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DMF News

Published by the Massachusetts Division of Marine Fisheries (DMF) to inform and educate its constituents on matters relating to the conservation and sustainable use of the Commonwealth's marine resources.

Inside

A lobster in a retail market.

From the Director's Desk

"Red-Listing" of Lobster: Misguided and Counterproductive

In September, the California-based Monterey Bay Aquarium's Seafood Watch "red-listed" American lobster caught in the U.S. and Canada. Seafood Watch claims that the lobster fishery poses an entanglement risk to endangered North Atlantic right whales and recommends that consumers avoid purchasing lobster. The red-listing was also extended to all fisheries in the Northeast that deploy vertical buoy ropes that could entangle wildlife such as right whales and leatherback turtles.

This unfortunate decision is counterproductive to ongoing efforts by DMF and the industry to further reduce entanglement risk. Throughout this past November, state and federal officials working with teams of fishermen met to devise plans to further reduce entanglement risk as mandated by recent federal court decisions. Then, in early December, the federal Large Whale Take Reduction Team met for two days to review and combine these into regional strategies affecting all East Coast fixed gear fishermen.

DMF Updates Commercial Permitting System

DMF's commercial permitting system is undergoing a much needed rebuild for 2023. After over 20 years in service, the old system has outlived its useful technological life. DMF staff have been working with state IT resources for nearly two years designing and building the new system. The new permitting system will include all details of commercial harvester, seafood dealer, and special (e.g., aquaculture, propagation, scientific collection, etc.) permits. In the long run, the new system will be more efficient for DMF staff and customers, including future online permit issuance and renewal capabilities.

Advising consumers NOT to buy lobsters, crabs, and fish taken with buoyed fixed fishing gears is a colossal mistake. As fishermen are adjusting to new regulations and making personal sacrifices, they need our support. Fishing will become less profitable due to the costs incurred by the need to comply with complex regulations to protect right whales. This is not the time to strip the industry of much-needed revenues for their hard and honest work delivering seafood. This is not the time to turn our backs on these small-scale, owner-operated, family businesses. If consumers heed the call to boycott these fish and shellfish, our local fisheries may not survive. The economic, cultural, and historic value of these fisheries would be lost.

Consumers need to have confidence in the seafood industry and know that hard-working, honest, and innovative fishermen are solving these problems. Seafood Watch's inclusion of the Massachusetts lobster fishery in the blanket red-listing of the entire U.S. and Canadian lobster fishery ignores data provided by DMF to explain state fishery management and right whale conservation measures. It also ignores substantial conservation steps undertaken by DMF and the state lobster fishery to prevent and mitigate entanglements.

Massachusetts lobster fishing regulations are stricter than any other jurisdiction in the United States. Lobster harvesters are required to remove all fixed gear from the water from February 1 through May 15, when right whales are abundant in Massachusetts waters (with the possibility of an extension of closure depending on whether right whales stay longer). During the open season, when right whales are rarely seen in Massachusetts waters, lobster fishers are required to use "weak rope," with breakaway links built in, that has a high probability of parting should a whale encounter it. The development of this weak rope was pioneered by the lobster fishery. It is scientifically designed to be in a pragmatic "sweet spot"; strong enough for the traps to be hauled, yet weak enough to break if right whales encounter it. Finally, all buoy lines used in the U.S. lobster fishery are now required to be marked to reveal geographic origin. The marking scheme required for the Massachusetts lobster fishery is more distinctive than any other jurisdiction. Should a future entanglement occur, DMF will be able to determine if it is due to Massachusetts-based lobster gear and will be able to take appropriate actions to prevent future entanglements.

All of these reforms and improvements have been made in consultation and cooperation with the fishing community. All have required adjustments and sacrifices, and all have come with costs. Massachusetts fishermen have proven time and again that they are committed to fishing in ways that will protect right whales, and maintain a fishery and habitat for the next generation. For these historic and heroic fishermen to be demonized by a blanket "red-listing" that does not account for their responsible behavior is unconscionable.

These incremental, successful efforts are very different from proposals now surfacing to create what is called a "ropeless" fishery, trying to eliminate any vertical lines that identify pot and gear locations on the ocean floor. "Ropeless" is far from a panacea. It is expensive, and while technically it can work, it creates myriad practical problems on the water in terms of gear conflict, safety, and enforcement issues; viable "ropeless" technology and best practice is probably at least a decade away. In the meantime, the leadership shown by Massachusetts lobstermen should be adopted everywhere, and that, not driving them out of business, is the best step forward and the best way to protect right whales -- right now.

We at DMF are committed to the recovery of the endangered North Atlantic right whale and appreciate that many conscientious seafood consumers want to support marine conservation goals by choosing sustainable seafood. We also do not want to lose these culturally important legacy industries along our waterfront. We will continue to work to keep fishers fishing and delivering the best and healthiest seafood anywhere. DMF's Seafood Marketing Program will work to educate the public on our conservation endeavors and continue to encourage the consumption of our healthy, local, sustainable and fresh seafood.

By Dan McKiernan, Director of DMF

Protected Species Update

The Atlantic Large Whale Take Reduction Team met in late November and early December to assist NOAA Fisheries in developing additional conservation measures for right whales. The goal is to reduce entanglement risk to right whales by 88 to 93% coastwide in the lobster, gillnet, and other trap fisheries relative to a 2017 baseline (known as Phase 2). The September 2021 modifications to the Take Reduction Plan (Phase 1) achieved a 47% risk reduction coastwide for the lobster and Jonah crab fishery, which represents the vast majority of risk. Concurrent with this federal action, the Division of Marine Fisheries implemented a suite of protected species regulations in 2021 in support of our draft Habitat Conservation Plan for an Incidental Take Permit under the Endangered Species Act. These proactive conservation measures mean that going into Phase 2 deliberations, risk reduction in Massachusetts state waters by trap fisheries is already at 85.8%. The additional risk reduction actions being explored by the Team for coastwide measures include line reduction, effort reduction, weak line, and seasonal closures. A federal judge has recently ordered that NOAA Fisheries must finalize amendments to the Take Reduction Plan by December 2024 that will get serious injury and mortality of right whales to below Potential Biological Removal within 6 months of the rule. The proposed rule will be released in mid-2023 for public comment.

In 2023, DMF will continue its gear removal efforts during the seasonal trap closure in collaboration with law enforcement and commercial fishermen. Ensuring that gear is removed from the water column when right whales are present is vital to preserving the conservation benefits of the gear closure. In addition, we will also be continuing to distribute weak rope and gear marking materials in support of the right whale conservation measures for buoy lines. Dates and locations for those events are still being finalized but will primarily occur in the first half of 2023. DMF will contact permit holders prior to those distribution and outreach events.

By Erin Burke, Protected Species Specialist

Cod Research in Massachusetts and the Release of a New StoryMap

Juvenile cod caught on the Industry-Based Survey.

By the time Pilgrims arrived in Plymouth, Massachusetts in 1620, the most prominent feature along the coast had already been known as Cape Cod for a generation. Cod fishing was North America's first industry and is still a central part of our heritage. Once an emblem of pride and prosperity, the cod fishery of today is drastically different, challenged by declining populations, warming ocean temperatures, and lost spawning grounds. No one group has all the answers for fixing these issues, but the Massachusetts Division of Marine Fisheries contributes extensive research to help improve stock assessments and fishery management.

Because of the multispecies nature of this fishery, a low cod quota acts as a "choke stock" for most fishermen, preventing them from accessing their available catch allocation of more abundant stocks. In other words, when fishermen use up their cod allocations, they are faced with an unfortunate choice: either cease fishing for the year or lease quota from others at exorbitant rates that often exceed the market price of the fish. For this reason, much attention has been focused on the credibility of the stock assessments that catch limits are based on. Many fishermen find it hard to believe that such extreme conservation measures are necessary.

Industry Based Survey

To help understand these different perspectives on the status of the cod stock, DMF initiated a new bottom trawl survey to address many of the questions underlying the fishing industry's disbelief in stock assessments. Through several meetings with fishermen and scientists, we developed a survey approach to intensively sample the core area for Gulf of Maine cod using standardized equipment and practices aboard commercial fishing vessels, but according to a randomized design that provides scientific credibility.

This effort, known as the Industry-Based Survey (or IBS), completed over 3,500 standardized tows from Chatham, MA to the Canadian border and collected biological data, such as length, age, sex, and maturity from over 100,000 individual cod. Both the IBS and the stock assessment agree that Gulf of Maine cod have declined dramatically in recent years. However, the survey disagreed with the assessment on age distribution of the population, which may be contributing to consistently poor management outcomes. The datasets generated by the IBS are being used in various ways to improve how we assess and manage cod in the Gulf of Maine.

Protecting Spawners

Understanding the occurrence and persistence of spawning grounds is critical to the protection of cod stocks. Atlantic cod reproduce in dense aggregations that form at specific locations and seasons. This predictability and abundance make spawning cod an easy and lucrative fishing target, but also vulnerable to disruption. A complex sequence of behaviors takes place prior to mating and intense fishing pressure can cause cod to abandon a spawning ground, essentially canceling reproduction at that site for the year. Many spawning grounds in the Gulf of Maine have been lost entirely. The future of the cod stock, and the fishery that it supports, relies on the continued existence of the remaining spawning aggregations - we need to let these fish complete their life cycle.

In addition to interviewing knowledgeable fishing captains, DMF scientists use high-tech tools like acoustic telemetry, autonomous underwater vehicles, and marine sound recorders to identify and map cod spawning grounds. In collaboration with commercial fishermen, NOAA, the Nature Conservancy, and the University of Massachusetts, we have now described all the cod spawning grounds known to remain in the Gulf of Maine and on Georges Bank. From this work, closed areas and seasons have been created that allow spawning cod the time and space they need, while minimizing the impact to our fisheries.

