Black sea bass at an artificial reef site near Harwich, MA.

Department of Fish and Game

Massachusetts Division of Marine Fisheries 2024 Annual Report

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2024 Annual Report

Commonwealth of Massachusetts
Governor Maura T. Healey
Lieutenant Governor Kimberley L. Driscoll

Executive Office of Energy and Environmental Affairs
Secretary Rebecca L. Tepper

Department of Fish and Game
Commissioner Thomas K. O'Shea

Division of Marine Fisheries
Director Daniel J. McKiernan

www.mass.gov/marinefisheries
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Introduction

The Massachusetts Division of Marine Fisheries (DMF or Division) of the Department of Fish and Game is the Commonwealth's marine fisheries management agency. DMF is responsible for the development and promulgation of the Commonwealth's regulations governing commercial and recreational fishing activity conducted in the marine environment. The Division promotes and develops commercial and recreational fisheries through research, technical assistance, and the collection of statistics. Guidelines for managing marine fisheries come through Chapter 130 of Massachusetts General Law, the Atlantic Coastal Fisheries Cooperative Management Act, the Interjurisdictional Fisheries Management Act, and the Magnuson-Stevens Fishery Conservation and Management Act. To successfully fulfill its responsibilities, the Division has established the following mission, vision, and goals.

Mission

Manage the Commonwealth's living marine resources in balance with the environment resulting in sustainable fisheries and contributions to our economy, stable availability of diverse, healthy seafood and enriched opportunities that support our coastal culture.

Vision

Achieve sustainable fisheries and healthy marine ecosystems through sound science, innovation, collaboration, effective leadership, and stewardship all serving to enrich the productivity and socioeconomic value of marine fisheries to the Commonwealth.

Goals

Advance understanding and stewardship of our living marine resources, including fish, habitat, and marine protected species.

Support sustainable commercial and recreational fisheries.

Protect public health through monitoring and management of shellfish resources and advance the development of a sustainable marine aquaculture industry.

Expand and foster regional science, management, and education partnerships.

Build and maintain a high level of staff professionalism and administrative leadership.

Frequently Used Acronyms and Abbreviations

USACE	US Army Corps of Engineers
ACCSP	Atlantic Coastal Cooperative Statistics Program
ASMFC	Atlantic States Marine Fisheries Commission
BOEM	Bureau of Ocean Energy Management (Federal)
CCB	Cape Cod Bay
CCS	Center for Coastal Studies (Provincetown)
DMF	Division of Marine Fisheries (Massachusetts)
EOEEA	Executive Office of Energy and Environmental Affairs (Massachusetts)
EPA	United States Environmental Protection Agency
FMP	Fishery Management Plan
GIS	Geospatial Information System
GOM	Gulf of Maine
ILF	In-lieu Fee
ISSC	Interstate Shellfish Sanitation Conference
LCMA	Lobster Conservation Management Area
*Mass*CZM	Massachusetts Office of Coastal Zone Management
*Mass*DCR	Massachusetts Department of Conservation and Recreation
*Mass*DER	Massachusetts Division of Ecological Restoration
*Mass*DEP	Massachusetts Department of Environmental Protection
*Mass*DFG	Massachusetts Department of Fish and Game
*Mass*DOT	Massachusetts Department of Transportation
*Mass*DPH	Massachusetts Department of Public Health
*Mass*Wildlife	Massachusetts Division of Fisheries and Wildlife
MAFMC	Mid-Atlantic Fishery Management Council
MEP	Massachusetts Environmental Police
MEPA	Massachusetts Environmental Policy Act
MFAC	Marine Fisheries Advisory Commission (Massachusetts)
MRIP	Marine Recreational Information Program
NEFMC	New England Fishery Management Council
NEFSC	Northeast Fisheries Science Center
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration (and NOAA Fisheries)
NSSP	National Shellfish Sanitation Program
OCC	Outer Cape Cod
PSP	Paralytic Shellfish Poisoning
SAFIS	Standard Atlantic Fisheries Information System
SMAST	School for Marine Science and Technology (at UMass Dartmouth)
SNE	Southern New England
USCG	United States Coast Guard
USFDA	United States Food and Drug Administration
USFWS	United States Fish and Wildlife Service
VTR	Vessel Trip Report
WEA	Wind Energy Area
YOY	Young-of-the-year

