&G permitting process, clarified the roles that states and the National Marine Fisheries Service (NMFS) play in the process, reviewed the environmental review process, and highlighted the mitigations that can be applied to the permit. Stakeholders had ample opportunity to address their questions and concerns directly to BOEM staff; additionally, the public was able to comment on the pending applications during the meetings.

The public G&G applications/information maps were published on BOEM's website and Regulations.gov for public comment. The comment period was 30 days for deep penetrating seismic (two- and three-dimensional air gun array surveys) and 10 days for other activities (bottom sampling; remote-sensing surveys). BOEM used the public comments to help identify any new information that may be available on resources of interest on the Atlantic OCS. After a permit is issued, the published permit and cover letter, along with the site-specific environmental analysis, will be uploaded to BOEM's website.

The comment period for the first 11 applications is now closed. One permit was issued and two were withdrawn; the other eight remain with BOEM for review. BOEM will not issue any of these permits until the NMFS issues the required Incidental Harassment Authorization.

Draft Proposed Program for Oil and Gas, 2017-2022

The Draft Proposed Program (DPP) is the first proposal in the staged preparation process of the new National Five Year Program. The DPP is preceded by a Request for Information (RFI) and will be followed by a further refined Proposed Program. Although the DPP decision document examines all 26 of the planning areas, only the areas and options included in the DPP decision will be further analyzed in preparing the Proposed Program.

Public comments were received after the RFI was published (June 16, 2014) until August 15, 2014. At the same time the DPP was published, BOEM issued a Notice of Intent (NOI) to prepare a Draft Programmatic EIS. In the potentially impacted States, BOEM hosted 23 scoping meetings regarding the NOI. The public had a 60-day comment period that ended on March 30, 2015, for both the DPP and NOI. The Proposed Program is expected in 2016 and will have a 90-day public comment period, and the Draft Programmatic EIS will be released with a minimum 45-day comment period at the same time. BOEM continues to meet with stakeholders during this process.

Renewable Energy Program

In 2009, President Barack Obama announced the final regulations for the OCS Renewable Energy Program. These regulations provide a framework for issuing leases, easements and rights-of-way for OCS activities that support production and transmission of energy from renewable energy sources (i.e., energy derived from

offshore wind, waves, currents). BOEM's renewable energy program occurs in four distinct phases: (1) planning and analysis, (2) lease issuance, (3) site assessment, and (4) construction and operations. BOEM's renewable energy program uses a variety of methods to engage the public and solicit comments on proposed activities.

Most of the renewable energy program's planning efforts begin with Intergovernmental Renewable Energy Task Forces for the 13 coastal states that have expressed interest in development of offshore renewable energy. The role of each Task Force, made up of federal, state, and local agencies and Tribal governments, is to collect and share relevant information that would be useful to BOEM during its decision-making process. Task Force meetings have helped identify areas of significant promise for offshore development and provided early identification of, and steps toward resolving, potential conflicts. To find out information on the various Task Forces, go to *http://www.boem.gov/Renewable-Energy-State-Activities/* and click on the appropriate state.

In addition to consulting with the Task Forces, BOEM solicits public comment on potential renewable energy areas and related environmental reviews through Federal Register Notices and public meetings/open houses. After considering all public comments and information obtained from the relevant Task Force(s), BOEM will then publish a Final Sale Notice in the Federal Register, which finalizes the number of lease areas, list of eligible bidders, and auction procedures, among other things. Prior to approving any construction for a commercial development BOEM will conduct an environmental review to analyze the construction and operation of the proposed facility. This environmental review will provide for additional public notice and comment on the specific activities proposed by the developer. In addition to these formal notice and comment opportunities BOEM also coordinates additional meetings with a variety of other constituents throughout the planning process. For more information about this process, check out our fact sheet here: *http://www.boem.gov/Commercial-Leasing-Process-Fact-Sheet/* or contact Brian Hooker at *brian.hooker@boem.gov* to see how you can provide input with regard to specific projects. We want to hear from you.

Marine Minerals Program

Similar to the renewable energy program, the Marine Minerals Program (MMP) utilizes several means of public engagement on proposed activities along the Atlantic. The MMP holds periodic regional sand management working group meetings with the stakeholders to discuss current projects, future sand needs, data sharing, and ongoing environmental studies as well as potential future study needs. In addition, MMP works with regional ocean planning bodies and councils on offshore sand management issues. At the project-specific level, MMP provides opportunities for public input and review of its National Environmental Policy Act (NEPA) documentation that it prepares. MMP staff are also active in providing presentations and participating in panel discussions at national, regional, and local conferences and forums held along the Atlantic coast in which the public actively engages.

BOEM appreciates public input and open dialogue about its activities because we are all stakeholders in the management of our Nation's resources.

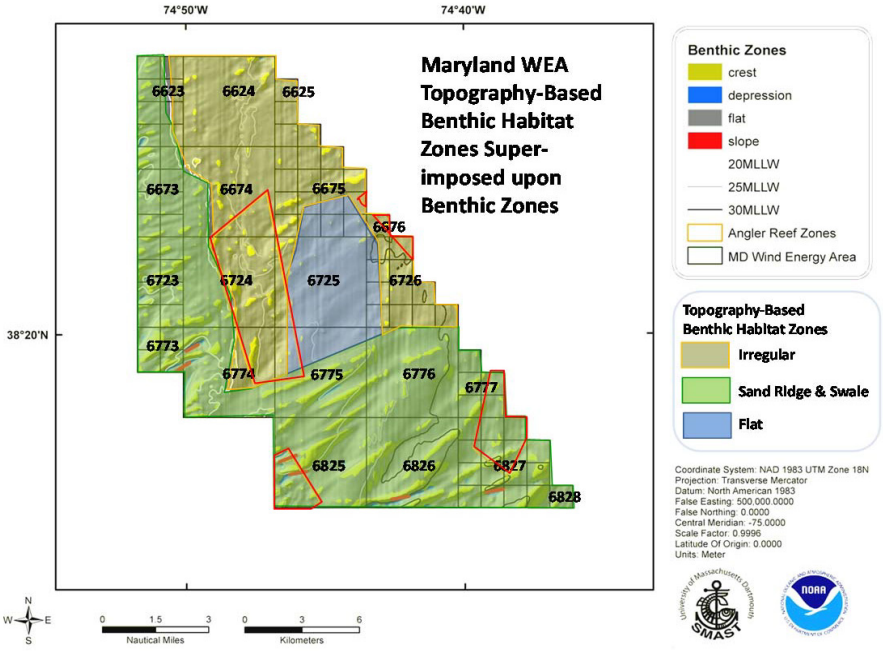
CASE STUDY

Report on Benthic Habitats in the Maryland Wind Energy Area

BOEM has partnered with the NOAA Fisheries and the University of Massachusetts, Dartmouth, to characterize the benthic habitats throughout the leased offshore wind energy areas and offshore wind planning areas from Massachusetts to North Carolina.

The first report from this collaboration, concentrating on the Maryland leased area, was finalized in January 2015. This effort used sonar imaging (seafloor and water column), photographic imagery, and physical sampling (grab samples and beam trawl) to characterize the almost 80,000 acres of seafloor within the wind energy area. This report classified habitats into the Coastal and Marine Ecological Classification System and concluded that the MD Wind Energy Area (WEA) benthic habitats are heavily dominated by mobile sandy bottoms although small patchy hardbottom cannot be entirely ruled out. One interesting finding is that the higher prevalence of sand ripples and lower prevalence of silt in the MD WEA as compared with the adjacent shelf was taken to indicate a bottom more influenced by strong physical forces, as Georges Bank is known to be. The most prominent fish encountered was sea robins, however, the report notes that this is not entirely consistent with previous fishery independent and fishery dependent trawl data which had far more Atlantic croaker, spot, and weakfish.

The figure on the right shows the topography-based benthic habitat zones superimposed upon benthic zones. Red lines indicate angler reef zones. Source data: CB&I 2014, Hawkins 2013, BOEM 2013.



CASE STUDY

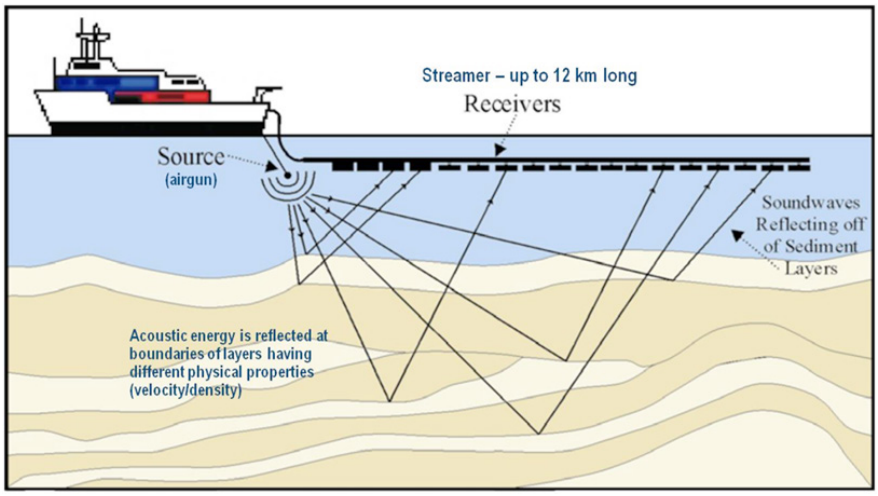
Mid-Atlantic Canyons: New Discoveries of Corals and More

BOEM is responsible for overseeing energy and marine minerals development in Federal waters on the OCS in an environmentally responsible manner. As stewards of the OCS, BOEM recognizes that there are many locations with extensive areas of hard bottom in the Mid-Atlantic shelf, particularly associated with canyon features. Hard bottoms, which can include large populations of deepwater corals, can be identified on seismic survey data. However, there are not large amounts of seismic survey data in the area at present. In 2010, BOEM initiated a 5-year study to explore the Norfolk and Baltimore Canyons that are located 100 miles offshore of Virginia and Maryland. Sponsored by the National Oceanographic Partnership Program, BOEM partnered with the United States Geological Survey and National Oceanic and Atmospheric Administration (NOAA) to collaborate on a large study titled, *Exploration and Research of Mid-Atlantic Deepwater Hard Bottom Habitats and Shipwrecks with Emphasis on Canyons and Coral Communities*. This effort also included researchers from 12 universities and research institutions and two companies (photographer and environmental consultants). The study will refine the understanding of the distribution and complexity of hard bottom communities in the Mid-Atlantic slope area.

The researchers found unexpectedly high densities of coral and even some species not previously described in the area. They identified over 125 species of fish, nine not seen before in the region. Near Norfolk Canyon, they discovered what could be the largest area of cold seep communities (patchily distributed, ephemeral environments that occur in areas of the seafloor where hydrogen sulfide, methane, highly saline water, and other hydrocarbon-rich fluids escape into the water column) in the North Atlantic. Historically important shipwrecks off the coast of Virginia were documented as part of the research effort (2011-2013), including eight captured World War I German warships from the "Billy Mitchell fleet," which sunk in an aerial bombing demonstration in 1921. Four research cruises were made with the primary sampling performed by remotely operated vehicles during more than 48 deployments and more than 400 hours underwater. During the study, researchers also used benthic landers and moorings deployed to the canyon floors to collect new oceanographic data over an entire year. These data included ocean currents, temperature, salinity, and chemistry. This information, as with most of BOEM's Environmental Studies Program (ESP) products, will inform BOEM's National Environmental Policy Act processes, reviews, mitigation measures, and management decisions. As part of the study, a video titled "Pathways to the Abyss" was released in May 2015. The video describes the research goals and methods and presents spectacular views of many of the deepwater canyon habitats. Photographs and logs from the Deepwater Canyons 2013 research cruise can be found on NOAA's Ocean Explorer webpage.

This study will not only aid in BOEM's decisionmaking by adding to our database of recorded bottom features and sensitive habitats, but it will also add to the baseline research of the Atlantic shelf and inform future investigations. A final report for this study is expected in 2016 and will be publicly available through BOEM's ESP.

Geological and Geophysical Activities on the Atlantic Outer Continental Shelf

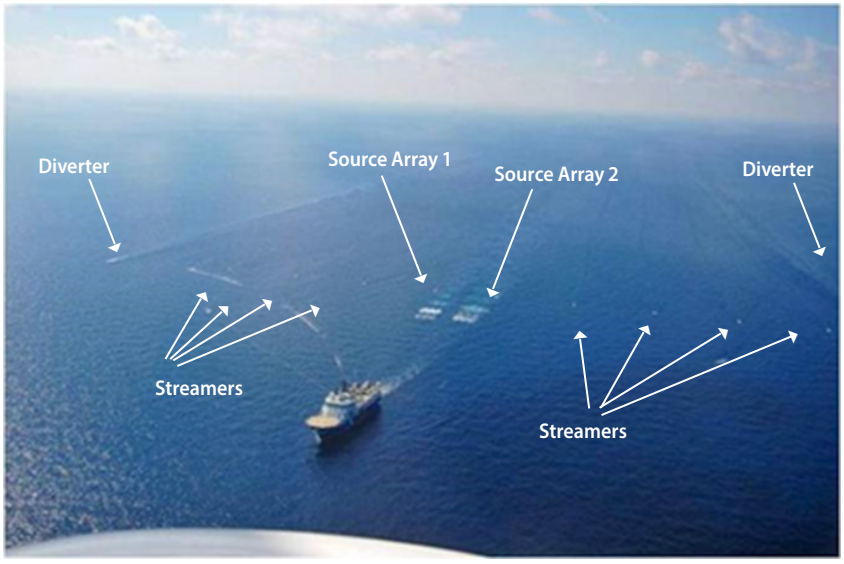


How A Seismic Survey Works

BOEM is responsible for issuing permits for G&G surveys on the U.S. OCS, including the Atlantic OCS, for oil and gas exploration and production (E&P) as well as marine mineral G&G activities. These permits provide an oversight mechanism which allows the oil and gas, and marine minerals (predominantly sand for beach replenishment) industries to conduct G&G operations in a responsible and safe manner, while ensuring that the data is collected in an environmentally sound way to reduce or minimize potential impacts to other OCS resources such as marine life. Upon completion of an extensive Programmatic EIS for the Mid- and South Atlantic OCS and the issuance of the Record of Decision (ROD) in July 2014, BOEM initiated the current G&G permitting process for the Atlantic OCS.

G&G surveys encompass both geophysical (deep penetration seismic, high resolution geophysical (HRG) seismic, magnetic, gravity, and remote sensing) and geological (bottom sampling and coring) data acquisition. The Atlantic G&G permit applications currently under review by BOEM are all geophysical. As such, this article will concentrate on the different types of seismic surveys (often mistakenly referred to as "seismic testing") that are being proposed on the Atlantic OCS.

The most well-known type of seismic survey is the deep penetration seismic survey. This is a low frequency high energy type of seismic acquisition. The sound waves generated by an acoustic source penetrate the subsurface and are reflected back, providing a picture of the subsurface geology. Deep penetration seismic is acquired as 2-dimensional (2D) or 3-dimensional (3D) data. Data collected by 2D surveys are typically for studying geology on a regional scale. The surveys are more economical as data can be acquired over a large area in a relatively short period of time. This type of survey typically utilizes a single seismic vessel towing a sound source (airgun array) and a single cable with built-in receivers (streamer), usually at a speed of 5 knots. Streamer lengths can range up to 12 km long. The data acquired can be thought of as representing a "cross section" of the earth beneath the vessel track. This type of data is collected in a grid pattern (i.e. 4 mi x 4 mi grid; 10 mi x 10 mi grid, etc.). All but one of the Atlantic deep penetration geophysical applications are for 2D surveys.