Improving Assessments

Wild fish populations are constantly subject to change. A primary goal of fishery management is to respond to these changes, regulating harvest to ensure the sustainability of the resource. To do this, we must accurately measure population change over time. This is the fundamental purpose of a stock assessment – to act as a mathematical 'model' of the fish population that can inform harvest regulations.

Age-based stock assessment models are the best available tool for setting catch limits. Although these state-of-the-art models incorporate a wide variety of data from the fishery and scientific surveys, there are many assumptions that must be made. It is critical to get these assumptions as correct as possible, or else the resulting harvest regulations will cause undue harm to the fish population, the fishery, or both.

A critical first step when assessing a "stock" of fish is to define its boundaries. The goal is to identify the limits of where the fish population completes its life cycle. For the past 40 years, cod in US waters have been separated into two stocks: Gulf of Maine and Georges Bank. A recent in-depth review of cod stock structure is re-drawing this map, which now includes five genetically-distinct stocks. MADMF research was integral to this effort.

One of the most difficult challenges confronting stock assessment and fishery management is the presence of two overlapping cod stocks in the Western Gulf of Maine. These two groups of fish maintain reproductive isolation by spawning at opposite times of year, yet intermix when not spawning. MADMF scientists developed a method to identify which group these cod belong to by examining calcified structures known as otoliths found inside fish skulls.

Not all sizes of cod are vulnerable to capture by the fishery. For example, smaller fish can escape through the large mesh netting used for gillnets and trawls. Alternatively, large adult cod become less vulnerable to capture when spawning grounds are closed to fishing. This size or age-based vulnerability to capture is known as "fishery selectivity" and is a key variable in a stock assessment model. To make the math simpler, assumptions are often made about the shape of the selectivity "curve" and how it varies over time. Using the Industry-Based Survey dataset, MADMF scientists have independently estimated the size selectivity of the Gulf of Maine cod fishery, demonstrating that assumptions used in the past need to be updated.

One way to check the assumptions of a stock assessment is to compare the results to independent estimates of population size. This is typically done by extrapolating the catch rates observed in a trawl survey to the entire stock area. However, for these population estimates to be credible, the behavior of fish when confronted by the survey trawl needs to be accounted for. Using carefully-designed experiments, sidescan sonar, and machine learning, we estimated the "herding effect" of the IBS trawl net, as well as the escapement of small fish beneath its footrope. These measures of trawl efficiency have allowed DMF scientists to provide realistic estimates of the size, trend, and age distribution of the Gulf of Maine cod stock. Although the assessment and Industry-Based Survey agree that the stock has declined dramatically in recent decades, they differ on the population age distribution, which may be related to the assessment assumptions about fishery selectivity.

DMF biologist Bill Hoffman holding a large cod caught during an Industry-Based Survey.

Reducing Cod Bycatch and Discard Mortality

Over the past 5 years, more than half of the cod removed from the Gulf of Maine came from recreational angling. Most of these fish were never actually brought home for dinner – instead, they died from capture-related injuries after being released. Due to strict limits on the numbers, size, and seasons for recreationally caught cod, there are many reasons why cod must be discarded. Understanding how many of these fish survive after being released is critical to fishery management and stock assessment. Working with our scientific partners (the New England Aquarium, University of New England), DMF has developed state-of-the-art methods to estimate discard mortality and to identify the factors influencing survival.

One clear way to reduce the number of cod that die after release is to avoid catching them in the first place. This sounds much easier to do than it is. Cod and haddock (a close relative) share similar habitats and are often caught together by the fishery. As cod fishing rules have tightened with the declining population, unprecedented growth in the haddock stock has attracted recreational anglers back out to sea. Discarded bycatch of cod by haddock anglers is now a leading source of mortality for the cod stock.

Using the Industry-Based Survey dataset, DMF has identified times and areas with excellent haddock fishing, but little cod bycatch. This information has been summarized in an easy-to-understand Recreational Haddock Guide that is available online, in print, and via a location-aware smartphone app. Before being released to the public, the Haddock Guide maps were rigorously tested by charter boat captains who reported their catch rates of cod and haddock from over 800 locations. A fleet of citizen scientists continue to test the Haddock Guide maps each year, making sure they are still relevant.

Understanding Perspectives

Although the Industry-based Survey and stock assessment agree that Gulf of Maine cod have declined by 80% over the past decade, most fishermen believe the stock has increased. How can this be? DMF scientists are trying to answer this question by examining the relationship between population size, regulations, catch rates, and fishery perceptions.

As the stock declined and access to fishing grounds ("days-at-sea") were cut, the amount of cod that could be landed each day was increased several times to reduce the wasteful discarding of fish. Understandably, this led fishermen to target cod more, which caused catch rates to increase while the stock declined. Although a switch to annual catch limits in 2010 has now aligned the incentive to target cod with the population size, the influence of past management choices is still impacting fishery perceptions today.

Not all sizes of cod have declined at the same rate. Recent poor-year classes mean less juvenile cod and a high mortality rate means fewer large cod than in previous decades. The lack of juvenile cod goes unnoticed by fishermen because they are required to use large mesh nets and hooks that only catch adults. Additionally, fishermen are unable to witness the loss of the largest cod because they are prohibited from accessing spawning grounds and other prime habitat. The medium-sized cod ("scrod" and "markets") most frequently caught by the fishery have declined the least, particularly along the Massachusetts coast. A decrease in the minimum fish size in 2013 has allowed the fishery to land more of these fish, adding to the perception of an increase.

Stakeholders and policy makers should recognize this unavoidable influence that regulations have on fishery perceptions. We are hopeful that by offering a translation between the scientific and and fishery perspectives, each group can acknowledge the validity that underlies the other, and future conflict can be avoided.

The Future of Cod

The research conducted by DMF and our partners has significantly advanced the understanding of cod population dynamics. From creating spawning closures to re-defining stock boundaries to accounting for discard mortality, our findings are already being applied at multiple levels to improve fishery management and stock assessments. We are hopeful that these changes will help alter the trajectory of the cod stock and ultimately improve the conditions for our struggling fishery. However, many important questions remain to be answered and we will continue to use our expertise to identify and fill these critical knowledge gaps.

StoryMap

A new online StoryMap was recently created to showcase the various cod-focused research projects that have been completed by DMF over the past decade. The StoryMap offers an immersive multimedia experience that includes photos, videos and sounds collected from both above and below the water's surface. Follow along as we use electronic tracking, underwater drones, sidescan sonar, machine learning, and citizen science to reveal the fascinating lives of Atlantic cod. The StoryMap can be found here: https://www.mass.gov/info-details/cod-research

Cover of the online StoryMap.

By Micah Dean, Senior Marine Fisheries Biologist

The Various Aspects of DMF's Resource Assessment Project

DMF's Resource Assessment Project is responsible for two long-term, fishery-independent surveys conducted in Massachusetts coastal waters. A seine survey has been conducted every year since 1976 and was designed to monitor young-of-the-year winter flounder recruitment within several estuaries in southern Cape Cod. Spring and fall bottom trawl surveys have been conducted since 1978 to monitor marine resource stocks in offshore waters. Both surveys provide a consistent record of population trends and marine resource presence over time.

Seine Survey

The seine survey is an annual fixed station survey designed to catch newly settled young-of-the-year winter flounder, and is conducted in Great Pond (Falmouth), Waquoit Bay/Eel Pond (Falmouth/Mashpee), Cotuit, North and West Bays (Barnstable), Lewis Bay (Barnstable/Yarmouth), Bass River (Yarmouth/Dennis), and Stage Harbor/Oyster Pond (Chatham) over nine days from mid-June through early July. The number of stations sampled in each estuary is proportional to the total area of each estuary.

Sampling occurs during daylight hours within two hours on either side of high tide. At each station, three replicate seine hauls are conducted using a 21' x 8' seine net with 3/16" mesh, set parallel to the shoreline in waist deep water. Area fished is calculated by using the distance from shore to the net and net width is consistently maintained using a restrictor line extended between the ends of the headrope. Once set, the ends of the seine are pulled toward the beach at a consistent and steady pace until the net is entirely on land. The entire catch is sorted by species, counted, and immediately released back into the water. The next replicate haul is made down the shoreline into the prevailing current. On occasion, factors such as sediment transport, vegetation growth, or anthropogenic disturbance (construction of seawalls and docks, watercraft, dredging, beachgoers, etc.) can interfere with the completion of all three hauls.

Bottom Trawl Survey

The spring and fall trawl surveys are used to monitor fish and invertebrate resources in offshore waters of Massachusetts. The spring survey was designed to intercept adult finfish when they move inshore to spawn, while the fall survey was intended to monitor juvenile finfish prior to their migration beyond state waters. The survey area is separated into five regions and stratified by depth. A stratified random survey design is used to select tow locations and each stratum has an assigned number of tows proportional to its total area. There are 103 stations randomly selected for each survey. The vessel follows the same general pattern to complete all stations, though there is variation due to weather. From 1978–1981, the surveys were conducted aboard the F/V Frances Elizabeth. From 1982–present, the NOAA R/V Gloria Michelle has been used. NOAA officers and contracted crew are responsible for operating the vessel and handling the fishing gear. The fishing gear has been consistent since the beginning of the survey.

Sampling occurs during daylight hours over a three-week span in May and September respectively. The net is towed at a speed of 2.5 knots for a planned 20-minutes at each station. Bottom water temperature is logged on the net for the duration of each tow. At the end of each tow, the net is retrieved, and all catch is separated and enumerated by species. Total collective-weights are recorded for each species and length measurements are recorded from a representative sample. For species subject to fisheries, individual fish are sampled to determine weight, sex, and maturity, and to collect age structures (i.e., scales, otoliths, fin spines). In addition to normal protocols, we also support other researchers by collecting whole animals, tissue and structure samples, or environmental data. Depending on logistics, station locations, and weather, 5–10 sites are completed each day and the surveys are usually completed in 17–18 days.