FISHERIES MANAGEMENT SECTION

Daniel J. McKiernan, Director, Section Leader

Fisheries Policy and Management Program

Personnel

Daniel McKiernan, Director
Melanie Griffin, Federal Fisheries Policy Analyst
Nichola Meserve, Interstate Fisheries Policy Analyst
Jared Silva, State/Local Fisheries Policy Analyst
Kelly Whitmore, Federal Fisheries Policy Analyst
Dr. Justin Bopp, Offshore Wind Specialist (through June)
Julia Kaplan, Communications Specialist (through April)

Overview

DMF is responsible for managing the Commonwealth's saltwater commercial and recreational fisheries. Management of marine resources unique to state waters and which cross state/federal boundaries is a constant, ongoing endeavor. A core of fisheries management professionals, with many years of practical experience and knowledge of Massachusetts fisheries, composes the team that initiates, evaluates, and selects fisheries management policy and strategies to implement rules and regulations. These rules and regulations frequently result from participation on, and in support of, federal fisheries management through the New England Fishery Management Council (NEFMC) and Mid-Atlantic Fishery Management Council (MAFMC), and interstate fisheries management through the Atlantic States Marine Fisheries Commission (ASMFC).

Our fisheries policy and management staff gather and analyze biological and economic data, communicate with the public on state, interstate, and federal fisheries management issues, and ensure adherence to administrative and regulatory protocols and procedures. This process also relies on our technical staff to provide biological analyses and other technical reviews of management options to ensure sustainable fisheries and fisheries habitat protection.

Frequent communication with commercial and recreational fishery participants is another important element of policy and management development. This effort directly involves a diverse array of fishermen, dealers, processors, and many other stakeholders. Public hearings to propose regulation changes are held by the Commonwealth's Marine Fisheries Advisory Commission (MFAC). The MFAC and the Commissioner of the Department of Fish and Game must approve most regulatory changes that DMF proposes in order for them to be implemented.

Advisory Groups

Following below is a summary of 2024 proceedings by groups advising DMF on fishery management issues.

Marine Fisheries Advisory Commission

The Massachusetts Marine Fisheries Advisory Commission (MFAC) was established by the Legislature in 1961. It

is a nine-member board, representing recreational and commercial fishing interests across the Massachusetts coast. Commissioners are appointed by the Governor to three-year terms and attend monthly business meetings as well as public hearings. Proposed regulatory changes are approved or disapproved by a majority vote at the Commission's monthly business meetings. Extensive staff preparation occurs for these meetings including the development of recommendation memoranda on proposed regulatory changes that summarize public comment and review the biological and socio-economic impacts of alternatives; and preparation of informational presentations and written briefing on state, interstate, and federal fisheries management issues to keep the MFAC apprised of recent developments.

The MFAC convened for ten business meetings during 2024. The MFAC's law enforcement focus group also met once during the year. Actions implemented during 2024 are included in the summary of fisheries management actions beginning on page 14. MFAC membership changed in 2024 with the resignation of Michael Pierdinock in September after eight years on the Commission in order to focus more on New England Fishery Management Council duties. A replacement was expected to be appointed in early 2025. The MFAC awarded DMF Deputy Director Michael Armstrong the 2024 Belding Award for his lasting contributions to fisheries science and conservation (Figure 1).

Figure 1. The June Business Meeting of the MFAC meeting was held outdoors on the grounds of the Division's Cat Cove Marine Laboratory in Salem (left) and included the presentation of the 2024 Belding Award to Dr. Michael Armstrong (right).

Marine Recreational Fisheries Development Panel

Pursuant to provisions of "An Act Instituting Saltwater Fishing Licenses," a Marine Recreational Fisheries Development Panel was established in 2010 to engage with the Division on how annual appropriations from the Marine Recreational Fisheries Development Fund should be spent. All fees collected from the sale of recreational saltwater fishing permits are deposited into this fund for the dedicated purpose of improving recreational fisheries or recreational fishery research in the Commonwealth, with a requirement that one-third of the annual appropriation be used for improving public access to marine recreational fisheries.

The Panel held one meeting during 2024; the typical second meeting for the year was postponed until early 2025 to accommodate the appointment of Tammy King, a surfcasting guide based on Nantucket, to the Panel as a replacement for outgoing member Michael Moss. Michael was involved with the Marine Recreational Fisheries Development Panel from the earliest days, starting with his participation in a 2008 Advisory Group to help DMF navigate the creation of a saltwater fishing permit. Mike was an inaugural member of the Panel and over 14 years provided valuable insights and advice that have helped improve recreational fishing in Massachusetts,

especially for shore-based anglers.