3D Seismic Survey

Acquisition of 3D data requires one or more vessels towing an acoustic source and typically up to 10 or 12 streamers per vessel. This type of survey, instead of collecting a series of "cross sections," like a 2D survey, acquires a volume of data and provides for highly accurate mapping

of the subsurface. Numerous 3D acquisition methods are available for data acquisition depending on the complexity of the subsurface geology. Given good conditions and an appropriate acquisition method, images down to 30,000 feet or deeper can be obtained with deep penetration seismic. These surveys are typically used by the oil and gas industry as well as researchers to study the Earth's subsurface.

High Resolution Seismic Survey Autonomous Underwater Vehicle

Shallow penetration seismic, or HRG, is another survey type that will be used on the Atlantic OCS. This type of survey uses a lower-energy (typically non airgun) higher-frequency sound source. Examples of these types of surveys are side scan-sonar, multi-beam sonar, single beam sonar (depth finders), and sub-bottom profilers (chirp). Depending on the survey design, the sensors/sources may be hull-mounted, towed or be part of an autonomous underwater vehicle. The oil and gas industry and renewable energy industry typically use these surveys to locate suitable locations for siting structures on the seafloor. The marine minerals industry uses these surveys in their search for sand deposits for beach replenishment projects. Surveys like side-scan and multi-beam sonar are used to map the seafloor and locate benthic communities. Archaeologists use them to locate submerged historical sites. BOEM is currently reviewing one application for a high resolution survey.

There are also, what might be termed, "non-invasive" geophysical surveys. These are magnetic, gravity, and remote sensing surveys. These surveys do not use a man-made source. Instead they measure changes in the Earth's magnetic or gravitational fields or energy reflected by the Earth's surface. These types of surveys can be used for frontier oil and gas exploration, archaeology, and research. BOEM issued an Atlantic OCS airborne gravity and magnetic survey permit in July 2015.

The last category of G&G survey (the other G) is the geological or geotechnical survey. These usually consist of taking seafloor or very shallow core samples. Information from this type of survey is typically used for geochemical analysis, benthic studies, and sediment stability analysis which could be used in conjunction with HRG surveys for siting structures on the seafloor.

In summary, G&G surveys are used by the oil and gas, renewable energy, and marine mineral industries as well as archaeologists and researchers to characterize and study the seafloor, shallow subsurface, and deep subsurface. These surveys are conducted worldwide, by international companies. On the U.S. OCS, oil and gas E&P as well as marine mineral G&G activities are permitted by BOEM to ensure that all regulatory requirements are met by the permittee such that data are collected in a safe, responsible manner while protecting other OCS resources. Further information on the Atlantic Programmatic EIS, ROD or G&G technology may be found on the Atlantic OCS Region page of the BOEM web site.

BOEM's Atlantic Offshore Renewable Energy Program Activity Update

This has been an active year for Atlantic offshore energy. To help keep everyone informed we have prepared the summary below. If you are interested in learning more about a particular project, check out BOEM's website at www.boem.gov where you can sign up for email alerts and find out how to follow BOEM on Facebook.

Southern New England/New York Bight Offshore Wind Energy

BOEM oversees five leased areas, one right-of-way grant, and is considering one planning area in the Southern New England/New York Bight area.

- In January 2015, BOEM successfully auctioned two leases southwest of Nantucket Shoals. The recipients of these leases are just beginning the site characterization work necessary to inform the development of a construction and operations plan to be submitted in the next five years.
- Continuing westward, BOEM leased two areas in the vicinity of Cox Ledge in July 2013. The lessee,

Deepwater Wind, began site characterization work this summer.

- BOEM has also issued a right-of-way grant for the transmission of renewable energy from a state waters project off of Block Island to mainland Rhode Island. While work on the transmission line isn't expected to begin until the summer of 2016, installation of the turbine foundations began late summer 2015 and may continue to early fall.
- Further to the west, BOEM has issued a "Call for Information and Nominations" for a potential lease area offshore New York. BOEM is reviewing comments submitted during the solicitation of information as it identifies what area should be considered for leasing. The identification of a wind energy area is expected in early 2016.
- Finally, as widely reported in the news, the Cape Wind energy project in Nantucket Sound has had a setback with potential purchasers of their project's power delaying project development.

Mid-Atlantic Bight: Offshore Wind Energy

- On November 9, 2015, BOEM held competitive lease auction for two areas offshore New Jersey. The successful bidders were RES Americ Developments Inc., for the northern lease area, and US Wind Inc., for the southern lease area.
- In March 2015, BOEM issued a Research Lease to the Commonwealth of Virginia Department of Mines, Minerals, and Energy (DMME) for the Virginia Offshore Wind Technology Advancement Project (VOWTAP). VOWTAP will consist of two offshore wind turbines and export cable to shore. Dominion Power was named the operator of the project by DMME and has submitted a site assessment plan for the deployment of meteorological/oceanographic buoys within the commercial and research lease areas. Additionally, the VOWTAP team and BOEM have both contributed to data collection and extensive seafloor surveys and sediment samples have been collected in the areas.
- In August 2014, US Wind Inc. was awarded two leases offshore Maryland and began site characterization studies in June to identify a location for a meteorological tower. US Wind submitted a Site Assessment Plan for the construction of a meteorological tower in November 2015 that is currently under review by BOEM.
- BOEM issued a commercial lease offshore Virginia in 2013.
- BOEM issued a commercial lease offshore Delaware in 2012.

South Atlantic Bight: Offshore Wind/Marine Hydrokinetic Energy

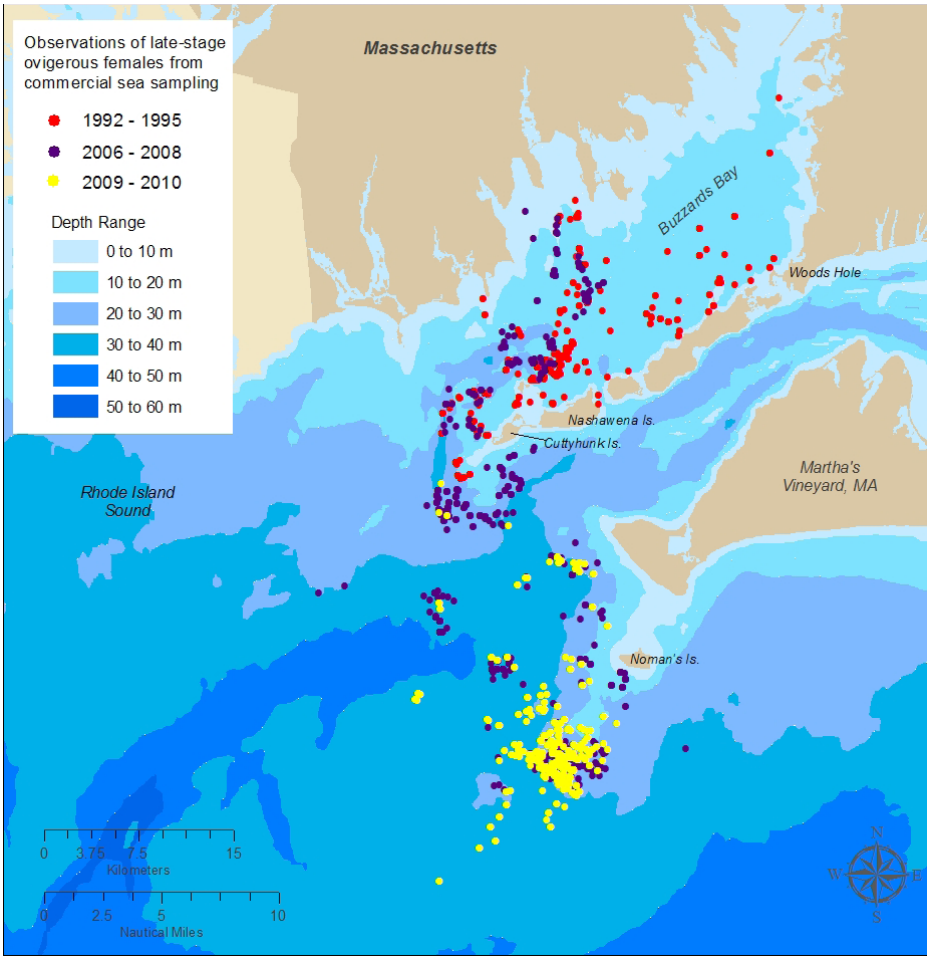
- BOEM is in the process of evaluating the issuance of commercial leases offshore North Carolina in three areas, one north of Cape Hatteras and two south of Cape Fear. A lease auction has not yet been scheduled.
- BOEM, in collaboration with the South Carolina Intergovernmental Renewable Energy Task Force, is evaluating potential areas for leasing offshore that state. BOEM published a Call for Information and Nominations to guage the offshore wind industry's interest in the areas and to gather information from interested and affected parties about site conditions, resources, and multiple uses in close proximity to, or within, the Call Areas. Public comments are being collected through January 25, 2016.
- Offshore Georgia, Southern Company is pursuing a limited lease for the construction of a meteorological tower and/or deployment of a met/ocean buoy. A limited lease does not permit the construction of any commercial project or power generation to shore.
- Offshore Florida, BOEM is working with the State Intergovernmental Task Force to identify potential lease areas for marine hydrokinetic devices. BOEM has issued one limited lease for testing underwater ocean current turbines by Florida Atlantic University.

Habitat Management

Habitat Bottlenecks

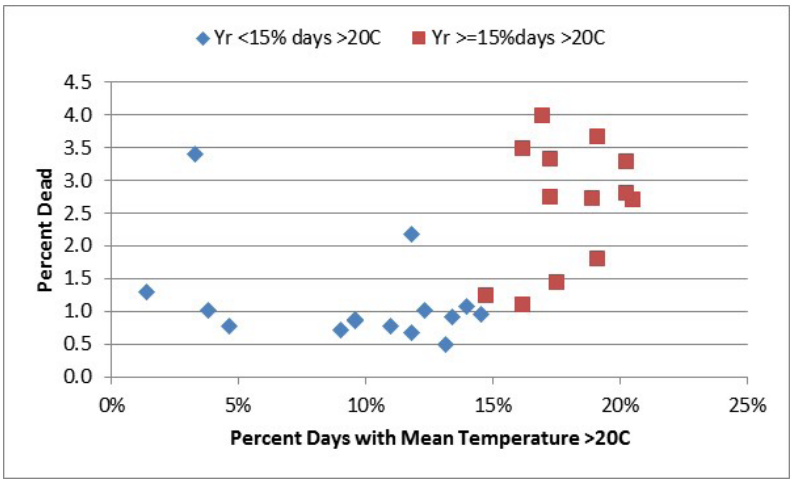
Robert VanDolah (retired), SC Division of Natural Resources; Penny Howell, CT Department of Energy and Evironmental Protection

There are many factors that can influence the productivity and resilience of fishery stocks such as harvesting pressure, natural mortality, changes in reproduction and growth rates, and habitat availability. This latter factor, while widely recognized by fishery management scientists, is often difficult to quantify and bottlenecks to critical habitats can have significant impacts on the sustainability of many harvested species. The Habitat Committee has defined a habitat bottleneck as "a constraint on a species' ability to survive, reproduce, or recruit to the next life stage that results from reductions in available habitat extent and/or capacity and reduces the effectiveness of traditional fisheries management options to control mortality and spawning stock biomass." Such constraints can come in the form of either environmental and/or structural bottlenecks. Structural bottlenecks in the form of dams that block access to historical spawning habitat are obvious problems that can seriously affect highly migratory anadromous species such as Atlantic sturgeon. Management efforts to alleviate some of the problems associated with these barriers can include fish passage measures. Environmental bottlenecks, on the other hand, such as temperature changes affecting habitat usage of critical life stages are much more problematic.



Map of distribution shift in late-stage egg bearing female lobsters in southern New England that has been related to changes in temperature. (Source: MA DMF 2011)

Scientific evidence now indicates that the American lobster is one species being impacted by thermal stresses through direct mortality in some areas and reduction of suitable thermal habitats for certain life stages in other areas. Laboratory studies have demonstrated that lobsters show a distinct and abrupt response to water temperatures above 20°C (Crossin et al. 1998) which field studies have shown



Relationship between the observed annual frequency of dead lobsters in research traps versus the percent of days that year with a mean bottom water temperature above 20°C. (Data provided by Millstone Environmental Laboratory, Dominion Nuclear Resources, Waterford, CT.)

can double observed mortality rates, making temperature a true bottleneck for this species. Ventless trap surveys and surface drogue studies carried out in offshore waters (ASMFC 2010) showed displacement of egg-bearing females out of traditional near-shore breeding grounds, which have recently warmed, into deeper water resulting in newly hatched planktonic larvae being carried on currents out to open ocean waters where their survival rate is diminished.

The Habitat Committee has developed a "Whitepaper on Habitat Bottlenecks" to provide further information on this issue using several case studies.

Atlantic States Marine Fisheries Commission (ASMFC), 2010. Recruitment failure in the Southern New England lobster stock. Presentation by the ASMFC Lobster Technical Committee to the Lobster Management Board.

Crossin, G., S. Jury, and W. Watson, III. 1998. Behavioral thermoregulation in the American lobster Homarus americanus. Journal of Experimental Biology 201: 365-374.

South Atlantic Bight Marine Assesssment

Regional Mapping the Ocean to Help Conserve Critical Resources and Inform Management

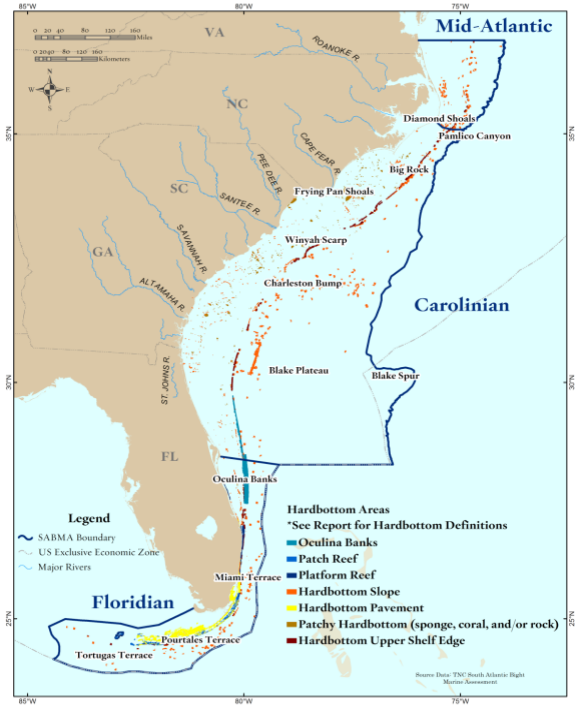
Mary Conley, The Nature Conservancy

Healthy coastal and marine habitats are vital to both people and natural communities. New and increasing activities in nearshore waters are increasing the need for spatial resource and use information to aid in decision-making. The South Atlantic Bight Marine Assessment (SABMA) builds on decades of marine research and data collection to improve understanding of critical habitats and their relationship with key species and oceanographic properties.