Importance of Survey Data

Fisheries independent survey data are important to inform assessments because they can differ from fisheries data. Unlike fisheries dependent data, where information can be confined to areas that fishermen are targeting a resource, fisheries independent surveys examine the whole resource area. Because all aspects of our surveys are kept consistent, fluctuations are indicative of changes in resource abundance or biomass within the survey area. The spring and fall trawl surveys are used for stock assessments of both recreationally and commercially important species. Abundance trends from the seine survey are used for winter flounder and summer flounder stock assessments.

Our surveys provide a long time-series with consistent annual timing, and consequently, the data can also be used to inform ocean planning and investigate species shifts over time. Ocean planning projects compile information about which species utilize which habitats. When marine development projects are proposed, the data are reviewed to consider the potential impacts on habitats and fisheries. In addition to ocean planning, there are also inquiries about changes in species habitat preference. There are two common types of requests related to species shifts. One type is looking for evidence of a species shifting habitat preference within our survey area, such as shifting to different strata or regions. The second type is related to new species detection. As ocean waters in our region warm, there are increased requests about occurrence of species traditionally seen elsewhere.

Survey Trends

The trawl survey has caught a total of 203 different species in the spring and fall surveys combined. The spring survey has caught 125 different species while the fall survey has identified 196. Over the last decade each survey continues to catch individual species for the first time. In recent years, the new species observed in the spring survey tend to be species that have already been encountered in the fall survey such as clearnose skate, hickory shad, naked goby, greenland halibut, hogchoker, and spot. The new species encountered in the fall survey over the last decade tend to be species associated with warmer waters. Those species include red snapper, sharksucker, cownose ray, blotched swimming crab, pinfish, northern stargazer, harvestfish, spiny butterfly ray, Atlantic stingray, and smooth puffer.

Following each survey, a series of audits are completed on all recorded observations. By weight and count, scup was the most observed species in both surveys in 2021. Scup has been the most abundant species in the last five completed spring surveys and three of the last five completed fall surveys. In the spring of 2021, the total weight of scup exceeded all other species weights

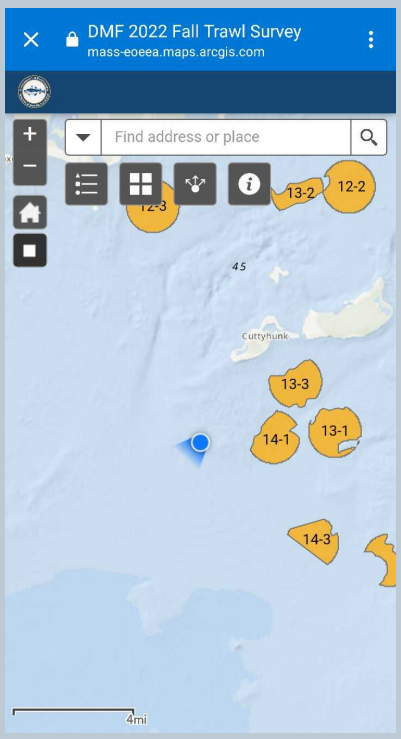
Spring 2021			Fall 2021		
Common Name	Count	Weight (kg)	Common Name	Count	Weight (kg)
Scup	52,656	11,716	Scup	356,581	3,107
Northern Searobin	7,265	1,380	Winter Flounder	3,392	733
Winter Flounder	4,442	691	American Lobster	1,352	637
Longhorn Sculpin	3,442	511	Yellowtail Flounder	2,360	472
Little Skate	893	467	Butterfish	32,320	458
Ocean Pout	889	348	Red Hake	3,428	428
Silver Hake	3,534	288	Little Skate	721	385
Winter Skate	513	269	Smooth Dogfish	364	291
Yellowtail Flounder	1,138	234	Longfin Squid	33,874	285
American Lobster	610	204	Winter Skate	229	255
Butterfish	3,507	150	Roughtail Stingray	3	229
Red Hake	1,426	147	Summer Flounder	376	226
Black Sea Bass	493	146	Silver Hake	1,557	139
Summer Flounder	320	143	Longhorn Sculpin	903	99
Atlantic Rock Crab	827	137	Black Sea Bass	3,312	84
Windowpane	477	97	American Plaice	876	82
Tautog	132	96	Spiny Dogfish	51	77
Horseshoe Crab	74	85	Windowpane Flounder	428	75
Spider Crab	678	84	Atlantic Rock Crab	577	60
Smooth Dogfish	28	83	Weakfish	1,018	52

Top 20 species caught by weight in the bottom trawl survey during the spring and fall 2021 cruises.

combined and accounted for approximately two-thirds of all survey biomass. Despite the total observed weight of scup being greater in the spring survey, there were almost seven times more individual scup observed in the fall survey. This is an example of a species that the survey detects the larger spawning fish in the spring survey and the resulting juvenile fish in the fall survey. Recent scup trends have been driven mostly by observations occurring in Nantucket Sound.

Survey Support

To accomplish the surveys each year requires a lot of help and support. In addition to all the staff of the research vessel, research scientists, and technical assistance, we also rely on help from the fishing industry. To aid in site completion of the trawl survey, fixed gear fishermen are notified to relocate their gear prior to the planned survey date at each station. All station locations are posted weeks ahead of each survey. In recent years a live GIS map has been posted on the DMF website. The live map is updated daily with all completed stations removed. As an aid to relocating fixed gear, there is an interactive feature that allows mobile devices to display current location on the map. This allows users to view where they are in relation to our survey sites while at sea. Once stations are completed, all gear can be returned to the area. In addition to removing completed sites from the live map each day, email updates are sent to anyone interested. This support is critical because dense clusters of fixed gear prevent the survey from towing at planned stations.



Example of the interactive survey site location map; the blue dot is mobile device location and orange shapes are survey sites.

By Steve Wilcox and Vincent Manfredi, Resource Assessment Project

Good News from the Striped Bass Assessment Update, but Management will Proceed Cautiously

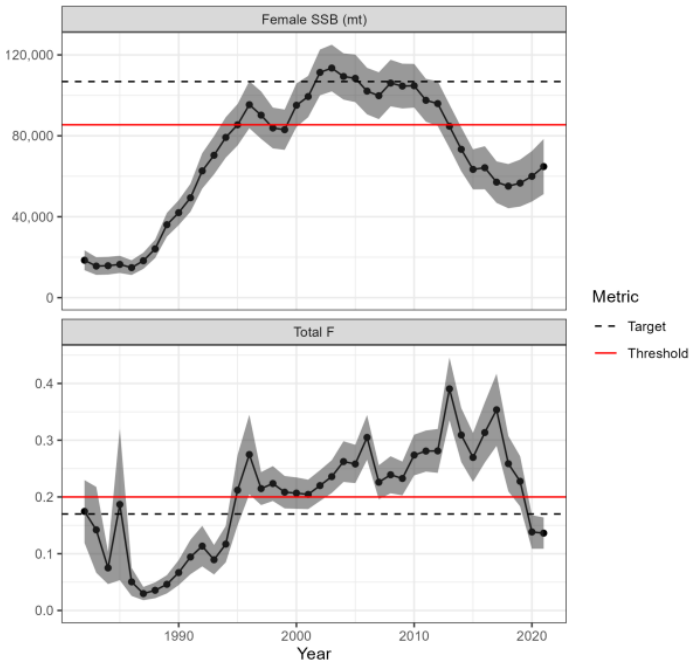
A new stock assessment has just been completed for striped bass and the results were presented to the Atlantic States Marine Fisheries Commission's Atlantic Striped Bass Management Board. The results of the 2022 Atlantic Striped Bass Stock Assessment Update indicate the resource is no longer experiencing overfishing but remains overfished relative to the updated biological reference points. Female spawning stock biomass (SSB) in 2021 was estimated at 143 million pounds, which is below the SSB threshold of 188 million pounds and below the SSB target of 235 million pounds. While the stock is still considered overfished, the trajectory of SSB is clearly trending upwards in the last few years. Total fishing mortality in 2021 was estimated at 0.14, which is below the updated fishing mortality threshold of 0.20 and below the updated fishing mortality target of 0.17.

An overview of the stock assessment is available on the ASMFC's striped bass webpage (http://www.asmfc.org/species/atlantic-striped-bass).

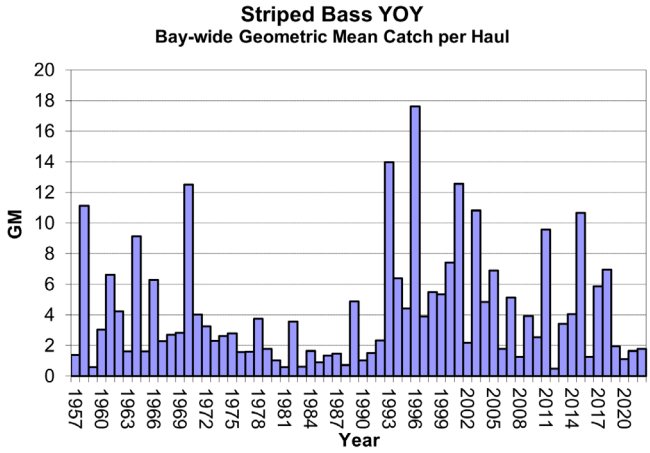
While the stock remains in a rebuilding state, the reduction of fishing mortality to below the target is a significant achievement. In order to lower fishing mortality, cuts to the harvest of striped bass had to be made in 2015 (25%) and 2020 (18%). This was achieved by lower bag limits, reduced commercial quotas, mandatory use of circle hooks, and a recreational harvest slot limit in the coastal states (28" to <35"). This lowering of the fishing mortality rate was necessary to put the striped bass population on a track to rebuild and to ensure sustainability of the fishery. These cuts represented a substantial sacrifice for all sectors and DMF greatly appreciates the cooperation of all the recreational and commercial interests.