The Panel's 2024 meeting focused on the Division's recommended spending plan for the expected FY2025 fund appropriation of roughly $2.18 million. The Panel endorsed the Division's FY2025 spending plan, which included: final construction costs for the replacement fishing pier in Salem Harbor at the historic Salem Willows Park and engineering and design costs for the next large pier project in Somerset at Slades Ferry on the Taunton River; the Small Grants Program through which municipalities can compete for funds to finance public access improvement projects; enhanced sampling and assessment of the recreational fishery; public informational and educational materials and programs; monitoring diadromous fish populations and a shad stocking effort in the Taunton River; monitoring fish populations at artificial reefs; and research into striped bass catch and release mortality rates. The Panel also continued its discussion of possible Fund revenue enhancement strategies. Later in the year, several Panel members joined the Division in celebrating the official opening of the Salem Willows Fishing Pier (Figure 2).

Figure 2. State staff, local officials, Panel members, and the public celebrated the official opening of the Salem Willows Fishing Pier at a ribbon-cutting event on December 2.

Seafood Marketing Steering Committee

On August 13, 2014, "An Act Promoting Economic Growth across the Commonwealth" established a Seafood Marketing Program within DMF. The legislation laid out the initial objectives of the program, required the appointment of a 19-member steering committee to guide DMF in the administration of the marketing program, and designated funding of up to $250,000 per fiscal year from commercial harvester and dealer permit revenues. The steering committee, chaired by the DMF Director, met once virtually in 2024. At the October meeting, Seth Rolbein presented a scup proposal. See Seafood Marketing (page 119) for additional programmatic information.

Shellfish Advisory Panel

The Shellfish Advisory Panel (SAP) was established by the Massachusetts legislature in 2021 (G.L. c. 130, §1C). Its purpose is to provide a public body to advise DMF on matters related to shellfish and create a forum for the dissemination of information relevant to shellfish resources and management and the discussion of emerging shellfish-related issues. This legislative action broadened and formalized an existing body, created by DMF in 2014 and meeting on an ad-hoc basis. A legislatively formed SAP was a primary objective of the Massachusetts Shellfish Initiative's 2021 Strategic Plan. To achieve these goals,

the Panel meets at least twice annually to address ongoing matters of importance and emerging issues related to shellfish resources, fisheries, and management.

The March meeting focused on shellfish management and water quality classification related to Wastewater Treatment Plants (WWTP) and the closure of DMF's Newburyport Shellfish Depuration Plant. DMF was in the process of reevaluating the spatial extent buffer zones around WWTP outfalls for compliance with the National Shellfish Sanitation Program's Model Ordinance, and as a result, the footprint of some areas classified as Prohibited and closed to shellfish fishing was increasing. Additionally, wastewater releases from the New Bedford WWTP's Combined Sewer Overflows (CSO) produced prolonged shellfish closures in western Buzzards Bay significantly affecting commercial shellfish harvest and aquaculture in neighboring Dartmouth and Fairhaven. The Newburyport Shellfish Depuration had become inoperable due to the loss of a well-head from coastal erosion. Facing significant infrastructure upgrades and declining throughput, the Commonwealth opted to permanently close the plant. To preserve opportunities for the harvest of moderately contaminated clams, fishery participants were afforded an opportunity to run their product through a depuration facility in Maine. The Panel also discussed the reclassification of certain shellfish growing areas around Boston Harbor due to improved water quality; shellfish recalls; guidelines for shellfish planting in Prohibited areas; DMF shellfish program staff changes; and regulatory updates regarding shellfish.

At the November meeting, the focus was on updates from the Panel's Focus Groups on Aquaculture License Site Transfers and Hatchery Seed Supply. There was also continued discussion of issues related to WWTPs, CSOs, and the Newburyport Depuration Plant. DMF and The Nature Conservancy provided an update on the new statewide shellfish restoration program. There was also some discussion about the annual audit of the state's shellfish sanitation management program by the US Food and Drug Administration, updates to the shellfish constable training program, shellfish landings, and the threat posed to shellfish resources by green crabs. Panel members also requested DMF reconvene the focus group on Bulk Tagging and consider allowing aquaculturists to conduct this activity.