Focused on coastal ecosystems, seafloor habitats and migratory species (e.g. marine mammals and sea turtles), the SABMA is designed to increase understanding of the location, extent, and seasonality of these natural resources. The suite of species and habitats selected for inclusion are based upon opportunities to refine analysis completed as part of the 2005 Carolinian Ecoregional Assessment and incorporate methods used in the Northwest Atlantic Marine Ecoregional Assessment to create consistent analysis datasets along the entire U.S. Atlantic coast.

The breadth of the assessment is large and required significant partner collaboration. Covering over half of the Atlantic seaboard from the mouth of the Chesapeake Bay to the Florida Keys (over 17,000 miles of coastline & 93 million acres), the project areas extends inland from the area of tidal influence seaward beyond the shallow continental shelf to the base of the U.S. portion of the continental slope. Over 30 technical experts from across the region engaged in review of the assessment to ensure validity of all products. Financial support came from regional organizations including the South Atlantic Landscape Cooperative and the Governors' South Atlantic Alliance.

The result is regional baseline spatial data on the distribution and status of seafloor habitats, coastal systems, marine mammals and sea turtles. Evaluation across resources enabled the identification of a conserva-tion portfolio – areas of ecological importance. These products, when combined with ocean use and more localized resource data, contribute to the body of knowledge needed to help reduce potential conflicts between and among human uses and ecologically significant resources.



Map of hard bottom habitats from the SABMA

Additional details and access to the report and geodatabase will be available this fall on the South Atlantic Bight website on the Conservation Gateway: *https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/marine/sabma*

The Importance of Sounds to the Fish Community and Their Habitat

Dr. Aaron Rice, Bioacoustics Research Program, Cornell University

We humans often don't think about it, but fishes live in a world of sound. Like other marine and terrestrial vertebrates, they use communication sounds for mate attraction and territorial defense. Fishes' internal ears (which share a common ancestry with those of reptiles, birds and mammals) allow them to detect and respond to biological and environmental sounds. For example, they use auditory cues from other fishes to find mates and food, or listen for predators. Larval fishes use environmental sounds to find a suitable place to settle. Sound is an essential component of the life history of fishes and an important attribute of the aquatic world.

In many ways, ecologists and acousticians think about the acoustic component of the fish world as a critical part of their habitat. This sonic component can most easily be thought of as the frequency range in which sounds occur (and can be heard), and the time duration they occur in. And all sounds that are useful as possible information sources fit into this frequency-time range. Just as fishes use visual or chemical information to perceive and respond to attributes of their habitat, they use sounds for similar functions. Different physical habitats have different sound conditions, which are influenced by wave action, depth, bottom type, and the other vocalizing animals present. Sounds associated with changes in the weather may convey that habitat conditions will change. Fishes use sounds like other sources of information to perceive and respond to changing conditions in their physical environment.

Alarmingly, the acoustic world of fishes is under increasing encroachment (and possibly threat) from human activities in the ocean. Many of these human made sounds directly overlap with the frequency range of most fish calls as well as the frequency range that fishes are adapted to hearing. To make matters worse, there aren't many data available that describe possible population-level impacts from long-term exposure to these noises. It is clear that immediate injury or death from sounds produced by human activities, while possible, is rare. The real scientific, conservation, and management concerns for anthropogenic sounds in fish habitats are the lower sub-lethal levels of ocean noise. Studies in other vertebrates (from frogs to birds to humans) show an increase in behavioral and physiological stress in response to chronic noise: for example, heart rates increase, immune systems are compromised, stress hormone levels increase, and metabolic rates increase. These stress responses, in turn, decrease individual survivorship and reproductive rates, two components that threaten the long-term stability of populations. However, there is a real research need to gather data to understand population-level consequences to fishes in response to increases in anthropogenic noise.

The natural sounds produced by the ocean's creatures continue to captivate the scientists and the public. Our increasing awareness of the importance of sounds in the ocean and the threats created by ocean noise now stimulate the opportunity to continue to understand if and how the ocean world is shaped by sound.

Further Reading

Kight, C. R. and J. P. Swaddle. 2011. How and why environmental noise impacts animals: an integrative, mechanistic review. Ecology Letters 14:1052-1061.

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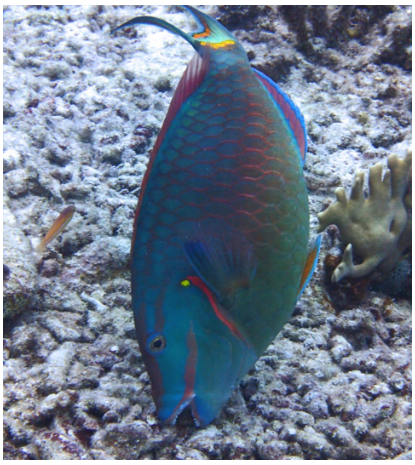
Slabbekoorn, H., N. Bouton, I. Van Opzeeland, A. Coers, C. Ten Cate and A. N. Popper. 2010. A noisy spring: the impact of globally rising underwater sound levels on fish. Trends in Ecology & Evolution 25:419-427.



(left) Feeding fishes such as this parrotfish make audible scraping noises. These acoustic cues provide information to other fish and predators. (right) Fish form aggregations to produce sounds to attrach mates for spawning. (Source: A.N. Rice)

Atlantic Coastal Fish Habitat Partnership Update

The Atlantic Coastal Fish Habitat Partnership (ACFHP) has continued to help restore and protect fish habitat through on the ground restoration projects along the coast, addressing science and data needs, and collaborating with partners to address fish habitat concerns in 2015.

On the Ground Restoration

ACFHP has partnered with the U.S. Fish and Wildlife Service (USFWS) for the sixth consecutive year to fund three new on-the-ground restoration projects in 2015. This year, all three projects aim to improve fish habitat in rivers and streams along the Atlantic Coast. One project will restore fish passage in Patten Stream, Maine by building a nature-like rock weir fishway at the Route 172 crossing. This work is being led by the Town of Surry, and will both restore access to 20 stream miles and 1,200 alewife spawning acres, and benefit species such as river herring, American eel, sea run brook trout, and endangered Atlantic salmon. Another project, led by The Nature Conservancy, will also restore fish passage in a New England river. The Cotton Gin Mill Dam, located on the Satucket River in East Bridgewater, Massachusetts, will be removed in order to restore stream processes and allow fish access to 124 acres of spawning habitat and 4.4 river miles upstream. Finally, the Cape Fear River Watch will restore 0.5 acres of spawning habitat for shad and sturgeon below a dam without current plans for removal, facilitating 32 miles of larval rearing habitat in the Cape Fear River, North Carolina. Extensive biological monitoring will also take place, not only essential for ensuring the success of the project, but to develop best management practices for spawning habitat restoration projects in the future. For more information on these and other ACFHP-USFWS funded projects, please visit: *www.atlanticfishhabitat.org/projects/fundedprojects/.*

ACFHP successfully installed four conservation moorings in Jamestown, Rhode Island this year thanks to funding provided by NOAA and support from the Rhode Island Division of Fish and Wildlife, Town of Jamestown Conservation Commission, Clarks Boat Yard, Conanicut Marine Services Inc., and Jamestown Boat Yard. Conservation moorings use a buoyant bungee-like cord to minimize contact with the seafloor. This eliminates "chain sweeping" and subsequent damage to submerged aquatic vegetation that occurs around traditional mooring systems. Before the

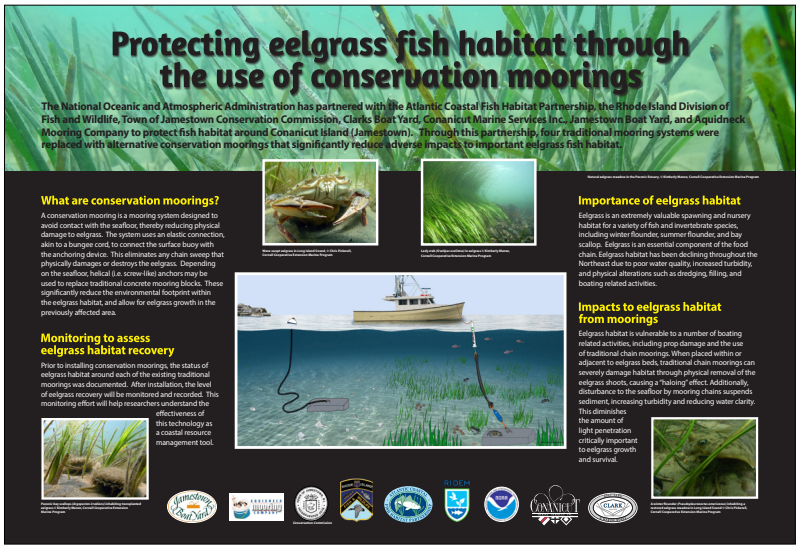
Nature-like rock weirs will replace the temporary fish ladder at the Route 172 crossing on Patten Stream to allow for fish passage. (Source: Town of Surry)

Cotton Gin Mill Dam, looking upstream (Source: Cathy Bozek, The Nature Conservancy)

moorings were installed, pre-mapping and monitoring took place, and post-monitoring will occur to determine project success. A 2' x 3' interpretative sign has been printed and will soon be installed to inform the public on the benefits of conservation moorings and submerged aquatic vegetation. To learn more about conservation moorings, please read about our eelgrass restoration efforts at: *www.atlanticfishhabitat.org/projects/fundedprojects/.*

ACFHP was recently awarded a grant from the the Mid-Atlantic Fishery Management Council to solicit projects that promote restoration or research on offshore black sea bass habitat in the Mid-Atlantic. The request for proposals was released in December 2015. Project applications will be reviewed in February 2016.

Lock and Dam 2 on the Cape Fear River. Native rock substrate will be placed approximately 800 feet downstream to increase sturgeon and shad spawning habitat. (Source: Cape Fear River Watch and Mike Wicker, US Fish and Wildlife Service)



Eelgrass intepretive sign to be installed in the Spring of 2016. (Source: ASMFC)

Science and Data Developments

Significant progress has been made in the development of a Decision Support Tool to Assess Aquatic Habitats & Threats in North Atlantic Watersheds & Estuaries. ACFHP and its partners are working with Downstream Strategies, LLC to compile and analyze the threats to inland, estuarine, and coastal aquatic species across the Northeast Atlantic. These data are then used to model species distributions, which will provide information to produce both distribution maps and a multi-criteria decision support tool for resource managers. This work is funded by the North Atlantic Landscape Conservation Cooperative. Eastern brook trout and winter flounder models have been completed, and river herring analysis is underway. To view the tool, please visit *www.fishhabitattool.org.*

Collaborative Opportunities

ACFHP and The Nature Conservancy successfully completed their final report on river herring needs in select watersheds along the Atlantic coast of the US, funded by the National Fish and Wildlife Foundation River Herring Initiative. The project involved collaboration with state and federal agencies and non-governmental organizations via in-person workshops, meetings, and webinars. This project resulted in multiple reports on river herring habitat needs, advanced the cooperation among stakeholders in each region, and will aid ACFHP in prioritizing river herring restoration needs for future USFWS project funding. To find out more, please visit *http://www.atlanticfishhabitat.org/planningresources/publications/.*

ACFHP has continued its Whitewater to Bluewater (*www.easternbrooktrout.org/groups/whitewater-to-bluewater/*) project this year with its Fish Habitat Partnership neighbors, the Southeast Aquatic Resources Partnership (SARP) and the Eastern Brook Trout Joint Venture (EBTJV). This initiative promotes a collaborative approach to implementing their respective goals and the National Fish Habitat Action Plan. Jessica Graham and Stephen

Perry, coordinators for SARP and EBTJV, respectively, attended ACFHP's spring Steering Committee meeting in Ft. Lauderdale, Florida. The three partnerships have continued to work on a Fish Passage Barrier Removal Fact Sheet that allows for conservation groups and agencies to easily modify the content in order to reach target audiences, which will be available to conservation groups soon.

In August, ACFHP attended the 145th Annual American Fisheries Society Meeting in Portland, Oregon. ACFHP both displayed outreach materials at the National Fish Habitat Partnership (NFHP) mbooth, and presented at the conference during the NFHP Symposium. The NFHP Symposium highlighted science and data, on the ground restoration, and collaborative successes of many of the 19 Fish Habitat Partnerships from around the country. For more information on the meeting, please visit the American Fisheries Society website at *www.fisheries.org*.

Two new partners joined ACFHP within the last year: the International Federation of Fly Fishers (IFFF), and the North Carolina Coastal Federation (NCCF). The IFFF is a 46-year old international non-profit organization dedicated to the betterment of the sport of fly fishing through conservation, restoration, and education. This organization is the only organized advocate for fly fishers on a regional, national, and international level, and has a total membership of 13,500 fresh- and saltwater fishers. The NCCF is a 33-year old 501(c)(3) non-profit organization dedicated exclusively to protecting and restoring the coast of North Carolina through education, advocacy and habitat preservation and restoration. This organization has over 10,000 members and 1,200 student and adult volunteers. We are excited to have such excellent organizations collaborating with ACFHP in the future.

Deb Wilson Receives 2015 Melissa Laser Fish Habitat Conservation Award

The 2015 Melissa Laser Fish Habitat Conservation Award was presented by ACFHP to Deb Wilson on November 2nd during the Welcoming Reception of the 74th ASMFC Annual Meeting in St. Augustine, Florida. Deb was selected for her tireless fundraising and project oversight in restoring the Damariscotta Mills fishway in Nobleboro, Maine, which facilitated the return of more than 1 million alewives accessing 4,700 spawning acres upstream. With too many depleted runs along the coast, Damariscotta Mills fishway serves as a model of sustainable, community-based fisheries management and a beacon of possibility for other communities seeking to restore their diadromous fish runs. Deb spreads that message through education and outreach initiatives such as the annual Damariscotta Mills Fish Ladder Restoration Festival, which welcomes around 100,000 visitors each year. She brings her restoration experience to the whole coast through service on the ASMFC's Shad and River Herring Advisory Panel.

From left to right: Chris Powell (ACFHP Vice-Chair), Jake Kritzer (Habitat Committee Chair), Deb Wilson, Kent Smith (ACFHP Chair), Lisa Havel (ACFHP and Habitat Committee Coordinator)

Deb approaches her work with the same combination of warmth, humor, positivity, respectfulness, and quiet enthusiasm that Melissa exemplified, which has led to truly unique contributions to habitat conservation.

The Melissa Laser Award was established in 2012 in memory of Dr. Melissa Laser, a biologist with the Maine Department of Marine Resources and active member of the ACFHP Steering Committee. Melissa dedicated her career to protecting, improving, and restoring aquatic ecosystems both locally in Maine and along the entire Atlantic coast. For more information on the Melissa Laser Award, please visit *www.atlanticfishhabitat.org/opportunities/awards/*.