The 2022 Assessment Update also included short-term projections to determine the probability of SSB being at or above the SSB target by 2029, which is the stock rebuilding deadline. Under the current fishing mortality rate, there is a 78.6% chance the stock will be rebuilt by 2029, indicating a further reduction in catch is not necessary at this time. This is indeed good news and will allow us to keep our current regulations the same for the immediate future.

The projections and the updated fishing mortality reference points took into account the period of low recruitment the stock has experienced in recent years in Chesapeake Bay. Unfortunately, these years of low recruitment (2019-2022) will present challenges for the future management of striped bass. While fishing mortality is currently at a good level and SSB is projected to rebuild by 2029, controlling fishing mortality will be difficult as these poor year classes become part of the SSB beginning in about 2026. The weak year classes coming out of Chesapeake Bay in recent years are believed to be the result of certain environmental conditions on the spawning grounds in the spring rather than a lack of spawning fish or insufficient forage. Occasional poor year classes are to be expected from a fish like striped bass owing to its particular life history, but the recent run of poor year classes for multiple years is of great concern. We have our fingers crossed that we will see a good year class coming out of the Chesapeake Bay in 2023, rather than continued poor recruitment and we will continue to closely monitor spawning success in the other two significant spawning grounds, Delaware Bay and Hudson River.



Striped bass female SSB (top) and total F estimates (bottom) plotted with their respective targets and thresholds. Shaded area indicates 95% confidence intervals of the estimates. Source: ASMFC 2022 Stock Assessment Update, http://asmfc.org/.



Maryland striped bass young-of-year index for Chesapeake Bay. Source: MD Department of Natural Resources, https://dnr.maryland.gov/fisheries/pages/striped-bass/juvenile-index.aspx

In summary, management of the striped bass population is in a pretty good spot for the moment. Fishing mortality is properly controlled and the biomass of the stock is on a positive trajectory towards being rebuilt by 2029. But possible problems loom for the future and we will be carefully watching the reproductive success in the upcoming years. As has been demonstrated in the past, appropriate and strong management and the cooperation of recreational and commercial fishermen will help us weather any problems arising in the future.

By Dr. Michael Armstrong, Deputy Director

Creature Feature: Razor Clams, *Ensis leei*

Atlantic razor clam posing as a barber's straight-edge razor in Plum Island Sound. Credit: David S. Johnson

Description: Razor clams are long thin bivalve shellfish that resemble old fashioned straight-edge razors for shaving. Like steamers, they are soft-shelled and rather delicate, but as their common name would imply the edges of their shells can be sharp and may slice your hands and feet. There are many species of clams given this common name but in Massachusetts we are typically referring to the species Ensis leei, formerly Ensis directus. Other names include the common razor clam, bamboo clam, Atlantic razor clam, or jackknife clam. The razor clam is easily identified by its long thin shell that is nearly six times as long as it is wide and has a slight curve to it. They range in color from black and brown to gray and white, matching the sandy or muddy substrate they are found in. There is a gap in the top of the razor clam's shell where the siphon protrudes surrounded by short sensory tentacles, and another gap at the bottom for their muscular foot. This large foot can extend to near half of the body length of the clam allowing the clam to dig quickly, swim, and even jump.

Scallops are well-known for their mobility, but razor clams are also a highly mobile bivalve species due to their shape and size of this muscular foot. They are specifically known for burrowing very deep, very quickly. Most other bivalve species are consigned to the same patch of mud they settled in as larvae, only being able to move vertically within the substrate—but not quickly. The long thin shape of the shell, muscular foot and unique burrowing strategy of the razor clam allow it to quickly tunnel deep into the sediment. Once the clam pushes its foot into the sand, it constricts valves inside its shell causing a sudden vacuum to exist in the sand around its foot. That vacuum is then filled almost instantly with water rushing in from the surrounding sand, fluidizing the sand around it and creating a localized quicksand effect. Then by extending the foot and retracting it quickly a stream of water flows through the mantle, forcing the substrate out of the way and allowing the razor clam to burrow up to three feet in under two minutes. This same motion allows them to swim through the water with a form of jet propulsion similar to squid or octopus. Another method of travel is by "jumping"; the clam will curl its foot under the shell and then rapidly retract it causing the clam to push off the flat. Razor clams will jump to escape from predators, or if the environmental conditions they reside in are no longer acceptable. Unlike most other bivalves, razor clams just up and leave when their current conditions are intolerable.

Distribution and Habitat: Common razor clams can be found on the Western side of the Atlantic Ocean from Canada to South Carolina in intertidal and subtidal areas up to 120 feet deep. They have been introduced to Europe and are known there by the scientific name Ensis americanus. In Massachusetts, razor clams are harvested both commercially and recreationally. While they can be found in both intertidal and subtidal areas, they tend to preferentially inhabit the lower intertidal zone which limits harvest to larger tides. This challenge, along with relatively high harvest effort due to their delicate shells and quick digging ability has caused them to be a less popular target than other bivalve shellfish species.

Reproduction and Life History: Razor clams are dioecious, meaning gametes are produced by separate sexes. Razor clams produce between one-half million to two million eggs. Spawning is based on temperature but most often occurs in late spring to early summer. Like most other bivalve shellfish, temperature triggers a large, synchronized spawning event. Known as broadcast spawning, male and female gametes are released simultaneously and fertilization occurs externally. Clam development occurs following the same process as other bivalve shellfish, going from fertilized eggs to trochophore larvae that are part of the plankton, drifting along at the mercy of the tide and currents. Free swimming veliger larvae are the next stage in development, and then tiny juveniles (seed/spat) resembling an adult razor clam settle to the bottom to begin their lives in the sand or mud flats. From gametes to free swimming larvae and finally miniscule clams the process takes a little over two weeks. Razor clams can tolerate a large range of salinities, from open ocean to brackish estuaries down to 15 parts per thousand. Juvenile clams settle once a suitable location is found but are highly mobile and will continue to migrate if conditions change. Razor clams reach marketable size between two to five years dependent on geographical location and local harvest restrictions. Razor clams are subject to a multitude of predators from both above and below. During low tide, sea birds and humans will pluck them from their holes. When submerged, they are vulnerable to crabs and fish species such as black sea bass and tautog that will nip at their exposed siphons, and milky ribbon worms will attack from below. Razor clams are also subject to high natural mortality during extremely cold winters. If they manage to avoid predation and harsh winters, razor clams can reach a maximum size of nearly 8 inches and live up to eight years.

Fisheries Management: While razor clams are a highly mobile shellfish species, they inhabit nearshore coastal areas and are at risk of being contaminated by sewage and other pollutants. Razor clams, like other bivalves, are filter feeders and can accumulate high levels of pollutants from their watery environment. The sanitary quality of the waters above shellfish beds needs to be monitored and evaluated to protect public health.

The Division of Marine Fisheries (DMF) Shellfish Sanitation and Management Program is responsible for monitoring and classifying the sanitary quality of the waters of the Commonwealth. Shellfish growing area classifications are assigned based on the results of sanitary surveys that assess actual and potential pollution sources in the area. The classification determines whether shellfish in the area can be harvested for human consumption. In Massachusetts, there are five Shellfish Growing Area Classifications. Razor clams may be harvested in Approved or Conditionally Approved growing areas in the Open status. Commercial razor clam harvest in Massachusetts was valued at almost $1.7 million with over 291,000 pounds landed in 2021.

On the east coast of the U.S., most states have sole authority to manage shellfish. In contrast, Massachusetts shares management and control with municipalities. Under this "home rule" management system, coastal municipalities—subject to MA statute and regulations—exert management control over all bivalve shellfish (except surf clams and ocean quahogs) in waters that are not considered contaminated. DMF has not established a minimum legal size for

razor clams, but some municipalities have. It is best to consult with local authorities for regulations and permit requirements. Methods of harvest vary by town; standard clam forks are commonly used to obtain razor clams in north shore municipalities, but some towns on Cape Cod and the Islands also allow use of hand plungers, or application of a food grade salt solution to the burrow which causes the clams to quickly rise and pop out of its hole. It is unlawful to use other substances, such as bleach, to irritate clams out of their burrow.
While the razor clam fishery in Massachusetts is exclusively wild harvest, the aquaculture industry has shown increasing interest in culturing razor clams. A major obstacle to the growth of razor clam culture is a lack of hatchery success with early post-set nursery culture. Efforts are underway to develop technologies that maximize the production and survival of razor clam seed for out-planting on shellfish license sites.

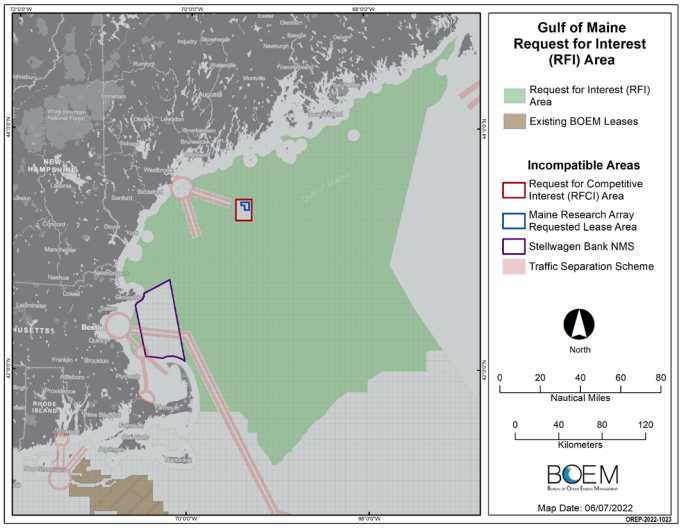
More information on the status of the razor clam industry in MA can be found in the Massachusetts Shellfish Initiative (MSI) 2020 Assessment Report.