Commercial Fisheries Commission

In Chapter 179 of the Acts of 2022, "An Act Driving Clean Energy and Offshore Wind," Section 79 established a Commercial Fisheries Commission to develop and recommend strategies, methods and tools to promote the long-term sustainability of the Commonwealth's commercial fishing industry amidst the development of offshore energy projects. This public body is co-chaired by DMF and MA Office of Coastal Zone Management (*Mass*CZM). By 2024, the 16 members of the public were appointed. The expectation is this public body will begin to meet in 2025. The Commission is charged with meeting at least four times per year through 2030 and producing an annual report.

Public Input & Stakeholder Engagement

Input from commercial and recreational fishery participants and other stakeholder groups is integral to the Division's initiation, development, implementation, and monitoring of fisheries management initiatives. Stakeholder engagement is achieved through various structured processes including public hearings and comment periods; scoping and informational meetings; and the distribution of Advisories, the Division's newsletters, annual reports, and other publications. Such activities for 2024 are described below. Policy and Management staff also routinely participate in informal meetings with commercial, recreational, and non-traditional fisheries stakeholders at their request to discuss items of interest; and respond to constituent inquiries about fisheries management issues in the Commonwealth.

DMF Public Hearings & Comment Periods

State law requires DMF to conduct a public comment period and hold a public hearing(s) on most types of proposed amendments to the state's marine fisheries regulations. During 2024, three such comment periods were held including a total of four public hearings.

- February 7–March 8 comment period, with hearings on February 28 (Bourne) and February 29 (Gloucester): commercial fishing for striped bass, whelk, summer flounder, horseshoe crab, smooth dogfish, menhaden, mackerel, groundfish, shellfish, and permitting.
- February 21–April 5 comment period, with a hearing on March 22 (Hyannis): recreational and commercial trap fishing requirements.
- April 26–May 20 comment period, with a hearing on May 20 (virtual): emergency recreational fishery measures for scup and black sea bass and recreational filleting allowances for striped bass, and proposed measures for recreational Gulf of Maine cod and haddock.

Certain other actions, such as the Director's Declaration to adjust commercial fishery limits for quota managed species, require a public comment period only. During 2024, written public comment was accepted on the following proposed actions:

- November 1–December 6: in-season adjustment to the 2025 Period I commercial summer flounder trip limit and multi-state allowance.

DMF Scoping and Informational Meetings

DMF occasionally holds additional ad hoc meetings to inform the industry of and/or accept informal scoping comment on upcoming issues. During 2024, the following such events were held:

- February 1 stakeholder engagement meeting (virtual) on issues relevant to state waters mobile gear fishing, including state-waters sea scallop harvest practices and the Nantucket Sound trawl fishery.
- February 15 stakeholder engagement meeting (Gloucester) to discuss the status of the Division's Newburyport Depuration Plant and challenges facing the softshell clam depuration fishery.
- February 21 scoping meeting (virtual) and February 9–March 7 scoping period to gather input on revising the recreational summer flounder and scup limits and striped bass filleting requirements in accordance with ASMFC requirements.
- March 11 stakeholder engagement meeting (virtual) regarding reclassification of certain shellfish growing areas in Buzzards Bay.
- October 16 scoping meeting (Gloucester) to inform regulatory proposal development for the state's management of the commercial menhaden fishery in 2025.
- November 4 scoping meeting (New Bedford) to inform regulatory proposal development for the state's management of the summertime commercial summer flounder fishery in 2025.

Publications

Advisories: DMF released over 85 electronic notices to our subscriber list on various rule changes, public hearings, quota closures, and other important information. The use of our subscription service (Granicus' GovDelivery platform adopted in 2020) continued to prove effective in improving the quality and expanding the reach of our electronic communications with stakeholders. Advisories are also posted to the Division's website and social media platforms.

DMF News: DMF published its newsletter twice in 2024 (Figure 3). These publications serve to inform and educate our constituents on major management, science, and administrative happenings at the Division. Distribution of the newsletter occurred in electronic format through the Division's website and listserv.

Annual Report: DMF published its *2023 Annual Report*.

Figure 3. The covers of the two 2024 editions of the DMF News.