New Hampshire

Green Crab and Macroalgae Monitoring at the Great Bay National Estuarine Research Reserve, New Hampshire

Paul E. Stacey, Research Coordinator, Great Bay National Estuarine Research Reserve, NH Fish and Game Department

The Great Bay National Estuarine Research Reserve (GBNERR), a program hosted by the NH Fish & Game Department (NHFGD), is one of 28 Reserves located in coastal areas of the US that comprise the National Estuarine Research Reserve System (NERRS). Monitoring environmental change is a primary component of each Reserve's research program and is anchored by participation in the NERRS System-Wide Monitoring Program (SWMP). The core effort of SWMP is to operate four water monitoring stations and a meteorological station at each Reserve. GBNERR's partner at the University of New Hampshire (UNH) operates water quality stations at the mouths of Great Bay's major tributaries – the Oyster, Lamprey and Squamscott Rivers – and a location in central Great Bay. Continuous measurements of temperature, pH, salinity, total suspended solids, depth, and dissolved oxygen are recorded during ice-free periods and monthly sampling for nutrients is conducted forming a foundation for SWMP assessments.

Recent efforts of the NERRS have been aimed towards establishing sentinel indicators for ecosystem change that reflect the effects of major drivers of climate, development, agriculture, fisheries, and instabilities caused by invasive species, habitat destruction, and shifting communities of plants and animals. GBNERR has been working with local and regional partners to monitor two indicators: 1) green crab (*Carcinus maenus*) invasions on a regional basis with New England NERRS at Wells, ME, Waquoit Bay, MA, and Narragansett Bay, RI; and 2) macroalgae (seaweeds) in Great Bay with UNH and the local National Estuary Program, the Piscataqua Region Estuaries Partnership (PREP).

Green crabs (*Carcinus maenus*), a European invader long-established in Atlantic coast estuaries to the south of Great Bay, have been expanding their range northward to a point where they may be responsible for impacting clam, mussel and even lobster populations in Maine. The NERRS is also concerned that green crab burrowing may compromise saltmarsh integrity, exacerbating erosion or collapse already affected by sea level rise. The monitoring involves sampling with two baited, wire-mesh traps at each of two tidal creeks in Great Bay, deployed for 24 hours on a bi-weekly basis from June through October. While the catch in Maine easily numbers in the thousands over the course of the summer, the Great Bay sites have been less productive, yielding only six crabs, all collected at one site in late July and early August. This may be a reflection of the muddy and unconsolidated habitats of the areas sampled, but does provide a baseline for future change over time as well as a geographic comparison with the three other sister Reserves.

Macroalgae has been identified by PREP as an indicator of nutrient enrichment as well as a changed ecology from climate change and invasive species. At GBNERR, sampling was begun in 2014 on the intertidal mudflats to assess species and biomass change using simple metrics at 12 plots sampled three times each summer to fall. The plots are placed 2 meters and 10 meters from the edge of the tidal flat on six transects, and a 0.25 m^2 grid is used to measure percent coverage of dominant species, primarily sea lettuce (*Ulva* and *Gracillaria)* that drift and settle on the tidal flats. The seaweeds are also harvested, dried and weighed to provide a biomass metric. Combined with additional plots sampled by UNH for PREP, changes in the production and composition of macro-algae can be assessed over time.

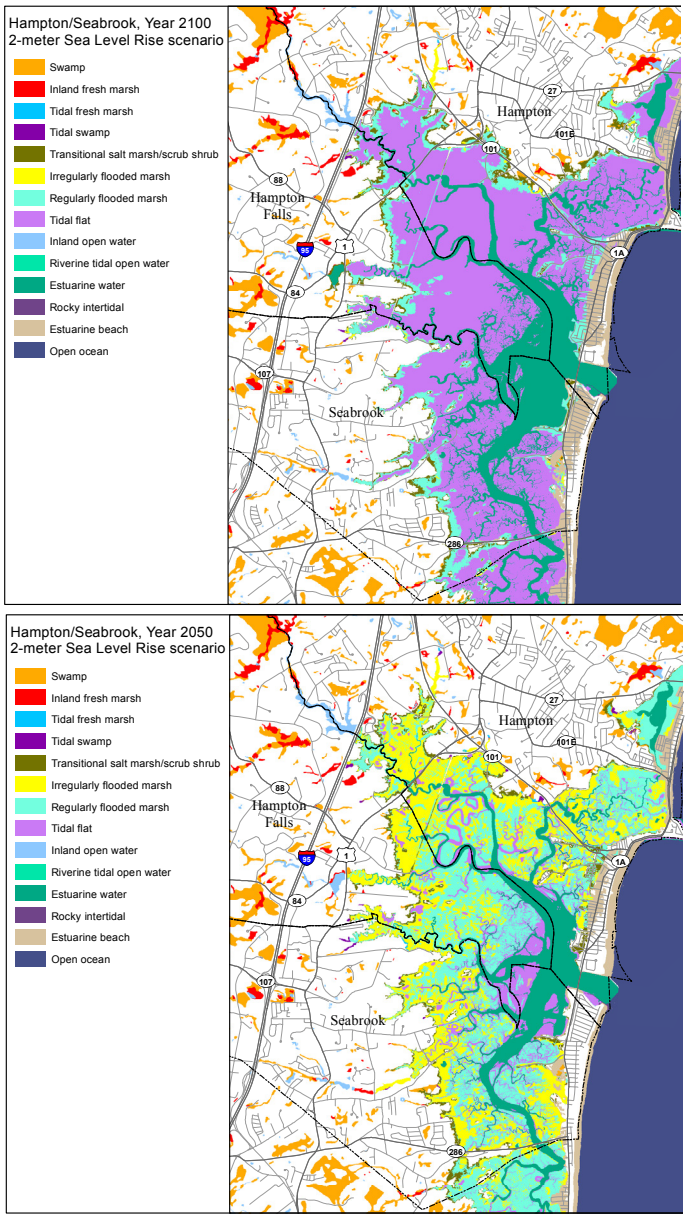
Modeling the Fate of New Hampshire Salt Marshes

Corey Riley, Manager, Great Bay National Estuarine Research Reserve, NH Fish and Game Department

As the sea level changes, coastal dynamics and ecosystems change with it. Natural resource managers and community conservation commissions will need to consider how different habitats will be impacted by sea level rise and extreme weather events as they consider what to protect and how. Salt marshes, one of the most important habitat types in coastal New Hampshire (NH), pose unique challenges in the future. Salt marshes are critical habitat for commercial and recreational important fisheries, they filter runoff to lessen the impact of non-point pollution on our waterbodies, sequester more carbon than mature forests, and they act as sponges to absorb water in flood conditions; protecting adjacent property and adjacent habitats.

Salt marshes are naturally resilient to changes in temperature, salinity, and water level but are limited by elevation and sediment supply. As sea levels rise, the marsh at the water edge will be drowned. But under the right conditions, salt marshes have the capacity to migrate inland with a rising sea level. The problem in NH, as in many coastal areas, is that the same low and level land that marshes could migrate to has been developed with roads, homes, and businesses.

The Sea Level Affecting Marshes Model (SLAMM) is a tool that models the processes that affect how coastal wetland systems naturally respond to sea level change over time and where natural and man-made barriers will inhibit these changes. This tool can help users visualize and understand how coastal wetland systems will likely shift and adapt over time under a range of projected sea level rise conditions. In 2014, NHFGD and GBNERR ran SLAMM for all of coastal NH using accurate, updated, local data, including recently updated National Wetlands Inventory data, and on the ground measurements of marsh elevation at four sites using Sediment Elevation Tables paired with detailed marsh elevation data. These model outputs are accessible through the University of New Hampshire's Geographically Referenced Analysis and Information Transfer System (UNH GRANIT) Coastal Viewer where users can track the projected shift of coastal wetlands from current conditions to the time points 2025, 2050, and 2100, under different sea level rise scenarios. As a part of a project, partners worked with four communities, Hampton, Hampton Falls, Seabrook, and Portsmouth to explore how SLAMM can aid local decision-making.



The top map represents 2050 habitat conditions for the Hampton-Seabrook Estuary and the bottom map represents habitats under a high sea level scenario in 2100. The aqua and yellow colors indicate low and high marsh, the purple is mudflat and the teal color is open water.
(Source: Catherine Callahan, GIS Specialist, NH Fish and Game Department)

The maps produced by the SLAMM can be used to support municipal and state decisions about citing future infrastructure, habitat restoration, land conservation, and the development of land use regulations (e.g. buffers and setbacks). Models do not provide definitive answers, but they can be powerful tools to encourage a dialogue about what the future might look like, and what actions we can take now to be proactive in achieving our conservation goals.

Mapping products from SLAMM modeling can be viewed in the GRANIT: NH Coastal Viewer, an online mapping tool that brings coastal resources spatial data, hazards-related spatial data, and other spatial data sets within NH's 42 coastal watershed communities together in one place.

Fishing for Energy Program in New Hampshire

Cheri Patterson, Supervisor of Marine Programs, NH Fish and Game Department

New Hampshire has been approved as a Fishing for Energy (FFE)port by the National Fish and Wildlife Foundation. The FFE Program launched in 2008 through a partnership among Covanta Corporation, the National Fish and Wildlife Foundation, NOAA Marine Debris Program, and Schnitzer Steel Industries, Inc. to provide a cost-free solution to the commercial fishing community to dispose of old, derelict (lost in the marine environment) or unusable fishing gear and to reduce the amount of derelict fishing gear in and around coastal waterways affecting fisheries and habitats. Gear collected at the ports is first sorted at Schnitzer Steel Industries for metals recycling, and the remaining non-recyclable material is converted into energy at Covanta Energy locations.

The Program is supporting one dumpster (FFE Bin) along the coast of NH. The FFE Bin is rotated between three ports to provide a disposal site for the commercial fishing fleet throughout the year for fishing gear.

The NH Department of Resources and Economic Development (DRED) staff is placing fishing gear removed from state properties (beaches, coastal state parks, etc.) either in or next to the FFE Bin (if the recovered gear is in good condition). In a coordinated effort between DRED and the NHFGD the owners of gear placed next to the FFE Bin are notified by the NHFGD and provided a short period of time to retrieve the gear or it will be disposed of accordingly by NHFGD Conservation Officers.

Massachusetts

Site selection Work Begins on MarineFisheries Shoreline Protection/Fisheries Habitat Enhancement Project

Mark Rousseau, MA Division of Marine Fisheries

The MarineFisheries Fisheries Habitat Program received a 2014 Hurricane Sandy Grant from the U.S. Department of Interior (DOI) to consider how to combine the dual purposes of shoreline protection and enhancing marine fisheries resources. The project identifies significant coastal infrastructure needs in Massachusetts which will require innovative management approaches. This is a collaborative effort that includes TNC, the Massachusetts Office of Coastal Zone Management, the City of Boston, Northeastern University, and the U.S. Army Corps of Engineers (USACOE). In 2015, work began to select potential project sites. An engineering team was assembled to conduct hydrodynamic modeling to help identify potentially suitable locations where submerged structures can provide shoreline protection. The engineering team is developing a site selection matrix that examines wave environment, sediment quality, sediment transport impacts, water clarity and other parameters to assess and rank site suitability. Project partners, in collaboration with the engineering team are working on conceptual designs to optimize structural design for biological value. Another important goal of the project is to examine the feasibility of repurposing materials taken from the Boston Harbor federal navigational dredge project for this and other shoreline protection projects. A working group consisting of regulators, non-governmental organizations (NGOs), scientists and academics convened twice in 2015 and is scheduled to meet again in 2016. The goal of the working group is to produce a document clarifying the potential beneficial re-use options. For more information, please contact Mark Rousseau at *mark.rousseau@state.ma.us*.

Shading Impacts of Docks and Piers on Salt Marsh

John Logan, MA Division of Marine Fisheries

In 2015, MarineFisheries completed a three year field study examining shading impacts of docks and piers on salt marsh vegetation. Fieldwork for 2015 consisted of a third year of shading at the experimental dock network in Marshfield, Massachusetts (*http://www.mass.gov/eea/agencies/mass-bays-program/grants/*

MarineFisheries biologist collects data at a dock on the Annisquam River in Gloucester. (Source: Kate Ostrikis)

dmf-shading-saltmarsh-2013.html). Additionally, 37 of the private docks sampled previously in 2014 for marsh vegetation (*http://www.mass.gov/eea/agencies/mass-bays-program/grants/impacts-of-docks-and-piers-on-salt-marsh-2014-.html*) were revisited in 2015 to monitor light levels. These docks had different heights, decking material, orientations, and widths, which allowed the influence of these characteristics on light penetration to be quantified. These light data as well as marsh clip plot samples from the experimental dock site are currently being processed and all data from the three project components are expected to be submitted for publication in a peer reviewed journal this winter. These experimental data will provide information for regulatory agencies to better inform dock design and regional planning. For more information, please contact John Logan at *john.logan@state.ma.us*.

Collaborative Effort Lead by EPA Examines Carbon Storage Capacity of Eelgrass in MA

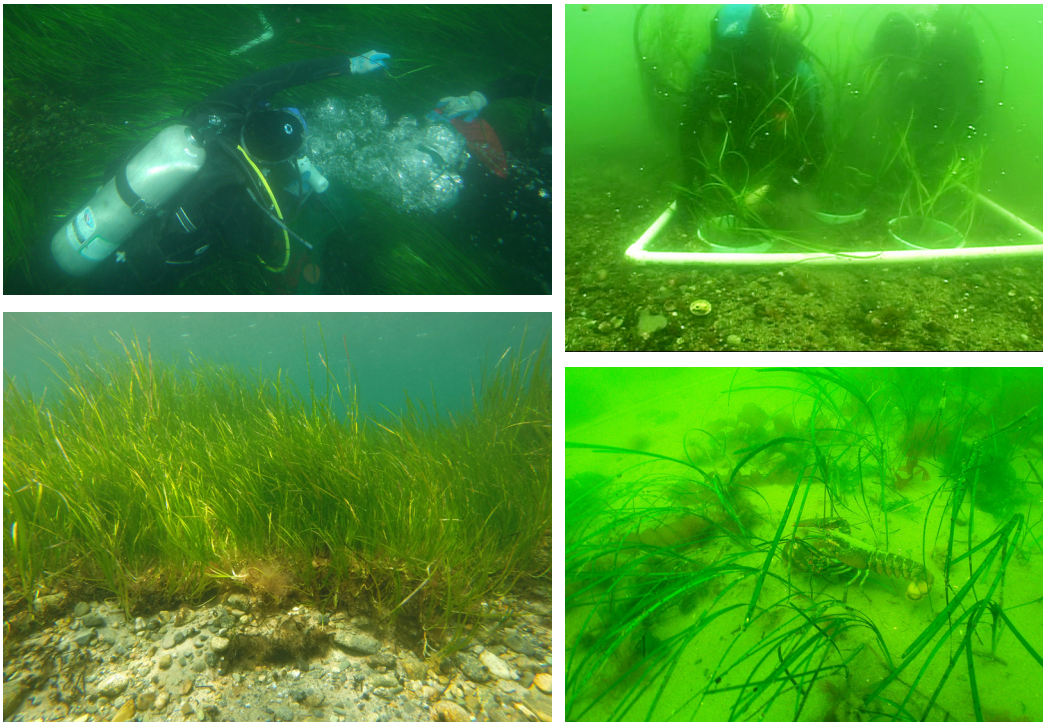
Phil Colarusso, EPA

In 2015, the Environmental Protection Agency (EPA), in collaboration with the Massachusetts Bays Program, MIT-Sea Grant, Boston University and MarineFisheries collected tissue and sediment cores from 5 eelgrass meadows in Massachusetts as part of a Blue Carbon project. Sampling sites were in Gloucester, Nahant, Cohasset, Sandwich and Oak Bluffs on Martha's Vineyard. Samples were processed for carbon and nitrogen content as well as analysis of carbon and nitrogen stable isotopes. This sampling represents the second year of a four year effort to assess the carbon storage capacity of eelgrass in Massachusetts. Over the winter, we will be assessing the impact of sea level rise on that carbon storage capacity. For more information, please contact Phil Colarusso at *colarusso.phil@epa.gov*.