By Melissa Campbell and Christian Petitpas, Shellfish Sanitation and Management Program

Offshore Wind Update

As DMF's role in offshore wind continues to evolve, the agency is committed to engaging fishery stakeholders in all phases of industry development. MA DMF works to minimize impacts during project siting and layout, participates in state and regional working groups to improve regional research efforts, contributes to preparation of federal guidelines for monitoring and fisheries compensation, and provides best management recommendations to state and federal agencies in response to developer permitting submissions. There are several offshore wind efforts currently underway offshore of Massachusetts. Here's an update on recent activities:

Gulf of Maine Offshore Wind Energy Planning
In August, the Department of the Interior (BOEM) announced the Request for Interest (RFI) for the Gulf of Maine (GOM), the first step in the commercial leasing process. The RFI area consists of 13.7 million acres off the coasts of Massachusetts, New Hampshire, and Maine and covers most of the Outer Continental Shelf (OCS) within the Gulf of Maine. BOEM also announced a Request for Competitive Interest (RFCI) in response to Maine's unsolicited research lease application.



Gulf of Maine RFI Area.

Maine's research lease is intended to inform future GOM commercial offshore wind development, including the deployment of floating offshore wind technology. Maine's proposed research array, the nation's first, including up to 12 floating wind turbine generators (WTGs) capable of generating up to 140MW, is located within a 10,000-acre lease area approximately 25 nautical miles offshore. Both the RFI and RCFI notices were published in the Federal Register on August 19, initiating separate 45-day comment periods. BOEM released an Issue decision on the RCFI requiring indications of interest in a commercial wind energy lease to include a conceptual Research Framework. The RFI and the RCFI are the first steps in the BOEM planning process to assess wind development in the GOM.

Southern New England
Cable installation in Nantucket Sound began in November for the Vineyard Wind 1 Project. Nearshore cable landfall activities begin just offshore of Covell's Beach in Barnstable and will continue along the cable corridor across Nantucket Sound and through Muskeget Channel. Offshore construction is scheduled to begin in 2023. Geophysical and Geotechnical surveys are underway along the cable corridors for Vineyard Northeast in Lobster Management Areas 2 and 3, including Buzzards Bay. DMF continues to support EEA in hosting and administering the $15 million Vineyard Wind Fisheries Innovation Fund. The fund was established to help build a skilled offshore wind workforce, attract investment in infrastructure, and advance offshore e wind technologies while continuing to protect marine resources.

Three areas are leased by Orsted (formerly Deepwater Wind) and co-owned by Eversource: Sunrise, South Fork, and Revolution Wind. The South Fork Wind Construction and Operations Plan (COP) was approved in early 2022. Onshore construction has commenced, and offshore construction is scheduled to begin in spring 2023. Seabed preparation activities including displacing boulders from foundation locations and cable routes is underway. Cable protection mattresses have been installed at six cable crossings. Existing and new locations for relocated boulders are posted to Orsted's Offshore Wind Farm Information for Mariners. The public comment period for the Sunrise and Revolution Wind DEIS closed in October. Input received will inform the preparation of the Final EIS for both projects, expected in 2023. Revolution Wind contracted the Woods Hole Oceanographic Institution (WHOI) Marine Policy Center to draft an impact analysis of fishery impacts in MA and the Federal waters section of the export cable route. The report uses NOAA fisheries data and other supplemental data to estimate the average annual commercial landings generated in their lease area. Draft results were presented to the MA Fisheries Working Group in October. The final report is in development.

New England Wind's COP was updated in 2022. Project DEIS is currently in preparation targeting a late 2022 to early 2023 public comment period. New England Wind 1 (NEW 1) and New England Wind 2 (NEW 2) export cables are proposed to come onshore in Barnstable. MEPA certificate for NEW 1 was obtained in 2022. Project permitting is ongoing at the state, regional, and local levels. The MEPA review of NEW 2 began in October. Geophysical surveys of the export cable route are expected to begin in March 2023.

Mayflower Wind is currently in the BOEM Environmental and Technical Review phase. A draft EIS is in development, with an expected public comment period expected to begin in early 2023. The export cables are proposed for Falmouth and Brayton Point in Somerset, MA.

Prysmian Projects North America, LLC submitted an Environmental Notification Form (ENF) and Draft Environmental Impact Report (DEIR) to MEPA to construct a submarine cable manufacturing facility at Brayton Point in support of U.S. offshore wind development.

Other Developments

In June, BOEM, in consultation with NMFS and affected coastal states drafted fisheries mitigation guidance to help in advancing an initiative to establish a regional fund administrator for fisheries compensatory mitigation which would manage financial compensation for impacts from offshore wind development in the Atlantic Coast region. This effort focuses on supporting the BOEM Draft Fisheries Mitigation Framework to guide funds dispersal to impacted members of the fishing community through a fair, equitable, and transparent process across the region. Draft guidance is being revised based on public comments received. The issuance of a final guidance is currently in development.

In October, Crowley Wind Services submitted an expanded Environmental Notification Form (EENF) to develop a 42-acre offshore wind marshalling terminal in Salem. The site will be used to transfer assembled components to wind farms. Comments on the EENF are due the last week of November.

In October, NOAA Fisheries and BOEM solicited public comment on a draft strategy to minimize the effects of OSW development on North Atlantic Right Whales and their habitat. Public comments are being solicited through December 4. The strategy provides guidance for agencies to use to collaborate and improve science and information to support offshore wind development while protecting biodiversity and promoting ocean co-use. The draft strategy will also provide offshore wind developers with guidance on mitigation measures.

In November, the Responsible Offshore Development Alliance (RODA) filed suit against the Bureau of Ocean Energy Management (BOEM) and other federal defendants in the U.S. District Court for the District of Massachusetts for summary judgment in its lawsuit over the approval of the Vineyard Wind 1 offshore wind energy project. The decision is pending.

By Mark Rousseau, Fisheries Habitat Program

Public Access Update: The Salem Willows Park Pier, A New Fishing Pier For the Next Hundred Years!

Many people who grew up on the North Shore have fond memories of catching their first fish on the Salem Willows Park Pier. That grand old structure stood for well over 100 years before succumbing to the eventualities of time and the saltwater environment. Next fall the construction of a new pier will begin and, if all goes well, new memories will be made there by the summer of 2024! This project is another example of the Division of Marine Fisheries (DMF) putting saltwater fishing permit fees to work for the betterment of the angling experience in Massachusetts.

The original Salem Willows Park Pier was permitted for construction in 1894 and stood until 2021 when age and sea-level rise required its removal under an emergency action. The old pier was calving parts during coastal storm events causing hazards to navigation. Many of the pilings holding up the dilapidated pier were from the initial structure! The new pier will extend out into Salem Sound 346 feet similarly to the old pier, but will also have a 16 foot x 60 foot 'T' at the end of the gangway. This design allows for more people to fish from the end of the pier, which is generally the most coveted location for angling.

The former Salem Willows Park Pier.

For those who have never been to Salem Willows Park it is a showpiece for the city, located at the tip of the Salem Neck peninsula. Named for the European white willow trees planted there in 1801 to form a shaded walk for patients convalescing at a nearby hospital, the area became a public park in 1858. Over the next century, popular attractions such as an amusement park, casino, and ballroom would come and go. These days, in addition to the fishing pier, this 35-acre park still has much to offer in the form of food kiosks, picnic tables and gazebos, walking trails, tennis courts, sandy and rocky shorelines for exploring, and a (seasonally operated) arcade. All of these amenities are complemented with spectacular views of scenic Salem Sound!

This pier project officially kicked off in 2020, when DMF and the Office of Fishing and Boating Access (FBA) entered into a Land Management Agreement (LMA) with the City of Salem. The LMA is a contract that spells out what the project is and the responsibilities of all parties. In most cases, DMF and FBA pay for and manage the project's design and oversee the initial construction, while the day-to-day operation becomes the responsibility of the municipality once the facility is complete. In the LMA with Salem, DMF's fiscal liability is limited to two million dollars with Salem paying the remainder of the construction costs. After all details of the LMA were negotiated, DMF put the engineering out to bid and the firm GZA GeoEnvironmental, Inc. was contracted to perform engineering tasks which include permitting, planning, and engineering of the new pier and later to include the surrounding area.

In addition to a new pier to act as a centerpiece for this scenic seaside park, the approach and landing area will be updated. The paved area and seawall leading to the pier entrance will be removed or secured, filled, graded, and repaved making the approach ADA compliant. Much of the cost of the new pier and approach is being paid for with Saltwater Recreational Fishing Permit dollars. The law which requires a permit for all saltwater anglers aged sixteen and older also stipulates that a full third of all money collected from the sale of those permits goes to improving public access. The old Salem Willows Pier was a great place to fish for well over one hundred years; the new fishing pier will serve the fishing public for many more years!

By Ross Kessler, Public Access Coordinator

DMF and MEP Meet with International Delegation to Discuss Fisheries Management and Enforcement

DMF staff, MEP, and the Philippine Delegation aboard the MEP Patrol Vessel Thomas Paine.

The US Department of State's International Visitor Leadership Program (IVLP) is an exchange program that brings professionals from abroad to the US for short-term visits to gain first-hand experience in regarding their areas of expertise in the American system and cultivate long term relationships with their American counterparts. Recently, the IVLP hosted a delegation from the Philippines as part of a project titled "Improving Monitoring and Management of Marine Ecosystems. The delegation spent four days in eastern Massachusetts and on Monday, December 5, 2022 met with DMF's Assistant Director Story Reed and Senior Policy Analyst Jared Silva, as well as leadership from the Massachusetts Environmental Police (MEP). MEP is a long-time participant in the IVLP, having hosted delegations from multiple countries for similar events over the past several years.