Regional Councils and Interstate Commissions

New England Fishery Management Council

Some fisheries go beyond state level and are managed regionally in collaboration with the federal government. The Director of the Commonwealth's Division of Marine Fisheries serves as one of 18 voting members on the New England Fishery Management Council (NEFMC). One of eight regional fishery councils established in 1976 under the Magnuson-Stevens Fishery Conservation and Management Act, the NEFMC supports management of the living marine resources within the United States exclusive economic zone (EEZ), spanning from 3 to 200 miles offshore, from Maine through Connecticut. The regional councils develop federal fishery management plans (FMPs), which are implemented by NOAA Fisheries after it ensures that 10 National Standards within the Magnuson-Stevens Act have been met. The NEFMC has federal FMPs for: Northeast Multispecies (13 groundfish stocks), Atlantic Sea Scallop, Monkfish, Atlantic Herring, Northeast Skate Complex (seven species), Small-Mesh Multispecies (five groundfish stocks), Red Crab, Spiny Dogfish, Atlantic Salmon, and Habitat. Since regional fisheries don't recognize jurisdictional boundaries, the Division also seeks to balance state waters management of regional fisheries in a manner consistent with and in support of federal FMPs; in some cases, this is done with the ASMFC to coordinate management plans between federal and state waters.

Meetings: During 2024, staff represented Massachusetts at five NEFMC meetings; served on the Committees for Atlantic Herring, Atlantic Sea Scallop (Chair), Executive, Groundfish, Monkfish, Skate, and Spiny Dogfish (Vice Chair) as well as the Risk Policy Working Group; acted as NEFMC liaison to the MAFMC River Herring/Shad and Squid/Mackerel/Butterfish Committees; provided technical expertise to the Groundfish, Scallop, Atlantic Herring, Monkfish, and Habitat Plan Development Teams, the Northeast Trawl Advisory Panel, and Research Set-Aside (RSA) program for Atlantic Sea Scallops; and participated in over 100 Council related meetings, hearings, and workshops. In recognition of these cooperative activities and their benefit to the successful management of fisheries, the Council once again granted the Commonwealth funds to support management and technical assistance (see Grants section for further details).

Actions: Throughout 2024, the Council finalized specifications for access to its various managed fisheries while advancing longer-term priorities including updates to Essential Fish Habitat, development of strategies for reducing gear interactions between on-demand fixed gear and other fisheries, incorporating climate resilience into fisheries management decisions and processes, as well as revising the Council's overarching Risk Policy. DMF staff continued to contribute to technical analyses and policy decisions at the NEFMC in support of 2024 work including habitat (offshore wind comments and Essential Fish Habitat review), Atlantic Sea Scallop Framework 39 (2025 specifications), Northern Edge Habitat-Scallop Framework (discontinued in June), Groundfish Amendment 10 and Framework 69 (2025–2027 specifications, Phase 1 of the Atlantic cod stock transition, and triggers for flatfish accountability measures in the scallop fishery), Joint Monkfish/Spiny Dogfish Framework to reduce sturgeon bycatch in large-mesh gillnet fisheries (Monkfish Framework 15 and Spiny Dogfish Framework 6), recreational recommendations to the Greater Atlantic Regional Fisheries Office for management of cod and haddock, and in-season adjustments to Atlantic herring specifications.

Coordination of NEFMC Nominations: DMF coordinated the process of gubernatorial nominations to vacant seats on the NEFMC, including solicitation of potential candidates and submission of nominations by the Governor's office. Nominee Mr. Michael Pierdinock of Plymouth, MA was reappointed by the Secretary of Commerce to the Massachusetts obligatory seat to serve a second three-year term on the Council.

Atlantic States Marine Fisheries Commission

The Atlantic States Marine Fisheries Commission (ASMFC) coordinates the conservation and management of 27 nearshore, migratory fish and shellfish species along the Atlantic coast. The Commission was formed through an Interstate Compact, ratified by the states and approved by the U.S. Congress in 1942. Each member state from Maine through Florida is represented by three Commissioners—the director of the state's marine fisheries management agency, a state legislator, and an individual appointed by the state's governor to represent stakeholder interests—who collectively have one combined ballot on votes taken by the Commission's species management boards. These species management boards develop and adopt interstate FMPs, which are then implemented at the state level. Failure to implement interstate FMP requirements can result in a non-compliance determination triggering the U.S. Department of Commerce to close a state's fisheries until regulatory compliance occurs. In addition to interstate fisheries management, Commission deliberations also address fisheries science, habitat conservation, and law enforcement.