MarineFisheries Wraps up Ten Years of HubLine Eelgrass Mitigation Work

Tay Evans, MA Division of Fish and Wildlife

Since 2005, MarineFisheries Habitat Program has been transplanting and monitoring eelgrass (*Zostera marina*) as mitigation for the HubLine natural gas pipeline project which impacted fisheries habitat in Boston Harbor and directly impacted 1.8 acres of eelgrass in Salem Sound.



Upper left: Diver in eelgrass (Source: Eric Nelson, EPA); Lower left: Eelgrass with peat layer (Source: Phil Colarusso, EPA)
Upper right: Biologists transplanting eelgrass at a restoration site in Salem Sound, MA. (Source: Jill Carr)
Lower right: American lobster in restored eelgrass habitat. (Source: Kate Ostrikis)

Potential restoration sites were selected using three site selection models and dozens of test-plots. Over the years, six different methods were used for eelgrass planting. The total acreage of restored eelgrass is approximately 11.5 acres over three sites in Boston Harbor, and 1 acre over two sites in Salem Sound. To assess restoration success, long-term monitoring transects were established at four reference sites, all of which will continue to be monitored annually as funding allows. The 2015 field season marked the final year of enhancement efforts at HubLine restoration sites, and MarineFisheries will be analyzing the data and publishing a final report this winter. For more information, please contact Tay Evans at *tay.evans@state.ma.us*.

Shellfish Enhancement in Boston Harbor

The MarineFisheries Shellfish Program continued into its tenth year of the Boston Harbor Softshell Clam Enhancement project. The enhancement project has now planted over an estimated ten million juvenile clams (*Mya arenaria*) on the intertidal flats throughout thirty sites of Boston Harbor and surrounding communities. This work is being accomplished in order to bolster the local softshell clam population which has suffered significant declines in the past decade. Through years of study assessing the growth, survival, and condition index of the planted clams, the project has been able to determine preferable environmental characteristics for the enhancement sites. This has led to planting at locations with demonstrated survival rates of at least 40 percent, helping to ensure a viable broodstock in local waters, and providing more of a desperately needed resource for the commercial harvesters. For more information, please contact Greg Bettencourt at *Greg.Bettencourt@state.ma.us*.

MarineFisheries biologists planting Mya arenaria seed on the flats in the Pines River, Revere MA. (Source: Greg Bettencourt)

Example of ponding on the marsh surface. (Source: USFWS)

Rhode Island

USFWS Restores Salt Marshes at National Wildlife Refuges in RI

Eric Schneider, RI Department of Environmental Management

The USFWS is restoring saltmarshes at the John H. Chafee and Sachuest Point National Wildlife Refuges (NWR) in Rhode Island as part of the Hurricane Sandy Recovery and Resilience Projects. Restoration activities include restoring tidal flow to improve fish access during low tide and improving surface drainage using the "runnel" method, which involves excavating shallow channels on the surface of the marsh to reduce ponding. A primary goal of the restoration is to increase saltmarsh elevation to help this important habitat keep pace with sea level rise. At the John H. Chafee NWR we are evaluating techniques to increase the elevation, including adding a thin layer of sediment dredged from the Narrow River. In addition to being a source of material for salt marsh restoration, these dredged areas will provide an area of cool-water refugia for fish and may allow for expansion of existing eelgrass beds, which are important foraging and sheltering sites for juvenile fish. We are also assessing the effectiveness of living shoreline techniques, including biodegradable coir logs and matting and bagged shell substrate, to enhance sediment stabilization along the marsh edge, and facilitate the growth of marsh grass and shellfish populations.

There are more than 22 partners and collaborators working with USFWS on these projects, including TNC, RI Coastal Resource Management Council, and RI Department of Environmental Management. For more information please visit the following website or contact Jennifer White, Ph.D. (USFWS) at *jennifer_white@fws.gov* or *http://www.fws.gov/hurricane/sandy/pdf/HurricaneSandyRecoveryRI.pdf*.

Conservation Moorings Help Restore Eelgrass

Eelgrass (*Zostera marina*) is an extremely valuable spawning and nursery habitat for a variety of fish and invertebrate species. In much of New England, including Rhode Island, the total acreage of eelgrass is only a fraction of historic levels, thus it's critical to maintain the integrity of current eelgrass beds while restoration and conservation practices attempt to increase eelgrass coverage and health. One approach that has shown promise is reducing the impact of existing mooring fields on eelgrass beds. When located in eelgrass, traditional mooring systems create a halo (loss of eelgrass) around the mooring anchor or block caused by the sweep of the chain along the bottom with shifting winds and tides.

In an effort to reduce this potential impact, ACFHP received a $20,000 NOAA grant to retrofit traditional mooring systems with conservation mooring technology. The ACFHP is partnering with the Rhode Island Division of Fish & Wildlife Marine Fisheries Section (RI F&W), Town of Jamestown Conservation Commission, Clarks Boat Yard, Conanicut Marine Services Inc., Jamestown Boat Yard, and the Aquidneck Mooring Company to reduce impacts of traditional moorings within the almost 60 acre eelgrass bed along the eastern shore of Conanicut Island (Jamestown), RI. In September of 2015 four traditional mooring systems were replaced with a Hazlett conservation mooring system, including replacement of the traditional mooring block with a helix embedded anchor. In order to assess how quickly the "halo" becomes revegetated with eelgrass the RI F&W with ACFHP will continue to conduct eelgrass surveys at moorings that were retrofitted, as well as at a few moorings that will not be retrofitted and will serve as control sites. To increase public awareness of conservation moorings an informational sign will be installed in the spring of 2016 along the waterfront at East Ferry in Jamestown. We hope to promote the use of conservation moorings in other communities that have traditional moorings currently within eelgrass beds. For more information please contact Chris Powell at *cpowell7@verizon.net* or Eric Schneider at *Eric.Schneider@dem.ri.gov*.

Example of a "halo" caused by the chain scour of a traditional mooring system located in eelgrass. (Source: RI F&W)

White Rock Dam Removal Improves Fish Passage

TNC, in partnership with the USFWS, Rhode Island Department of Environmental Management (RI DEM), CT Department of Energy and Environmental Protection (CT DEEP), NOAA, Wood Pawcatuck Watershed Association, and other partners are in the process of restoring fish passage through the removal of the White

The Pawcatuck River after removal of the White Rock Dam. (Source: RI F&W)

Rock Dam on the Pawcatuck River located along the border of Westerly, RI and Stonington, CT. The 6 ft high, 108 ft wide concrete structure was removed in October 2015 enhancing fish passage and river connectivity. The improvements enhance access for river herring and American shad to over 30 miles of riverine habitat and 1,900 acres of nursery and spawning habitat in the Pawcatuck River. In-stream habitat upstream of the former dam is likely to benefit from cooler water temperatures in the summer and reduced siltation.

An earlier evaluation study by US Army Corps of Engineers (ACOE), USFWS Fish Passage engineers, and RIDEM determined the White Rock Dam by-pass channel's water velocities and length greatly reduced the ability of anadromous fish to reach valuable spawning habitat The removal of the dam was determined to be the best alternative for fish passage. The dam removal project was funded from USFWS Hurricane Sandy Recovery funds. Fuss and O'Neill was selected for engineering and design, and Sumco LLC completed the construction. This project was a collaboration between two states and numerous partners to improve fish passage and river connectivity on the Pawcatuck River. For more information please contact Scott Comings at *scomings@tnc.org* or Phil Edwards at *phillip.edwards@dem.ri.gov*.

A stretch of the Pawcatuck River after removal of the White Rock Dam. (Source: RI F&W)

Connecticut

Penny Howell, CT Department of Energy and Environmental Conservation

Stratford Point Restoration

In the early 1900s, a coastal bluff was removed from Lordship Peninsula and a tidal marsh was ditched, drained and ultimately filled in the 1950s. Remington Arms Gun Club operated a trap and skeet range from 1926 to 1986 when concerns over the tremendous accumulation of lead shot forced the club to cease operations. Remediation involved removal of the lead shot along with all of the vegetation and top soil. A restoration project was awarded to Sacred Heart University which required not only stabilization of the shoreline but also sequestration of the remaining lead shot below newly accreted sand and soil. In December 2011 'geotubes' were placed along the remaining upland dune and beach grass was replanted. The real innovation came in May 2014 when cement reef balls were placed on the intertidal

The fishway with viewing window at the Lilly Pond Dam, a 5-foot high dam originally built in 1790.

slope to stabilize the beach front (tide prism here is ~6 ft). Wave energy within the reef ball array is measured with pressure sensors; suspended sediment measured by optical backscatter and particle autosampler; sediment accretion measured by GPS station elevation survey.

After one year (April 2015), the reef balls have remained stable (without anchors) and show no deterioration. Sediment accretion of ~3cm has occurred on both sides of the reef. Oysters, barnacles, and algae have colonized the reef balls which have attracted forage fish and invertebrates. Spartina plugs have survived and grown along the dune, and upland vegetation is growing on the geotubes.

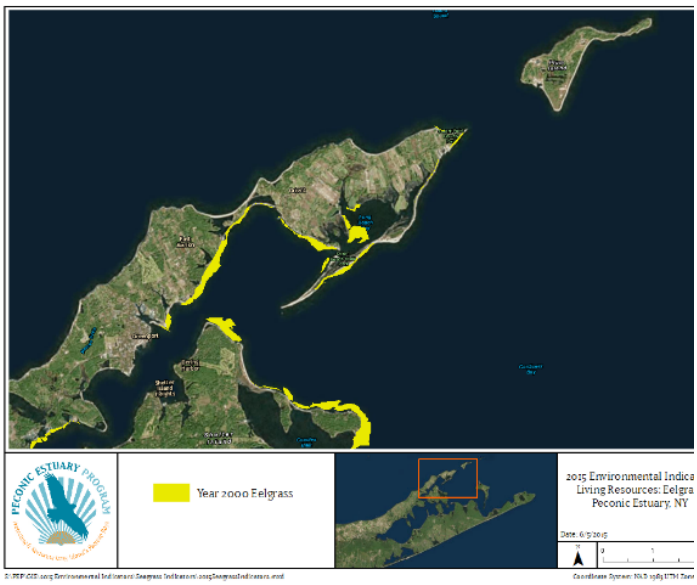
Fishways are good but dam removal is better: Steeppass fishways were installed in 2000-2001 on the Eightmile River system in Lyme and Lilly Pond on the West River in New Haven to open up extensive spawning and nursery habitat for various anadromous species. While these fishways successfully restored limited fish passage on these rivers that were dammed centuries ago, the dams themselves have become fiscal and legal liabilities with no economic reason to keep them maintained. Private and government grants have been obtained to demolish both dams in 2016. Demolition will eliminate the danger of catastrophic dam failure and flooding, while also opening these rivers to all species for more natural upstream and downstream migrations over a wide range of water levels. Staff from CT DEEP will remove the fishway units and store them for reuse at other locations.

New York

Dawn McReynolds, NY State Department of Environmental Conservation

Assessment of 2014 Submerged Aquatic Vegetation Distribution in the Peconic Estuary

The Peconic Estuary Program, with funding through the New York State Department of Environmental Conservation (NYSDEC), recently completed an assessment of submerged aquatic vegetation, specifically eelgrass, throughout the Peconic Estuary ecosystem located on the east end of Long Island in New York state. The last survey was completed 14 years ago in 2000. This



Example of changes seen in eelgrass beds between 2000 and 2014.

assessment is a critical step in managing and restoring eelgrass beds, as well as evaluating past restoration efforts. Eelgrass is an important part of the ecosystem because it stabilizes bottom sediments, improves estuarine water quality, and provides critical habitat for a large number of fish and wildlife species within the Peconic Estuary. Once abundant throughout the estuary, eelgrass has suffered significant losses over the years.

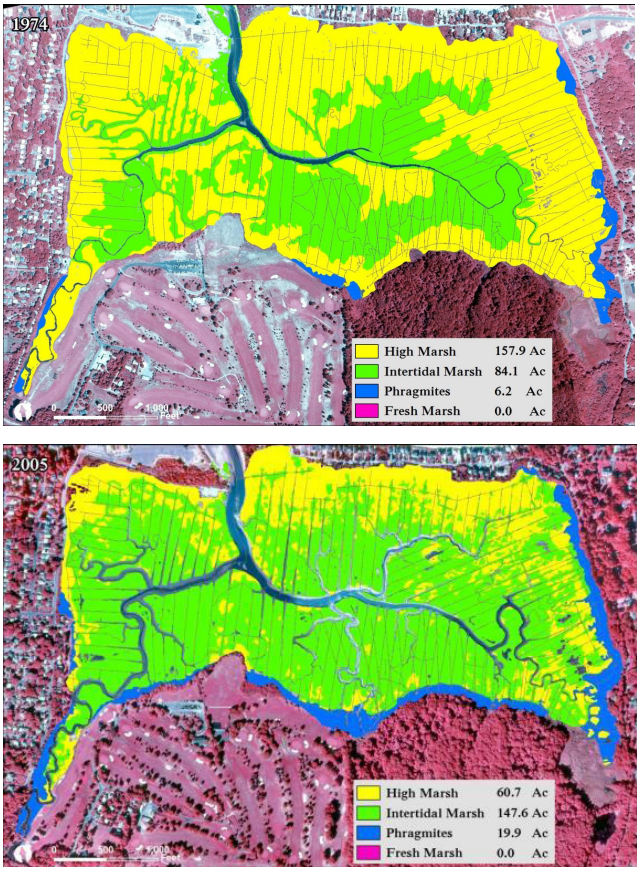
Historical analyses and current inventories suggest that since 1930, the Peconic Estuary has lost well over 80% of its eelgrass. From this most recent 2014 survey, there was a 40% loss in eelgrass from the eelgrass beds assessed in 2000. Only 900 acres of eelgrass remain in the Peconic Estuary, mostly east of Shelter Island in areas that are well flushed and influenced by ocean waters. Many activities and environmental conditions threaten the health and extent of eelgrass beds. Simultaneous multiple stressors may be the cause for the significant loss of eelgrass in the Peconic Estuary. Within the Peconic Estuary, eelgrass beds may be negatively affected by fishing practices, pollution, disease, harmful algal blooms, boating activities, dredging, storms and ice scouring, shoreline stabilization structures, and sea level rise.

NYSDEC can use these assessments and research findings to help move forward with their goal of partnering with municipalities to create Eelgrass Management Plans for all of Long Island in order to protect and restore this essential estuarine habitat. Contact: Julie Nace, Peconic Estuary program Coordinator at *julie.nace@dec.ny.gov,* or (631)-444-0871.