The group took a boat ride onboard the MEP Patrol Vessel Thomas Paine from Sandwich Marina to New Bedford Harbor. This provided an opportunity for discussions regarding fisheries science, management, and enforcement. Additionally, we took a boat tour of New Bedford to see the harbor's diverse fishing fleet and were able to watch an offshore lobster and Jonah crab boat offload their catch at a New Bedford dealer.

The delegation was eager to learn about the structure of our fisheries management system in the United States and in Massachusetts and how fishing regulations are developed and enforced. There was a lot of interesting discussion regarding jurisdictional boundaries between fishery management agencies, the real-time enforcement of discrete time area closures, and the demand for high resolution data to enhance management and compliance. It appears some fisheries challenges may be universal!

DMF expects IVLP will host another delegation of international fisheries professionals this spring in Massachusetts and looks forward to the opportunity to meet with them.

By Jared Silva, Senior Policy Analyst

DMF Returns to Cat Cove Marine Laboratory in Salem

Cat Cove Marine Laboratory in Salem, MA.

Changes are afoot for the Division's work locations within the state. For decades, DMF staff have operated primarily out of three regional offices: an administrative headquarters in Boston and two field stations in the state's biggest fishing ports of New Bedford and Gloucester. (Additional smaller facilities support Division operations like the Shellfish Purification Plant in Newburyport and Hughes Hatchery on Martha's Vineyard). While the addresses for the Boston and New Bedford offices have changed during this time, the most recent development is the addition of a third principal field station at the Cat Cove Marine Laboratory in Salem.

The move to Salem is actually a return to former DMF stomping grounds. The Cat Cove Marine Lab was the Division's north shore field station for about 25 years prior to the opening of the Gloucester office in 1996 on account of needing more space. The lab then transferred hands to Salem State University, where it supported the college's aquaculture and marine biology programs, before coming back into DMF's care this past year. A combination of research and office space (after some renovations!), the facility now provides desk space for a mix of fisheries management and stock assessment professionals relocated from other offices, and houses an extensive seawater system flowing into myriad aquaculture tanks that are expected to support studies by in-house and visiting researchers.

Located on the Salem Neck, not far from the historic areas of Salem Willows and Winter Island, the lab is also uniquely situated next to Smith Pool, an 8-acre saltwater impoundment originally developed as a public swimming area in the 1930s but which can now be used for marine research studies. For example, Smith Pool was the venue for a mid-1990s striped bass discard mortality study co-led by former Director Paul Diodati when he was a fisheries biologist at the facility, the results of which are still used in coast-wide stock assessments for the species. This summer the pool was used for a study examining the rate at which acoustic tags fall off striped bass which is a critical piece of information used in the analysis of data from studies on striped bass release mortality.

The current facility manager and Deputy Director Michael Armstrong is working with staff to develop studies that utilize Smith Pool and the abundant indoor tanks that can be operated as flow-through seawater or recirculating fresh or seawater. Studies beginning next spring will include eelgrass and winter flounder. Dr. Armstrong is also seeking to establish collaborative studies with local universities including Salem State University and UMass-Boston.

The availability of the Cat Cove Lab came at an opportune time for DMF, given an administration-wide lease space consolidation effort in Boston. Within the next year, the Boston office at 251 Causeway Street in the North End will close, and the Division staff working from there are all relocating to our field stations. DMF will keep a Boston zipcode at our parent Executive Office of Energy and Environmental Affairs' address at 100 Cambridge Street, but it will be a smaller footprint and permits will no longer be issued there. Formerly known as the Leverett Saltonstall Building, 100 Cambridge Street is also where the DMF headquarters resided for over 30 years, until the early 2000s when it underwent major renovations, which led to our residency in the North End for the past 20 years.

While the Cat Cove Marine Laboratory is currently not open to the public, our long-term goals include developing community-based activities such as a Marine Education Center, a Lecture Series, an Intern Program, and an Angler Education Program. We look forward to the public's involvement with the Cat Cove Marine Lab!

By Dr. Michael Armstrong, Deputy Director; and Nichola Meserve, Policy Analyst

Recent Publications

The following publications are recent articles written or co-written by DMF staff and published in scholarly journals or the DMF technical series. A full list of publications can be found at https://www.mass.gov/marine-fisheries-publications.

Annual Report

DMF published its 2021 Annual Report and it is available for viewing online at: https://www.mass.gov/doc/division-of-marine-fisheries-2021-annual-report/download

Contributions

Scott Elzey was a co-author on an article titled: Evaluating growth dimorphism, maturation, and skip spawning of Atlantic halibut in the Gulf of Maine using a collaborative research approach which was published in the Journal of Northwest Atlantic Fishery Science.

Scott Elzey was a co-author on an article titled: A Life History Study of Atlantic Wolffish Resolves Bias and Imprecision in Length-and Age-at-Maturity Schedules by Recognizing Abortive Maturation, published in Marine and Coastal Fisheries.

Chrissy Petitpas was a co-author on a recently published article titled: Cross-shelf exchange associated with a shelf-water streamer at the Mid-Atlantic Bight shelf edge, published in Progress in Oceanography, Volume 210.

Tracy Pugh was a co-author on an article titled: Differences in the size at maturity of female American lobsters (Homarus americanus) from offshore Southern New England and eastern Georges Bank, USA which was published in the Journal of Crustacean Biology, 250.

Greg Skomal was a co-author on a recently published article titled: Conservation implications of white shark (Carcharodon carcharias) behavior at the northern extent of their range in the NorthWest Atlantic. The article was published in the Canadian Journal of Fisheries and Aquatic Sciences.

Electronic Vessel Trackers for Lobster Vessels Coming in 2023

All commercial Lobster Permit holders with a federal lobster trap permit will be installing a vessel tracking device beginning this spring. This new requirement comes from a recent interstate plan addendum to improve the accuracy of data depicting where and when lobster harvesters fish their traps. Fine-scale location data are critical as lobster fishers face challenges of being displaced by offshore development (wind turbines and aquaculture), and to understanding lobster trap fishing in order to protect right whale aggregations. Also, lobster and Jonah crab stock assessments need more accurate catch locations to attribute landings to each species' respective stock units.

Vessel tracking devices require very little power and maintenance. Devices operate independently and do not rely on any external electronics or mobile phone to function. They will record a position every minute, which will allow managers to distinguish between fishing activity (hauling or setting traps) and traveling to the fishing grounds. Tracking devices may use cellular data transmission. If the vessel travels beyond cellular service, the device will continue to record the location data and then upload the data once the vessel returns to cellular service. Costs from approved systems are intended to be far less than the satellite vessel monitoring systems commonly deployed in offshore federal fisheries such as scallops, groundfish, and surf clams.

Costs for the first three years will be covered by DMF through a federal appropriation approved by Congress. There are about 300 eligible vessels that fish from Massachusetts ports. We expect to cover the costs of each eligible vessel owner's purchase, installation, and data plan for around $1,500. Up to five different vendors are expected to offer devices for sale to the industry this winter. Eligible permit holders will be allowed to choose the approved tracking device that best fits their business.

As required by state and federal law, data collected from an individual vessel will be kept strictly confidential, just as DMF maintains all catch reports and sales of fish and shellfish to dealers confidential. The data recorded helps us to understand the importance of fishing locations that may be subject to offshore development or proposed for closure with various conservation objectives. For additional background, see the article published in DMF's previous newsletter: https://www.mass.gov/news/lobster-vessel-trackers-to-be-required-in-2023

By Dan McKiernan, Director of DMF; and Nick Buchan, Harvester Reporting Coordinator

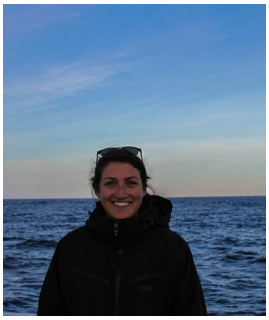
Division Comings and Goings

Alex Boeri has been promoted to an Aquatic Biologist II on the Invertebrate Fisheries team. Alex has been with DMF since 2017 when he started with the Habitat team on the north shore. He was hired into a full time ABI position with Inverts in 2019. Alex will continue to be heavily involved with both field sampling and gear-related work on the Ventless Trap Survey, and will be taking on more analytical duties related to lobster, as well as starting to coordinate whelk sea sampling and handling annual summaries of the whelk data.

Lucas Cunningham will be working in the Gloucester office for Brian Castonguay as a Laborer II. Luke will assist Brian in the operation and maintenance of the Gloucester and Salem facilities. Luke joins us from Symes Associates where he worked doing commercial and residential maintenance and construction. Luke attended the Peterson School for HVAC training and has his EPA Section 608 Universal Refrigeration Usage Certification.

Brooke Dejadon joined DMF in October as an Aquatic Biologist for the North Shore shellfish program based in Gloucester. Brooke has a bachelor's degree in Wildlife and Conservation Biology form UNH. She has over 4 years of experience working as a shellfish specialist for the State of New Hampshire where she gained the skills and knowledge to assist with public health protection and management of commercially and recreationally harvested shellfish resources. Brooke is familiar with the required components of the NSSP, including water quality assessments, shoreline surveys, marine biotoxin monitoring, and many other elements. Her main area of expertise is Harmful Algae Bloom monitoring, specifically phytoplankton collection and identification.

Kara Duprey joined DMF in July as a Lab Technician. She will process and age scales, otoliths, opercula, and fin spines as a member of the Age and Growth Lab in Gloucester. Kara graduated from the University of Massachusetts - Amherst in 2020 with both a B.S. in Environmental Science and a B.S. in Natural Resources Conservation. She spent a year of her undergrad working with the U.S. Fish and Wildlife Service to monitor and restore endangered freshwater mussel populations within Massachusetts. Prior to coming to DMF, Kara spent over a year working with Xenopus frog species and CRISPR technologies to model human diseases as a lab technician in Woods Hole, MA.