Long Island Wetland Trends Analysis, 1974 – 2005/8

NYSDEC, along with New England Interstate Water Pollution Control Commission (NEIWPCC), recently oversaw an analysis of Long Island Tidal Wetlands Trends. This project was completed by Cameron Engineering and Land Use Ecological Services through a Wetland Program Development Grant provided through the EPA. Other partners include NYSDEC, Peconic Estuary Program, Suffolk County Department of Economic Development and Planning, TNC, and the Town of East Hampton.

The purpose of the Long Island Tidal Wetlands Trends Analysis project was to quantify the magnitude of landscape-level changes in wetlands loss and changes in marsh condition within the Long Island Sound, Peconic, and South Shore Estuaries including Nassau and Suffolk Counties and parts of Westchester County, the Bronx, and Queens. The time period for this analysis was 1974 through 2008. The results of this project, the observed trends in wetland area and composition change, and implications for estuary health and supply of estuarine ecosystem services are intended for use by environmental managers, conservation advocates and elected officials across a variety of regulatory agencies, environmental organizations, and governments.



Example of Wetland Loss from 1974 to 2005: Crab Meadow Wetland with the Long Island Sound estuary, north shore of Long Island.

Overall, Long Island's estuaries have lost 13.1% of native intertidal, high marsh, and coastal fresh marsh communities between 1974 and 2005/2008. The Peconic Estuary and South Shore Estuaries have slightly lower percentages of marsh loss (-10.4% and -11.6%, respectively) compared to the Long Island Sound Estuary (-22.6%). Collectively, Long Island's three estuary complexes lost, on average, 85 acres of native marsh annually over this time.

The largest loss of native marsh, 1,692 acres, occurred in the South Shore Estuary where the native marsh area declined from approximately 14,652 acres in 1974 to 12,959 acres in 2008. The native marsh in the Long Island Sound decreased by an estimated 654 acres from

2,892 acres in 1974 to 2,237 acres in 2008. Approximately 356 acres of native marsh were lost in the Peconic Estuary, declining from an estimated 3,444 to 3,078 acres from 1974 through 2008.

Contact Dawn McReynolds, Marine Habitat Section Head, *dawn.mcreynolds@dec.ny.gov*, (631) 444-0452 for more information.

Long Island Sound Tidal Wetlands Loss Workshop

In 1999, NYSDEC noted consistent and continued wetland loss despite legislation to protect tidal wetlands. As a result, the EPA Long Island Sound Study funded and NYSDEC administered and hosted two Long Island Sound Tidal Wetland Loss Workshops, in 2003 and a recent follow-up workshop in 2014, to bring together experts and investigate this phenomenon. On October 22-23, 2014, approximately 70 professionals in tidal wetland research, monitoring, restoration, and management came together to discuss the causes of tidal wetland loss and change in Long Island Sound and the region over the last decade and select recommendations for research, monitoring, management, and restoration for the future. Some of the major causes of marsh loss were identified as hydroperiod and hydrologic regime change due to sea level rise (SLR), excessive nutrients (nitrogen), and lack of a natural sediment supply. These factors result in vegetation changes, changes in plant health, and marshes getting wetter/panne formation. Recommendations for the future included creating a conceptual model for tidal wetland systems, creating a central database/repository/clearinghouse for tidal wetland information, creating standard pre- and post- restoration tidal wetland monitoring protocols/metrics, and organizing a regional marsh monitoring framework. The 2014 workshop materials and presentations are posted on the Long Island Sound Study website *http://longislandsoundstudy.net/issues-actions/habitat-quality/2014-lis-twl-wksp/*.

Effects of a Storm-Induced Barrier Breach on the Ecosystem within Great South Bay

NYS in Cooperation with State University of New York Scool of Marine and Atmospheric Sciences (SUNY SOMAS) is undertaking a study to understand the physical and biological effects of the 2012 Superstorm Sandy breach in the barrier island that separates Great South Bay, NY from the Atlantic Ocean. To examine the effects of this breach on fish and mobile invertebrates, seasonal otter trawl sampling has been carried out in 2013-2015 and is being compared to a previous study in 2007 that occurred before the breach opened. Preliminary analyses indicate that the fish and mobile invertebrate assemblage has changed substantially, particularly in species richness and species distribution patterns. Analysis is ongoing and is attempting to identify whether the observed changes are long term and due to the breach, a transient phase as the faunal assemblage adjusts to the perturbation of the breach opening, or interannual natural variability. Contact: Dawn McReynolds, Marine Habitat Section Head, *dawn.mcreynolds@dec.ny.gov*, (631) 444-0452 for more information.

New Jersey

Russell Babb, NJ Department of Environmental Protection

Beach and Dune Construction Projects Underway

The Christie Administration joined with the US ACOE's Philadelphia District to commence on a series of beach and dune and other resiliency-related projects along New Jersey's coast. A $128 million contract to complete beach and dune projects for Long Beach Island will protect coastal towns against future storms such as Superstorm Sandy. The projects encompass a total of 12.7 miles of beaches in Long Beach Township, Ship Bottom, Beach Haven and part of Surf City. They will complete storm damage reduction projects that were being constructed in phases prior to Sandy striking New Jersey in October 2012. The Army Corps' will construct beach and dune systems ranging from 325 ft to 415 ft wide. The beach berm itself

New Jersey Shore Protection: Brigantine Inlet to Great Egg Harbor. (Source: US Army Corps of Engineers)

will be built up to approximately eight feet above sea level. The dune system behind the beach – critical to protection of property, infrastructure and lives – will have a top elevation of approximately 22 feet above sea level.

The Long Beach Island project, also known as the Barnegat Inlet to Little Egg Inlet project, is one of seven significant beach improvement projects statewide authorized by Congress but never completed before Sandy hit. Ultimately, eight million cubic yards of sand will be pumped from an approved "borrow area" approximately three miles offshore.

Furthermore, the Christie Administration and US ACOE launched the start of a $57.6-million project to construct beaches and dunes in southern Ocean City, Strathmere and Sea Isle City in Cape May County. At the same time, the Administration announced the start of $38.2 million project to construct beaches, make stormwater outfall improvements and implement modifications to other shore protection structures in the area of Loch Arbour, Allenhurst and Deal in Monmouth County. The Christie Administration and the Army Corps of Engineers also announced a $202 million resiliency project that will bolster storm protection for Union Beach along Raritan Bay, one of the communities hardest hit by Sandy.

New Jersey Department of Environmental Protection (NJDEP) Superstorm Sandy Blue Acres Acquisition and Conservation Program

The Blue Acres Program recently enjoyed its second anniversary and is part of New Jersey's Green Acres Program. The program purchases floodprone properties and will spend $300 million in federal disaster recovery funds to give homeowners the option to sell Sandy-damaged homes at pre-storm value in flood-prone areas. The program is designed to give homeowners the ability to choose the best option for their individual situation. The State will buy clusters of homes or whole neighborhoods that were flooded in Superstorm Sandy. These homes will be demolished, and the land will be permanently preserved as open space, accessible to the public, for recreation or conservation purposes. Following demolition of the homes, the preserved land will then serve as natural area buffers for flooding and will aide in protection against future storms and floods. The goal of the Blue Acres Program is to dramatically reduce the risk of future catastrophic flood damage and to help families to move out of harm's way.

The Blue Acres Program, which allows willing homeowners to sell their houses at pre-Sandy market value, was launched by the NJDEP on May 16, 2013. To date, results of the program include:

- 716 approvals for buyouts in 10 municipalities across six counties
- 673 offers made
- 468 offers accepted
- 309 closings
- 207 demolitions

The Federal Emergency Management Agency's Hazard Mitigation Grant Program has approved more than $100 million in federal funds for the Blue Acres program, which have been processed through the New Jersey Office of Emergency Management.

New Jersey's Barnegat Bay Blitz

Thousands of volunteers, many of them schoolchildren, joined the NJDEP for the 6th Barnegat Bay Blitz, a day-long cleanup that draws attention to efforts to protect and enhance the bay and its watershed, which sprawls over a 660-acre watershed across much of New Jersey's central coast. The Blitz demonstrates the DEP's continued commitment to the protection and enhancement of Barnegat Bay and allows residents to directly participate in the State's comprehensive restoration plan for the bay, furthering region-wide appreciation of this natural asset. The clean-up targets a wide variety of areas, including wetlands, stream banks, storm water discharge points, schools, trails, docks, areas around bulkheads and the waters of the bay itself and involved 37 communities within the bay's watershed. The DEP is working with academic institutions and stakeholders on a series of studies, the first-ever broad-based scientific examination of the bay. Study areas include nutrient loading and impacts on water quality, fish and shellfish health, marsh health, and the health of organisms that live in the sands and sediments under water and are critical indicators of ecological health.

Since it was first launched in October 2011, Blitz participants have collected 2,637 cubic yards of trash and recyclables. Individual past Blitzes have attracted more than 5,500 participants annually.

Raising Boaters' Awareness of Ecologically Sensitive Areas in Barnegat Bay

The NJDEP continues to work to remind boaters to use caution while navigating within or near ecologically

sensitive areas in Barnegat Bay. The reduction of impacts from boats and personal watercraft within Barnegat Bay's critical ecosystems, including wetlands, aquatic vegetation, shellfish and fish habitats, is part of the State's comprehensive plan to protect and restore the bay.

An online interactive map for boaters, which can be accessed on mobile devices and computers, is available so they can easily ascertain the locations of 16 designated ecologically sensitive zones on Barnegat Bay. Users also can find helpful services such as the locations of marinas, sewage pump-out facilities, bait-and-tackle shops, launches and ramps, restrooms, and places to dispose trash. The green boating effort is being done cooperatively with the boating and fishing industries in New Jersey, which are vital to the economic and recreational needs of the state. Barnegat Bay's 75 mi^2, environmentally sensitive estuarine system is home to plants, fish and other wildlife that populate these areas in the bay. They contain submerged aquatic vegetation which acts as nursery grounds for fish and wildlife. Motor boat propellers and turbulence caused by boat wakes can disturb and harm these special areas that are critical to estuarine finfish and invertebrate species.

The DEP encourages boaters to take these actions to help keep the bay vibrant:

- Stay out of restricted areas set aside for wildlife.
- Do not harass nesting birds and other animals.
- Maintain a 100 ft distance from natural shorelines.
- Minimize wakes in all shallow areas to help reduce erosion and harm to aquatic plants and animals.
- Buoy/float mooring chains and lines to prevent them from scraping on the Bay bottom and harming submerged aquatic vegetation.
- Appreciate wildlife from a distance.
- Reduce air pollution by not idling in open water.

Pennsylvania

Benjamin D. Lorson, PA Fish and Boat Commission, Division of Habitat Management

Fish Passage Restoration: Heistand Sawmill Dam Removal

Heistand Sawmill Dam was located on Chiques Creek approximately 150 meters upstream from its' confluence with the Susquehanna River near Marietta, Lancaster County, PA. The 12 ft tall dam had blocked passage of fish into Chiques Creek for more than 100 years. Columbia Water Company, American Rivers, and the Pennsylvania Fish and Boat Commission worked collaboratively to remove the dam in 2015. The project will restore unimpeded fish passage to approximately 13 miles of Chiques Creek and tributaries to benefit resident and migratory fishes.

Fish Passage Restoration*: *Susquehanna River Fish Passage

Noteworthy progress towards migratory fish restoration in the Susquehanna River basin was made through settlement negotiations between resource agencies and hydroelectric stations on the river. Namely, fish passage performance measures were incorporated as conditions of the Pennsylvania Department of Environmental Protection's 401 Water Quality Certification (a requirement for Federal Energy Regulatory Commission hydroelectric facility operating license) for the Muddy Run Pump Storage Facility and the York Haven Hydroelectric Project. Additionally, the Holtwood Hydroelectric Station, through its re-development and amended operating license conditions, continued to develop and test facility modifications specifically designed and implemented to improve American shad passage at the dam and meet fish passage performance measures.

Fish passage improvements at the Holtwood Hydroelectric Station (i.e. construction of zones of passage in the tailrace and spillway, dedicated attraction water flow to spillway, increased attraction flow and replacement of flashboards with Obermeyer crest gates) were near completion in 2014, and will be evaluated during 2015 through 2017 (per 401 Water Quality Certification conditions). Initial indications from the 2015 fish passage counts suggest improvements in American shad passage; 64% of shad that passed Conowingo Dam passed Holtwood, compared to the long-term average of 31% (range 3% to 63%). The 401 Water Quality Certification at the York Haven Hydroelectric Project requires the construction of a nature-like fishway along the main dam to be constructed by 2021. The planning and design phases of the nature-like fishway were well underway in 2014, with several pre-permit application meetings being held. This project will likely represent the largest nature-like fishway on the Atlantic Coast, and allow for year-round volitional fish passage.

Delaware

Jeffrey Tinsman, DE Division of Fish and Wildlife

When Governor Markel signed HB 160, more than two years ago, Delaware became the last state along the Atlantic coast to begin permitting and regulating shellfish aquaculture activities. About the same time, analysis was completed on a 2013 bay-wide hard clam survey of Delaware's coastal bays. Results showed that Indian River and Rehoboth Bays still had hard clam densities virtually identical to the last survey conducted in 1975-76, almost 40 years earlier. During that period, wild hard clam populations along the Atlantic coast have generally not fared well and some important populations have been decimated. These declines may be due to a variety of causes, but certainly the importation of massive volumes of seed shellfish associated with aquaculture may have potential to negatively impact wild stocks. Delaware's challenge was to permit hard clam and oyster aquaculture while protecting the wild stocks as much as possible. This is being done in a variety of ways:

1. The level of aquaculture leasing was limited to 5% of Indian River and Rehoboth Bays and 10% of Little Assawoman Bay, in order to accommodate navigation and other recreational users. Leased areas will be limited to areas of the lowest density of wild hard clams.
2. Rigorous disease testing will be required for the importation of shellfish seed or brood stock. This can minimize the effects of disease imported with the shellfish, but not completely eliminate it.
3. Wild hard clam stocks are found in Indian River and Rehoboth Bays. Little Assawoman Bay will support hard clams, but has no wild population. Hard clam aquaculture will be limited to Little Assawoman Bay to provide geographic separation between aquaculture activities and wild stocks.
4. Delaware coastal bays have no wild oyster population. Delaware's wild oyster stock is found in Delaware Bay. Oyster aquaculture will be limited to the three coastal bays, maintaining a geographic separation between aquaculture activities and wild stocks. It is hoped that these measures will allow the aquaculture industry to operate without negative impacts to wild shellfish stocks.

Delaware has made a request to the US ACOE to use Nationwide permit 48 to conduct aquaculture leasing and this request is under consideration. Delaware has used the bay-wide clam survey data to select candidate areas for leasing, but will survey each acre to verify that the wild clam density is below the threshold. This survey is well underway and will continue throughout 2015.

Maryland

Marek Topolski, MD Department of Natural Resources

The Maryland Department of Natural Resources (MD DNR) addressed three major habitat issues in 2015. In response to the presence of Atlantic sturgeon in spawning condition in Marshyhope Creek, a tributary of Nanticoke River, MD DNR and NOAA Chesapeake Bay Office have been working to assess available spawning habitat for the endangered species. MD DNR has been conducting a tagging study of these sturgeon, while NOAA Chesapeake Bay Office is conducting a habitat assessment with broadbeam and sidescan sonar.

The state is conducting a thorough review of oyster sanctuary status, which will consider modifications to existing boundaries, harvest buffers, and the possibility of opening some sanctuary reefs to harvest. In a related effort, restoration of the Harris Creek Oyster Sanctuary was completed. This is the first of three sanctuary reefs designated for restoration efforts.

Department of Natural Resources has documented the expansion of zebra mussel populations from the Susquehanna Flats (upper Chesapeake Bay) down to the Bush, Gundpowder, and Middle River sub-estuaries north of Baltimore. Navigation buoys are monitored for zebra mussel attachment. Zebra mussels have also been observed on the leaves of submerged aquatic vegetation. Salinity appears to be a barrier to zebra mussel expansion, however, years with high precipitation such as 2015 have allowed spread to downstream estuaries. Monitoring and outreach programs continue to be implemented.

Virginia

Tony Watkinson, VA Marine Resources Commission

Virginia Living Shoreline General Permit

Legislation originally adopted by the Virginia General Assembly in 2011 and subsequently amended in 2014 directed the Virginia Marine Resources Commission

(VMRC) in cooperation with other interested state agencies and local wetlands boards to establish and implement a general permit regulation that authorizes and encourages the use of "living shorelines as the preferred alternative for stabilizing tidal shorelines in the Commonwealth." The legislation defines living shorelines as: "a shoreline management practice that provides erosion control and water quality benefits; protects, restores or enhances natural shoreline habitat; and maintains coastal processes through the strategic placement of plants, stone, sand fill, and other structural and organic materials." The first of two living shoreline general permit regulations became effective on September 1, 2015.

VMRC's Habitat Management Division solicited input on the general permit from all of the State's local wetlands boards and formulated two workgroups to assist with the development of the general permit. The "Technical Workgroup" was comprised of representatives of the Virginia Institute of Marine Science, The Department of Conservation and Recreation, The Department of Environmental Quality, and the US ACOE, and they assisted with the development of the technical requirements of the general permit such as material specifications and fetch limits. A second group called the "Living Shoreline Advisory Committee" was comprised of the representatives of organizations that would either use or review applications for the general permit. That group included local wetlands board members, permitting agents, and waterfront contractors and concentrated on the actual permit review processes.

It was realized from the outset that a general permit could not be developed that would effectively handle all types of

living shoreline projects. Certain projects like nearshore breakwaters are too site-specific and generally require more input and review than would typically be associated with any streamlined review process. Additionally, desiring to streamline the permitting process as much as possible, it seemed appropriate to develop two separate general permits that would receive different levels of review. The first type "Group 1" was developed to authorize the simple enhancement of an existing tidal wetland area through the placement of sand fill to improve the growing conditions for wetlands vegetation. The recently authorized Group 1 general permit allows the placement of biodegradable fiber logs and oyster shell bags to assist in retaining the sand fill and protecting the planted wetland. All activities are confined to areas landward of mean low water. A second type of general permit "Group 2" is still under development but will authorize certain projects involving rock sills placed channelward of mean low water in conjunction with sand fill and wetlands vegetation. Given the increased complexity and potential to affect neighboring shorelines, the Group 2 general permit process will likely be a little more involved than the Group 1 process.

The goal of the general permit is to provide an incentive to the applicant to encourage the use of a living shoreline technique in lieu of more traditional shoreline hardening techniques. Accordingly, application processing times were minimized and proposed permitting fees have been eliminated under the Group 1 general permit. If the application meets the criteria and both the wetlands board and VMRC concur with the use of the general permit process, VMRC shall issue the general permit. Given the limited potential for a project qualifying under the Group 1 general permit process to adversely impact the environment, adjoining neighbors or the general public and the desire to streamline the permit review process, there is no required public notice or notification of adjoining property owners.

A separate permit will still be required from the US ACOE and they will act independently, however the activities qualifying for the general permit should also qualify for the US ACOE's Regional Permit #19 under their new living shoreline authorization. We worked closely with the Corps to make certain the general permit and regional permit would have similar requirements.

During the development of the general permit, concerns were raised expressing that the general permit should not encourage the use of an inappropriate living shoreline structure in an improper setting for fear that even a few failed living shoreline projects could lead to a reluctance of the public to utilize this approach to address erosion along their property. Accordingly, the applicability of the general permit is limited to certain settings and techniques that have a high likelihood for success. Additionally, there is a provision that stipulates in the event either the local wetlands board or VMRC determine a particular project needs a more thorough evaluation, either can disagree with the use of the general permit process. In such instances, the application can be reviewed in accordance with the standard wetlands permit review process.

In the proper setting, living shoreline techniques can effectively control shoreline erosion while providing water quality benefits and maintaining natural habitat and coastal processes. Virginia's Living Shoreline Group 1 general permit may be viewed at *http://mrc.virginia.gov/regulations/fr1300.shtm*.

North Carolina

Jimmy Johnson, NC Department of Environment and Natural Resources

Work was completed in late 2014 with regard to the identification of strategic habitat areas in the White Oak River Basin. The primary lead agency for this work is the Division of Marine Fisheries, with significant assistance from staff of the Albemarle-Pamlico National Estuary Partnership (APNEP), other NC DENR divisions, and universities. The identification of a subset of strategically located, high quality coastal habitats is an important non-regulatory planning tool for resource managers, local government, and conservation groups.

During the 2014-2015 year, APNEP, along with researchers from East Carolina, set up ten sentinel sites around the Albemarle Sound to monitor the presence and species type of submerged aquatic vegetation (SAV) in the Albemarle Sound. During the spring of 2015, those same researchers began the process of identifying sentinel sites in the Pamlico Sound/Pamlico River area. These research efforts are being funded through grants from the Coastal Recreational Fishing License funds. SAV is a significant habitat emphasized in the CHPP. This work will continue through the 2015-2016 reporting year.

Building on the momentum generated by the Low Impact Development (LID) Summit, which was held in Raleigh in 2014 and attended by close to 300 people, the NC Coastal Federation (NCCF) was awarded a Clean Water Management Trust Fund Grant allowing for a second Summit in 2016. In 2016, this Summit will again be led by the Division of Water Resources (DWR) while working with the NCCF and NC State University. The Summit will continue to educate contractors and local government officials about the positive impacts of LID. It will also be used to promote the importance of LID as an environmentally sound way to develop, and the application and use of the computer model, Stormwater EZ. This model can be used state-wide to help design LID projects and help secure the necessary permits.

To encourage alternatives to vertical shoreline stabilization, the Division of Coastal Management (DCM) drafted a Living Shoreline Strategy with input from other DENR division representatives in 2014. This Strategy is now being put into practice by DCM and it has identified six short-term and four long-term actions for the Department. The document summarizes previous and ongoing estuarine shoreline stabilization research in the state, identifies information gaps, highlights the need for continued staff engagement and public awareness, and investigates potential grant programs or cost reductions. The strategy also recognizes the need to promote other living shoreline alternatives (other than riprap sills), to develop training programs/certification for marine contractors, and to partner with groups such as the military to increase the number of demonstration sites. The strategy has been presented to the CHPP Steering Committee in 2015 and has been endorsed by the Steering Committee as a top priority for the 2015 CHPP revision. This past year, the NERR hosted two training sessions for contractors teaching the importance of living shorelines and the benefits associated with using this strategy. Two more are planned for this upcoming year with some funding being provided by APNEP.

The five-year review and revision of the CHPP as required under the 1997 Fisheries Reform Act, is well underway and currently on time for completion by the end of the year. In an effort to streamline the document, it has been reorganized to reduce redundancy, and the CHPP writing team has focused on priority issues, as directed by DENR and the CHPP Steering Committee. Those priority issues include:

- Increasing oyster habitat restoration and enhancement activities.
- Increasing the use of living shorelines for erosion control.
- Addressing sedimentation and its effects on estuarine creek habitat .
- Generating metrics on management success and habitat trends.

While DMF staff has taken the lead in working on the revised plan, agency staff from throughout the Department, as well as staff from the NC Forest Service and the Division of Soil and Water within the NC Department of Agriculture and Consumer Service, has also actively participated in the CHPP revision.

South Carolina

Dr. Robert Van Dolah (retired), SC Department of Natural Resources

The South Carolina Department of Natural Resources (SCDNR) continued its development of living shorelines using a variety of materials including oyster shell, experimental crab trap reefs and oyster castles. The agency has been notified of additional funding to work with the state's Coastal Zone Management Agency, SC Department of Health and Environmental Control (SCDHEC), to test living shoreline options (modified crab traps, natural fibers) for erosion control. The current SC regulations do not specifically address living shoreline options for erosion control. This does not preclude homeowners from requesting permission but it requires a longer time period for review than other erosion control options. A living shoreline guidance document will be developed to help SCDHEC and homeowners in future considerations of this option. The proposed project is a 3-5 year effort.

The Charleston Harbor Deepening Project (Post 45) Study is continuing on an accelerated schedule. The planned project will both widen and deepen existing channels to a minimum of 54 ft (maintained) + 2 ft (overdraft) + 2 ft (advanced maintenance) for the entrance channel, 52 + 2+ 2 ft for the lower harbor and 48 + 2 + 2 ft for the upper Cooper River section. Environmental assessments (of interest to habitat effects and protection) include assessments of hard bottom habitats, benthic surveys, wetland assessments habitat suitability indices, sediment testing, and air quality analysis. The proposed project includes limestone rock dredged from the entrance channel would be used to create eight 33-acre artificial reefs in proximity to the entrance channel. Other beneficial use of dredge material opportunities are also being explored to create additional habitat in or near the harbor. The project is starting the Pre-construction Engineering and Design (PED) phase. Updates on the Charleston Harbor Post 45 Project are provided at *http://www.sac.usace.army.mil/Missions/CivilWorks/CharlestonHarborPost45.aspx*.

The SCDNR and the BOEM, as part of a two-year cooperative agreement, will undertake an effort to compile, collect, and reassess old and new data on sand resources in the OCS of South Carolina. The goal of this project is to develop a framework for locating OCS sand resources offshore of South Carolina by improving our knowledge of existing data. Previously assembled data sets will be expanded with additional data to develop an inventory of sand resources. The purpose of the inventory is to provide a data framework that can be evaluated for data gaps, so that future data collection can be directed towards areas needing information of any particular type. BOEM is also collecting some new geotechnical and geophysical data for four areas off SC including Folly Beach, Cape Romaine, Myrtle Beach and Hilton Head.

BOEM also hosted another meeting of the South Carolina Renewable Energy Task Force in September. Details of

areas proposed for notice in the Federal Register titled, Commercial Leasing for Wind Power on the OCS Offshore South Carolina - Call for Information and Nominations (Call) were presented and included two large areas off the Grand Strand and Cape Romain and two smaller areas further offshore east of Winyah Bay and Charleston Harbor. Discussions at the task force meeting included some concerns about the suitability of the proposed Cape Romain Call area due to the proximity of extensive protected lands. Once all comments have been received in writing from the Task Force, BOEM plans on publishing the Call in the Federal Register for public comment.

Georgia

January Murray, GA Department of Natural Resources

Management of Artificial Reefs

The Georgia Department of Natural Resources (GADNR) continues to focus on providing suitable and accessible quality habitats for coastal recreational anglers through enhancement of Georgia's 30 marine and 15 estuarine artificial reefs. These reefs play an important role in Georgia's marine and estuarine ecosystems and coastal economies along with providing recreational opportunities as popular fishing and diving destinations. Reef project goals include seeking partnerships from fishing clubs and other interested organizations as well as accepting financial and material donations in order to further develop Georgia's Artificial Reef System. From September 2014 through August 2015, GADNR conducted offshore enhancements of two reef sites through deployments of donated materials of opportunity: a deck barge (110 ft l x 34 ft w x 6 ft h) loaded with approximately 140 metal poultry transport cages and four concrete double T beams to "SAV" Reef, and approximately 400 concrete transmission line poles to "F" Reef. One inshore enhancement was conducted at Joe's Cut Reef through deployment of 14 steel drum frames. Both state and federal permits were maintained for offshore and inshore reefs and annual material inspection surveys via side scan sonar, aerial reef flyovers, and SCUBA diving occurred. GADNR also updated artificial reef project webpages *http://coastalgadnr.org/ArtificialReef* to include downloadable GPX files of material coordinates, maps, Google Earth files, and historical project summaries.

Oyster Reef Restoration

In the spring of 2015, GADNR conducted multiple oyster reef deployment types: test plots, maintenance, enhancement, and restoration. Test plots evaluated the viability of each location and cultch materials used by testing larval recruitment and sedimentation rates prior to scaling up a project. Maintenance deployments placed additional cultch materials on existing reef areas that were overtaken by sediment, in order to retain the initial project footprint. Enhancement deployments transpired within Georgia's public shellfish harvest areas to augment existing oyster habitats. Restoration deployments occurred in non-shellfish harvest areas where existing oyster habitats were lacking suitable substrate for recruitment.

In partnership with the Coastal Conservation Association of Georgia and the Oatland Island Wildlife Center, GADNR planted cultch materials to provide substrate for oyster recruitment at one maintenance, one enhancement, and one restoration location plus four test plot sites. GADNR's Oyster Shell Recycling Project, shells donated from restaurants, roasts, and the local community, provided 29.5 tons of cured (three to six months) shells for use in 2015 oyster projects. Only 19 tons of shells were required for use in 2015 oyster projects, creating a 10.5 ton reserve. Additional materials were deployed at four test plots: 40 concrete-coated bamboo spat sticks, six wire bundles, 16 steel drum frames, and 20 oyster balls.

GADNR conducts monitoring at all oyster reef sites to ensure project objectives were achieved. In June 2015, a GADNR Oyster Restoration Monitoring Plan was created for implementation in July and October 2015. Test plots were monitored to document changes in larval recruitment and sedimentation rates by observing variations in recruitment in relation to: 1) material type; 2) distance from marsh edge; and 3) distance from mean low water. Maintenance, enhancement, and restoration sites were monitored to document 1) sediment accretion within the

reef footprint; 2) reef height; 3) oyster and spat densities; 4) oyster size-frequency distributions; 5) enhancement of adjacent habitats; and 6) density of selected species and faunal groups. All sites were permitted through the state CMPA No. 600, and federal US ACOE Nationwide No. 27 and No. 5. In addition to these oyster project sites providing essential fish habitat, improved water quality, and bank stabilization they also serve as excellent locations for education and outreach projects showcasing restoration of shellfish in Georgia's estuarine waters.

Florida

Kent Smith, FL Fish and Wildlife Conservation Commission

Habitat Restoration at Fishery Enhancement Ecocenters

Florida has embarked on the Florida Marine Fishery Enhancement Initiative (FMFEI) to create a regional network of centers conducting work on restoration and enhancement of both marine sport fisheries and the habitats on which those fisheries depend, along with providing opportunities for environmental research, education and outreach (*http://fmfei.org/*). One of the first habitat focused restoration projects was recently completed at the New Smyrna Beach site near Daytona Beach, Florida. The site became one of many properties around the state named as a Marine Enhancement Center (MEC).