Michele Heller joined DMF as the newest Aquatic Biologist I in the Fisheries Research Project (FRP) this past December. Michele graduated from University of New Hampshire with a BS in Marine Biology and later earned a MS from Scripps Institution of Oceanography with a degree in Advanced Studies in Marine Biodiversity and Conservation. Prior to coming to DMF, she gained experience working collaboratively with the recreational, commercial, and for-hire fishing industries supporting tuna tagging programs and studies, conducting shore-side interviews for NOAA's Large Pelagic Survey, and collecting biological samples from tuna fishermen and dealers. More recently, she has supported a citizen scientist effort to conduct scientist-led research projects including an acoustic telemetry study on juvenile sharks and rays in Belize. Michele with be based in the Gloucester field office and provide port and sea sampling support.

Joe Holbeche was hired as an Aquatic Biologist I for the Fisheries Research Project (FRP) this past November. Joe previously worked for DMF as a FRP seasonal contract employee beginning in spring of 2019 through calendar year 2020, and again as a seasonal contractor for the Diadromous Fisheries project starting this past spring. Before joining DMF, Joe spent a year as a certified federal fisheries observer working aboard commercial fishing vessels, sampling several different New England-based fisheries. While working for DMF as a seasonal employee, Joe supported FRM studies that included the cod avoidance and bycatch reduction in the Gulf of Maine recreational groundfish fishery and determining post-release mortality of striped bass in the recreational fishery. Joe graduated from Roger Williams University in 2013 with a Bachelor of Science in Marine Biology and is currently pursuing a Master of Science degree in marine biology from UMass - Dartmouth.

Matt McLaughlin first joined the DMF as a temporary employee in October of 2019 as a Data Entry Specialist based in Gloucester. He is a graduate of Salem State University with a degree in Communications. He has previously worked as an interviewer for the Large Pelagic Intercept Study for NOAA over the last three years. Matt loves numbers, data entry, handwriting analysis and chasing hidden mysteries on trip reports to their exciting conclusion.

Amanda Meli has been promoted to the Grants Management Team. She has worked for the Division both as an MRIP Interviewer and as a Receiving Teller in our New Bedford Office. She is completing her master's degree in marine science at UMASSD/SMAST with a focus on using optical and ventless trap surveys to estimate the abundance, biomass, and distribution of crustaceans along the Northeast continental shelf.

Alyson Mello joined DMF as a bacteriologist in September. She is a graduate of UMass Dartmouth where she studied marine biology with a focus on marine microbiology. She has volunteered with Gloucester's Sportfish Angler Data Collection team since 2014 where she caught and identified an array of fish and collected data from each specimen. Additionally, she volunteers for Mass Audubon Society as a field technician in their Spadefoot Toad conservation program monitoring toads in man-made vernal pools to establish viable populations.

Tay Evans left DMF at the end of September and joined the MA Department of Environmental Protection (DEP) as an Environmental Analyst in their Wetlands Major Projects and Policy Unit in Boston. Tay worked for more than 17 years in DMF's Habitat Program in Gloucester overseeing the permit review of North Shore coastal alteration projects. Tay was instrumental in advancing efforts to protect and restore critical seagrass habitat in MA, and in promoting regional initiatives and collaborations to advance seagrass science. In one of her new roles with DEP, Tay will oversee the geospatial analysis and data acquisition related to seagrass and wetland resource mapping. We look forward to collaborating with Tay in her new role with DEP.

Simi Harrison left the Division in September to start a new career in scientific publishing with Elsevier. Simi joined DMF in October 2021 as an Environmental Analyst in the New Bedford office assisting the Fisheries Habitat Program with technical review of coastal construction projects and fisheries habitat research. She transitioned to the Offshore Wind Specialist position in the Fisheries Habitat Program in February and focused on technical review of permit applications and monitoring plans associated with offshore wind development in southern New England. We wish Simi the best of luck in her new venture in the field of publishing.

Taylor Stoni, DMF Aquatic Biologist II, left DMF in November to pursue an opportunity with the Bureau of Ocean and Energy Management (BOEM) as a marine biologist. Taylor joined DMF in May of 2021 working as a Permit Specialist within the Protected Species Program. We wish Taylor well in her future endeavors.

Justin Wilson, DMF Protected Species Gear Specialist, left DMF in August to pursue an opportunity with a consulting group working on fisheries research in wind energy areas. Justin joined DMF in early 2021 to coordinate the testing, construction, and distribution of modifications to fixed gear that interact with protected species. We wish Justin well in his future endeavors.

Five DMF Employees Promoted to Management Roles after Restructuring

DMF has a revamped organizational structure, with five longstanding employees being elevated to new leadership roles. The new structure has two Deputy Directors overseeing the science and biological monitoring aspects of DMF. Additionally, two assistant Directors have been appointed, and a third employee promoted as a newly created manager.

• **Mike Armstrong, Deputy Director**, responsible for the Fisheries Biology Section, and the Recreational and Diadromous Fisheries Program. This role continues Dr. Armstrong's leadership on the Fish Biology front, and now includes the Assessment and Survey Program. He has also been transferred from the Gloucester facility to the newly re-acquired Cat Cove Marine Lab in Salem where he will supervise the refurbishment of the facility.

• **Bob Glenn, Deputy Director,** responsible for the Shellfish, Habitat, Invertebrate Fisheries, and Protected Species Programs. In addition to the oversight of those four programs, the position will oversee studies of climate change assessments and help address offshore wind energy development issues. Bob is based at DMF's New Bedford South Coast Field Station.

• **Story Reed, Assistant Director**, responsible for state fisheries management and policy. This includes oversight of state fisheries management and policy development, the seafood marketing program, the statistics and permitting programs, administrative law, and liaising with Department of Fish and Game staff on many of these activities. Story is based at DMF's Gloucester Field Station.

• **Kevin Creighton, Assistant Director,** responsible for Operations & Finance. This includes all agency fiscal matters, capital assets, grant programs, operations plans and internal policy development. In addition, Kevin will provide assistance to the Department's HR Director and fiscal officer. Kevin is based at DMF's South Coast Field Station where he oversees daily operations.

• **Stephanie Cunningham, Fiscal Administration & Operations Manager.** She will continue to oversee all federal grant programs as well as all capital programs for the Annisquam River Marine Station. Stephanie is based at DMF's Gloucester Field Station where she now also oversees daily operations.

By Dan McKiernan, Director of DMF

2023 Quota Outlook

Please note that the quotas described herein are subject to change. Check the Division's quota monitoring webpage for updates on commercial quotas and landings.

Atlantic Herring: 27,401,222 pounds (coastwide quota)
The coastwide quota for herring is increasing for 2023 per the stock's rebuilding plan. While still well below prior levels, the quota of 27.4 million pounds is roughly three-times that of 2022 (9.03 million pounds). The limit was derived from the 2021 stock assessment for herring, which indicated the stock is still overfished (21% of the biomass target) but not experiencing overfishing (very low F of 31% of the overfishing limit), and hampered by continued poor recruitment. The coastwide limit is allocated among four management areas: 28.9% to Area 1A (inshore Gulf of Maine), 4.3% to Area 1B (offshore Gulf of Maine), 27.8% to Area 2 (south of Cape Cod), and 39% to Area 3 (Georges Bank).

Atlantic Menhaden: 10,820,216 pounds (MA quota)
Massachusetts' menhaden quota for 2023 is nearly double that of 2022, when it was roughly 5.4 million pounds (before transfers). This is a consequence of a 20% increase in the coastwide total allowable catch or TAC (from 194,400 metric tons to 233,550 metric tons) and an elevated state allocation for Massachusetts as a consequence of a recent interstate management action to update the allocation formula. The TAC increase was based on positive menhaden stock growth and with consideration of menhaden predators; it incorporates a conservative risk level of exceeding the ecological reference point target designed to support menhaden's role as forage. Addendum I to the interstate management plan changes the historical landings basis for the state allocation from 2009–2011 to 2018/2019/2021 (2020 was excluded due to the impact of the covid pandemic on fisheries), and reduces the default minimum allocation for six states (not including MA) from 0.50% to either 0.01% or 0.25%. As a result, MA's state allocation has moved from 1.27% to 2.12% due to the increased availability (and harvest) of menhaden in our waters in recent years. A 1% set-aside of the TAC remains available to the states of ME–NY for episodic events of menhaden availability (the "EESA"); however, purse seines will no longer be eligible to continue harvesting menhaden under the incidental catch and small-scale fishery provision after a state's quota is taken on account of these landings having caused the TAC to be exceeded recently. Furthermore, should landings under this provision by other gears cause the TAC to be exceeded in the future, the Board must take action to further adjust gear eligibility of the trip limit. MA's quota for 2023, while increased significantly, is not expected to change the fishery here drastically. By way of state quota transfers and use of the EESA, MA landings in recent years are on par with the quota for 2023. The revised quota will provide more certainty about the state's access to the resource at the start of the season and allow for better management of the quota. Some changes to the regulations are likely for next year.

Black Sea Bass: 741,071 pounds (MA quota)
The 2023 coastwide quota and MA's portion of it face a 26% reduction from 2022. The 2023 coastwide quota of 4.80 million pounds, down from 6.47 million pounds in 2022, was affected by a 12% reduction in the acceptable biological catch (ABC) plus the implementation of new commercial/recreational allocations adopted by the Mid-Atlantic Council and Atlantic States Marine Fisheries Commission beginning in 2023. The 1983–1992 reference period for the sector allocations remains unchanged but the full fishery catch (landings and dead discards rather than landings alone) including recalibrated recreational estimates stemming from the revised effort survey methodology, determine the shares. Instead of a 49% share of the allowable landings, the commercial fishery now receives a 45% share of allowable catch, which brought the 2023 commercial quota down from what would have been 5.71 million pounds. Massachusetts' share remains at 15.4%, up from 13% historically based on the incorporation of stock distribution into the allocation system; this share will be revised depending on future stock assessment results for regional biomass estimates. The outcome for MA is a 2023 quota that will represent a reduction from the 2022 fishery landings of roughly 910,000 pounds (91% of the 998,901-pound quota for 2022).