The 22-acre New Smyrna site includes some submerged lands which contain saltmarsh. According to maps from the 1800s, the entire property was historically saltmarsh. In 2013, the Florida Fish and Wildlife Conservation Commission (FLFWCC) and partners secured funding from NOAA's Habitat Restoration program to conduct restoration in northeast Florida on habitats such as oyster reefs, seagrass beds, and saltmarshes. The grant included funds to restore 5 acres of New Smyrna MEC property to its original saltmarsh state.

Over a five-month period in 2014, excavators removed over 45,000 cubic yards of fill material from the northwest corner of the property (site of the old high school track and field). Crews carefully graded the new marsh surface and its slopes to the upland in order to provide the perfect substrate for native plants. As work progressed, dozens of volunteers planted over 25,000 native plants to jumpstart the natural community. Along the new slope, crews constructed various shoreline stabilization features such as seawalls and terraces to showcase erosion-control techniques. Fill material was placed into three features on the property: an overlook mountain, a future building pad and an amphitheater.

The project's objectives include:

- Restore five acres of the property to historic saltmarsh habitat.
- Plant the restored saltmarsh with native species
- Provide a demonstration area for shoreline stabilization techniques.
- Use the new saltmarsh for research, education and outreach .
- Harvest native plants from the new saltmarsh and use them for regional restoration projects.

Smooth cordgrass planting units from the restored marsh are currently being harvested and outplanted at a regional marsh restoration project site in an adjoining county.

Florida Livingshoreline Website

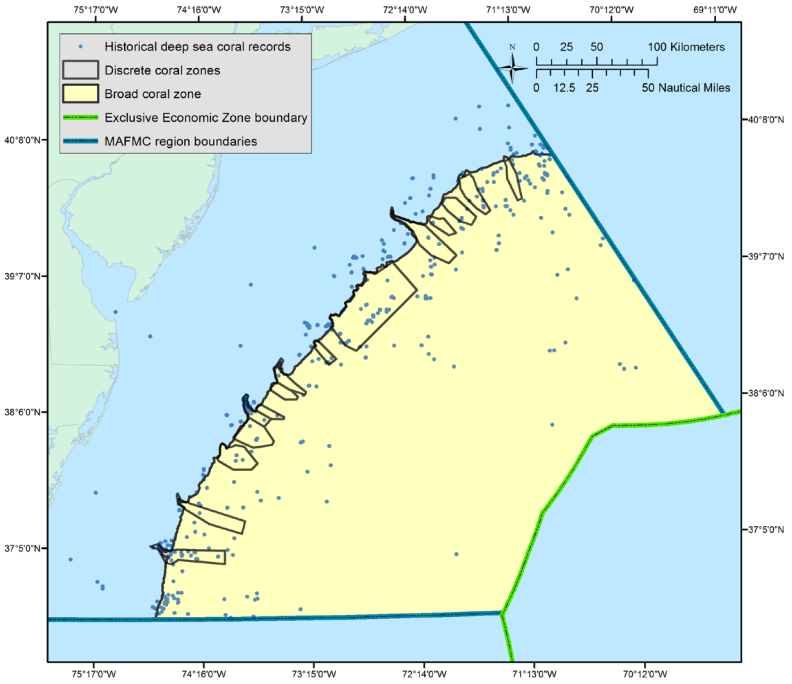
A number of state, federal and NGO organizations have completed a working draft of a living shoreline website for private property owners interested in learning more about the use of living resources to stabilize their property bordering on estuaries in Florida. Although work is being conducted to improve the website, it is on-line and being

used by the public, contractors and resource managers. The goal of this website is to provide resource information and points of contact to help private property owners implement living shorelines as an alternative to other shoreline armoring approaches. With much of certain parts of Florida's estuaries seawalled and with the pending push to protect private property from sea level rise, living shorelines are viewed as a means to maintain connectivity across estuarine to terrestrial landscapes, provide room for migration of habitats, maintain and enhance productivity in the estuaries, all while providing erosion protection to the property owner. *http://floridalivingshorelines.com/.*

New England Fishery Management Council

Michelle Bachman

During the April and June 2015 meetings, the New England Fishery Management Council took final action on Omnibus Essential Fish Habitat Amendment 2. The amendment updates the habitat provisions of all of the Council's fishery management plans. Changes include revised essential fish habitat designations and new habitat area of particular concern designations. The intent of these designations is to highlight important fish habitats so the Council can better protect these areas via its management actions, and the NOAA Fisheries can best focus its habitat conservation recommendations for federally-permitted projects.

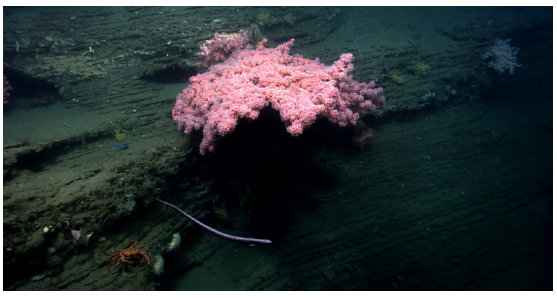


Selected discrete zones and an approximated broad zone.

Often multiple species of invertebrates are found co-occurring on rock ledges and canyon walls. Here a brisingid sea star, an octopus, bivalves, and several individuals of the cup coral, Desmophyllum, are found in close proximity to one another. (Source: Deepwater Canyons 2013 - Pathways to the Abyss, NOAA-OER/BOEM/USGS)

The amendment also revises the Council's system of gear restricted habitat management areas, which are intended to protect seabed habitats from negative impacts associated with fishing gear use. These areas encompass complex, structured seabed, and include restrictions on mobile bottom-tending gears, i.e. dredges and trawls.

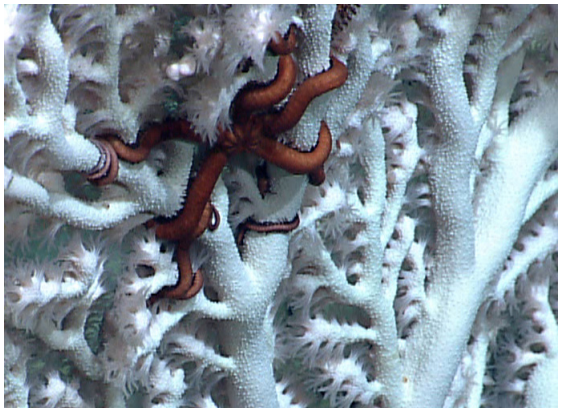
In addition, the amendment designates a new groundfish spawning area in Massachusetts Bay, and two new habitat research areas, one on Stellwagen Bank and one on Georges Bank. Some longstanding year-round closures on Georges Bank were either eliminated (Nantucket Lightship Closed Area) or made seasonal (Closed Area I and Closed Area II). In the Gulf of Maine (GOM), both the Western GOM Closure Area and the Cashes Ledge Closure Area were kept in place year-round, although the boundary of the Western GOM closure was moved five miles to the west.



One of the large colonies of bubblegum coral ROV Deep Discoverer imaged in Norfolk Canyon. (Source: NOAA Okeanos Explorer Program, Our Deepwater Backyard: Exploring Atlantic Canyons and Seamounts)

Council staff are in the process of revising the Habitat Amendment Environmental Impact Statement and fishery management plan amendment document, and will submit it to NOAA Fisheries for review early this fall. The final EIS and proposed regulations should be available for public comment early next year. The changes

adopted in the amendment, if approved by NOAA Fisheries, are expected to be implemented during summer 2016. A concise summary of the measures in the amendment can be found in the June Council newsletter: *http://s3.amazonaws.com/nefmc.org/CouncilReptrev_6.pdf.*



A red brittle star occupies a beautiful white octocoral. (Source: NOAA Okeanos Explorer Program, 2013 Northeast U.S. Canyons Expedition.

Once the Essential Fish Habitat (EFH) amendment is submitted, the Council will turn its attention to an amendment to protect deep-sea corals in the New England region. Coral protection areas have been identified in the Gulf of Maine, in the Georges Bank canyons, and on the New England Seamounts. The measures for this amendment have largely been developed (*see http://s3.amazonaws.com/nefmc.org/June_2012_Coral_Alternatives.pdf*), but will be reviewed in the coming months in light of many recent advances in the scientific understanding of corals and coral habitats in New England.

Finally, in the near term, the Council may initiate an action to develop hydraulic clam dredge exemption areas within some of the habitat management areas recommended in the EFH amendment. During final action on the EFH amendment, the Council recommended a one-year exemption for this gear type in two new habitat management areas overlapping Georges Shoal and Nantucket Shoals. This short-term exemption was designed to allow for a more thorough evaluation of the issue in a trailing management action.

Mid-Atlantic Fishery Management Council

Jessica Coakley

In June 2015, the Mid-Atlantic Fishery Management Council approved an amendment to protect deep sea corals from the impacts of bottom-tending fishing gear in the Mid-Atlantic. If approved by the Secretary of Commerce, the amendment will create "deep sea coral zones" in areas where corals have been observed or where they are likely to occur. Within these zones, fishermen will not be allowed to use any type of bottom-tending fishing gear such as trawls, dredges, bottom longlines, and traps. In total, the areas proposed for deep sea coral zone designation encompass more than 38,000 square miles – an area nearly the size of Virginia.

Most deep sea corals are slow-growing and fragile, making them vulnerable to damage from certain types of fishing gear that come in contact with the sea floor. Under the Magnuson-Stevens Act, regional fishery management councils have the authority to designate zones where, and periods when, fishing may be restricted in order to protect deep sea corals. This provision has been in place since 2007, but the Mid-Atlantic Council will be the first of the eight councils to exercise this authority to designate deep sea coral zones.

The measures approved by the Council include the designation of fifteen "discrete coral zones," which are areas of known or highly likely coral presence. Most of these areas are located around underwater canyons or slope areas along the continental shelf edge. Secretarial review of the amendment will involve a thorough review of the proposed measures by NOAA Fisheries, including further opportunities for public comment.

NOAA Fisheries

Southeast Regional Office

Pace Wilber

While development of offshore wind farms in the southeastern U.S. has lagged development seen in the northeastern U.S., several significant efforts are underway. BOEM Renewable Energy Task Forces for North Carolina, South Carolina, and Florida met during the past year. For the North Carolina, BOEM released a draft Environmental Assessment (EA) covering three Wind Energy Areas, including two near the entrance to the Port of Wilmington, and expects to finalize the EA before 2016. For South Carolina, a draft EA is expected before 2016 and to describe as many as four Wind Energy Areas, including one abutting a North Carolina area. Efforts in Florida focus on harnessing the power of the Gulf Stream Current offshore from Fort Lauderdale. Staff from NOAA

Fisheries serve on each of these BOEM task forces as well as a task force focused on streamlining regulatory processes in South Carolina; this task force is funded by the Department of Energy (DOE) and the South Carolina Energy Office. South Carolina also is home of the Clemson University SCE&G Energy Innovation Center, a $98M facility ($45M from DOE and $53M of private and state contributions) to accelerate development and deployment of new wind turbine technology primarily through building and operating a facility capable of full-scale, highly accelerated testing of next-generation wind turbine drive-train technology.

Greater Atlantic Regional Fisheries Office

Lou Chiarella

This past summer marked the start of construction of America's first offshore wind farm, which includes five 6-megawatt turbines within state waters off Block Island, Rhode Island. NOAA Fisheries Habitat Conservation Division was involved with this project at the earliest stages, since 2009, working with Deepwater Wind, the US ACOE, and the state of RI. Through early coordination we were able to ensure eelgrass impacts were avoided and impacts to hard bottom habitat were significantly minimized by providing technical assistance during siting of the cable route. We worked with the state to ensure implementation of a robust fisheries survey, including a total of 6 years of trawl survey data (pre-, during, and post-construction) as well as ventless trap lobster surveys. We also recommended comprehensive noise monitoring and mitigation measures and benthic monitoring of potential impacts to hard bottom habitat from vessel anchoring near the turbine site.

Acronymns Defined

ACFHP	Atlantic Coastal Fish Habitat Partnership
APNEP	Albermarle-Pamlico National Estuary Partnership
ASMFC	Atlantic States Marine Fisheries Commission
BOEM	Bureau of Ocean Energy Management
Call	Call for information and nominations
CHPP	Coastal Habitat Protection Plan
CT DEEP	Connecticut Department of Energy and Environmental Protection
DCM	Division of Coastal Management
DENR	Department of Environment and Natural Resources
DMME	Department of Mines, Minerals and Energy
DOE	Department of Energy
DOI	Department of Interior
DPP	Draft Proposed Program
DRED	Department of Resources and Economic Development
DWR	Division of Water Resources
E&P	exploration and production
EA	Environmental Assessment
EBTJV	Eastern Brook Trout Joint Venture
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESP	Environmental Studies Program
FFE	Fishing for Energy
FMFEI	Florida Marine Fishery Enhancement Initiative
G&G	geological and geophysical
GADNR	Georgia Department of Natural Resources
GBNERR	Great Bay National Estaurine Research Reserve
GOM	Gulf of Maine
HRG	high resolution geophysical
IFFF	International Federation of Fly Fishers
LID	Low Impact Development
MDDNR	Maryland Department of Natural Resources
MEC	Marine Enhancement Center
MMP	Marine Minerals Program
NCCF	North Carolina Coastal Federation
NCCF	North Carolina Coastal Federation
NEIWPCC	New England Interstate Water Pollution Control Commission
NERRS	National Estaurine Research Reserve System
NFHP	National Fish Habitat Partnership
NGO	Non-governmental organization
NHFGD	New Hampshire Fish and Game Department
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NWR	National Wildlife Refuges
NYSDEC	New York State Department of Environmental Conservation
OCS	outer continental shelf
PEP	Pre-construction Engineering and Design
PREP	Piscataqua Region Estauries Partnership
RFI	Request for Information
RI DEM	Rhode Island Department of Environmental Management
ROD	Record of Decision
SABMA	South Atlantic Bight Marine Assessment
SARP	Southeast Aquatic Resources Partnership
SAV	submerged aquatic vegetation
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SLAMM	Sea Level Affecting Marshes Model
SUNYSOMAS	State University of New York School of Marine and Atmospheric Sciences
SWMP	System-wide monitoring program
UNH	University of New Hampshire
UNH GRANIT	University of New Hampshire Geographically Referenced Analysis and Information Transfer System
USACOE	US Army Corps of Engineers
USFWS	US Fish and Wildlife Service
VMRC	Virginia Marine Resources Commission
VOWTAP	Virginia Offshore Wind Technology Advancement Project
WEA	Wind Energy Area

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Based on our review/recommendations, Deepwater Wind set up "no anchoring" zones to ensure substantial hard bottom areas were avoided during construction. Our EFH recommendations were provided to the USACOE in July 2013 and the permit, issued in September 2014 included all of our recommendations. We expect to gain valuable information from this project which will help with our review of larger offshore wind development projects in federal waters off the Northeast. (Sue Tuxbury, *Susan.Tuxbury@noaa.gov*).

HABITAT PROGRAM MISSION

To work through the Commission, in cooperation with appropriate agencies and organizations, to enhance and cooperatively manage vital fish habitat for conservation, restoration, and protection, and to support the cooperative management of Commission managed species.

REPRODUCTIONS

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