Bluefish: 329,578 pounds (MA quota)
Massachusetts' 2023 commercial quota for bluefish is increased 29% from 2022, when it was 254,748 pounds. This increase is the product of a 21% increase in the coastwide commercial quota plus a higher share of the coastwide quota for Massachusetts. Under the ongoing seven-year stock rebuilding plan instituted in 2022, the coastwide quota is scheduled to gradually increase, and has been set at 4.29 million pounds for 2023, up from 3.53 million pounds in 2022. Revised state-by-state allocations that reflect more recent landings trends are being phased in over the seven years, which will bring Massachusetts share from its historical allocation of 6.72% up to 10.11% by 2028. For 2023, our state share is 7.69%. Landings in 2022 came in at 97% of the 2022 quota.

Horseshoe Crab: 165,000 crabs (MA quota)
Massachusetts' commercial quota for horseshoe crabs remains unchanged. This quota is for crabs harvest for bait purposes (primarily used in the whelk and eel pot fisheries). Horseshoe crabs harvested for other purposes (primarily biomedical use) and released are not counted against this quota. Landings in 2022 amounted to roughly 80% of the quota.

Scup: 1,177,996 pounds (MA Summer Period quota)
At 14.01 million pounds, the 2023 coastwide commercial quota for scup is reduced over 31% from 2022 (20.38 million pounds), as are the seasonal and state-specific allocations of it. The reduction is caused in small part by declining biomass (albeit still about two-times the target), but is more a consequence of new commercial/recreational allocations. The catch data from 1988–1992 that form the basis of the sector allocations were updated with improved recreational catch and commercial discard estimates. Instead of a 78% share of the allowable catch, the commercial fishery now receives a 65% share, which brought the 2023 commercial quota down from what would have been 17.87 million pounds. The Winter I (January–April) and Winter II (October–December) Periods, which are open to all states at federally set trip limits, receive 45.11% and 15.94% of the quota, respectively; this equates to 6.32 and 2.23 million pounds for 2023. Given recent landings trends, the fishery may not be constrained by these lower quota levels but likely won't have as large a trip limit in Winter II as recent years. The Summer Period fishery (May–September) receives 38.95% of the coastwide quota (5.46 million pounds for 2023), which is further distributed into state shares. The Massachusetts summer fishery is unlikely to be affected by its 21.6% share declining to 1.18 million pounds, given landings in 2022 that totaled less than 500,000 pounds.

Spiny Dogfish: 6,967,533 pounds (ME–CT regional quota)
The coastwide commercial quota for fishing year 2023 (May 1, 2023–April 30, 2024) is reduced roughly 60% from the prior fishing year, from 29.6 million pounds in FY22 to 12.01 million pounds in FY23. This reduction is the result of the Mid-Atlantic Council's Scientific and Statistical Committee's recommendation to scale down the Acceptable Biological Catch based on declining indices of abundance and other concerning signals about the stock's health, while awaiting the completion of the 2022 research track assessment and 2023 management track assessment. The northern region of Maine–Connecticut has a 58% share of the coastwide quota, meaning a quota reduction from 17.1 million pounds in FY22 to 7.0 million pounds in FY23. However, landings in FY21 (the most recent full year) were roughly 11 million pounds coastwide and XX million pounds in the Northern Region, and landings in FY22 are tracking similarly. While some states with individual quota shares may struggle with the allocation at the reduced quota, negative impacts to the Northern Region may be blunted by the recent landings trend.

Striped Bass: 701,904 pounds (MA quota)
Massachusetts' 2023 commercial striped bass quota will be reduced roughly 4% on account of a quota overage in 2022. The underlying base quota of 735,240 pounds remains unchanged from that in 2020–2022, but an overage of roughly 33,000 pounds must be paid back pound-for-pound in 2023. All states' commercial quotas were reduced 18% in 2020 with the goal of ending overfishing and achieving the target fishing mortality rate. The 2022 stock assessment confirmed that the combination of commercial and recreational fishery measures implemented in 2020 were successful in reducing fishing mortality as intended (F in 2021 = 0.14 compared to Fthreshold = 0.20 and Ftarget = 0.17), and the stock is projected to rebuild within the 10-year rebuilding period (i.e., 2029). As such, an additional reduction in catch was not warranted for 2023 and the 2022 management measures remain in place. Progress with the rebuilding plan will be monitored with periodic stock assessment and responded to as required.

Summer Flounder: 1,358,834 pounds (MA quota)
Massachusetts' 2023 state quota for summer flounder (fluke) is nearly status quo with that of 2022 (reduced only ~33,000 pounds). The coastwide commercial quota of 15.27 million pounds represents a 1.7% decrease from 2022 (15.53 million pounds), which results in a 2.3% decrease for MA due to the manner in which the coastwide quota has been allocated since 2021. This approach allocates the first 9.55 million pounds of quota using the historical allocations, and anything beyond that in equal shares of 12.375% to all states (except ME, NH, and DE which split 1% of the additional quota). For 2023, this result is an effective 8.90% share of the commercial quota for MA, rather than the historic 6.82% share. State landings in 2022 were similar to 2021, totaling roughly 740,000 pounds or 53% of the 1.39-million-pound quota. A review of the fishery's performance and industry scoping will take place this winter to consider additional rule changes.

Tautog: 57,178 pounds (MA quota)
Massachusetts' 2023 tautog quota will be lower than its baseline amount of 64,753 pounds due to a 12% overage of the 2022 quota. The 2022 quota (60,986 pounds due to an overage in 2021) sustained the fishery from its opening on September 1 until early November, similar to recent years. Massachusetts' baseline quota has been status quo since 2008. The next stock assessment for tautog is tentatively scheduled for 2024.

Adjudicatory Proceedings

Under state law, DMF may sanction commercial and recreational fishing permits for violations of the state's marine fishery laws and regulations subject to a due process adjudicatory proceeding. These adjudicatory proceedings are held before a magistrate. They may be initiated by the agency, the Environmental Police, or municipal officials (constables) authorized to enforce the marine fishery laws of the Commonwealth.

Between May 1, 2022 and present, DMF initiated four adjudicatory proceedings. Three of these matters address protected species violations and the other dealt with the harvest of shellfish from an area closed due to contamination. Two of these matters have been resolved. In one of the matters dealing with protected species violations, DMF reached a settlement agreement with the Respondent. This resulted in a three-year suspension of their commercial lobster permit. In the matter dealing with the harvest of shellfish from a contaminated area, DMF immediately suspended the permit pending a hearing. Following the conclusion of the hearing, the agency permanently revoked the permit for cause. The two additional matters dealing with protected species violations remain ongoing.

Four matters initiated between June 1, 2021 and April 30, 2022 remained ongoing as of May 1, 2022. Each of these matters were resolved between May 1, 2022 and present. One matter involving violations of lobster conservation and management and protected species violations proceeded to hearing during the spring of 2022. Following the conclusion of the hearing, DMF permanently revoked of the Respondent's commercial lobster permit. One matter involving permitting violations, including operating a charter boat business on a revoked charter boat license, proceeded to hearing during the spring of 2022. Following the conclusion of the hearing, DMF permanently revoked the individual's remaining fishing permits. DMF also reached a settlement agreement in two matters involving protected species violations. One permit holder agreed to transfer out of the commercial lobster fishery and another permit holder agreed to a two-year suspension of their commercial lobster permit.

Regulatory Updates

During the period of July 1, 2022 through December 31, 2022 the following regulatory changes were enacted by DMF after public hearings and Marine Fisheries Advisory Commission approval, or by the Director under his declaratory and emergency authorities.

Commercial Period II Summer Flounder Trip Limit Increase (322 CMR 6.22).
Through an in-season adjustment, DMF increased the commercial summer flounder trip limit for October 1 – December 31 from 3,000 pounds to 10,000 pounds. This action was taken to enhance access to and increase the utilization of the available 2022 commercial summer flounder quota.

Recreational Gulf of Georges Bank Cod (322 CMR 6.03).
New recreational Georges Bank cod limits were implemented in July 2022. This established an August 1 – April 30 open season with a five-fish bag limit and a slot limit of 22" to 28". The replaced the prior limits that allowed recreational fishing year-round with a 10-fish bag limit and 22" minimum size. These changes matched the federal regulations implemented as part of Framework 63 to the Multi-Species Groundfish Fishery management Plan. Framework 63 cut the Georges Bank recreational cod target by about 50% for the 2022 and 2023 fishing years and these amendments to the recreational fishing regulations were designed to keep recreational fishing mortality below the catch target.

Recreational Gulf of Maine Cod (322 CMR 6.03).
New recreational Gulf of Maine cod limits were implemented for September 1, 2022. This established open seasons of September 1 – October 7 and April 1 – April 14 with a 1-fish bag limit and 22" minimum size. This extended the fall recreational fishing season by three weeks and increased the minimum size by 1" compared to the prior limits that established open seasons of September 15 – September 30 and April 1 – April 14 with a 1-fish bag limit and a 21" minimum size. These state limits matched the federal rules adopted by NOAA Fisheries for this stock.

Recreational Gulf of Maine Haddock (322 CMR 6.22).
New recreational Gulf of Maine haddock limits were implemented for September 1, 2022. This increased the recreational haddock bag limit from 15-fish to 20-fish while maintaining the April 1 – February 28 open season and 17" minimum size. These state limits matched the federal rules adopted by NOAA Fisheries for this stock.

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