Meetings: During 2024, Massachusetts had a declared interest and served on 16 species management boards, including American eel, American lobster/Jonah crab, Atlantic herring, Atlantic menhaden, Atlantic striped bass, Atlantic sturgeon, bluefish, coastal sharks, horseshoe crab, northern shrimp, shad/river herring, spiny dogfish, summer flounder/scup/black sea bass (Chair), tautog, weakfish, and winter flounder. The DMF Director also served as Vice-Chair of the Commission throughout 2024. DMF represented Massachusetts at the four routine quarterly meetings of the ASMFC, plus ten additional Board-specific meetings, three of which were held jointly

with the MAFMC on co-managed species. Management and Policy staff also served on several committees that were active in 2024 including the Striped Bass Workgroup on Recreational Release Mortality (responding to five Management Board tasks on the issue to inform future management decisions),the Recreational Measure Setting Workgroup (advising the action's Plan Development Team), and the Northern Shrimp Plan Development Team (for Draft Amendment 4), and also attended the meetings of various other technical, scientific, and monitoring committees to stay informed and contribute to the latest developments in interstate management issues. Dr. Michael Armstrong was awarded the Commission's prestigious 2024 Hart Award at the Spring Meeting for his many notable scientific and management contributions to the betterment of the fisheries of the Atlantic coast.

Public Hearings: States are afforded the opportunity of a public hearing for any draft addendum or amendment to the ASMFC's interstate fishery management plans. DMF assists ASMFC in the scheduling and moderation of such hearings. During 2024, DMF hosted or co-hosted six ASMFC public hearings to collect stakeholder input on the following management actions: American Lobster Draft Addendum XXX, Northern Shrimp Draft Amendment 4 Scoping Document, Summer Flounder Draft Addendum XXXV, American Lobster Draft Addendum XXXI, and Spiny Dogfish Draft Addendum VII.

Actions: Several of the more remarkable interstate fishery management actions that DMF management and policy staff played an integral role in 2024 included: the Striped Bass Management Board's adoption of new management measures for 2024 (Addendum II) and consideration of additional Board action for 2025, both to keep the stock on its rebuilding trajectory; the Lobster Board's approval of Addendum XXXI to postpone the implementation date of previously approved conservation measures for the GOM stock to give industry and Canada more time to prepare for the changes; and the Policy Board's ongoing development of alternative recreational measure setting processes for summer flounder, scup, black sea bass, and bluefish, for which final action was expected in 2025.

Fisheries Management Actions

Described below are the fishery management actions enacted by DMF during 2024. Actions fall into several categories: permanent regulatory changes to 322 CMR (Code of Massachusetts Regulations) which can occur only after a public hearing and comment period on the proposals and are subject to the MFAC and Commissioner of DFG's approval of the Director's recommendation; temporary (90-day) regulatory changes to 322 CMR under the Director's Emergency Authority for the preservation of the public health, safety or general welfare; annual specifications and adjustments under the Director's Declaration Authority as established in pertinent regulations, some of which require public comment periods; time-specific authorizations or restrictions per Letters of Authorization, Permit Conditions, Pilot Programs, and Quota Transfers. This list does not include regulatory changes approved by the MFAC in 2024 but not codified until 2025; such items will be covered in the 2025 Annual Report.

Atlantic Herring

Area 1A Effort Control Permit Conditions: DMF implemented landing days, possession limits, and seasonal closures for the directed herring fishery in Area 1A (inshore Gulf of Maine) consistent with ASMFC Herring Management Board decisions. Letters of Authorization were issued to vessels which had declared into the directed fishery through DMF's opt-in process and according to their federal category permit. The Massachusetts/New Hampshire spawning area closure was also implemented per the FMP's default closure dates (September 23–November 3).

Atlantic Mackerel

Commercial Mackerel Regulations: DMF adopted a new state-waters commercial trip limit for Atlantic mackerel effective May 1, 2024. The trip limit starts at 5,000 pounds and is reduced to 2,500 pounds once 80% of the annual federal mackerel quota is taken. This matches the federal open access trip limit. Catch by fish weirs is exempt. Vessels may possess non-conforming quantities of mackerel provided they were lawfully caught in another jurisdiction and all gear is stowed and no fishing is occurring.

Atlantic Menhaden

Commercial Menhaden Regulations: DMF adopted several adjustments to its commercial menhaden management rules in response to fishery performance in 2023. Specifically, DMF sought to make access more adaptive to differing resource distribution and availability scenarios, while still balancing quota use and season length. First, the directed purse seine fishery opening date was moved up to May 15 (formerly June 15); this did not alter the June 1 date to access the inshore restricted areas with nets. Second, the limited entry trip limits were amended with two quota-use provisions: (1) for the 50% quota use trigger that drops the trip limit to 25,000 pounds, should this not occur until after August 31, the trip limit will remain at 120,000 pounds through 90% quota use; and (2) if more than 10% of the quota remains on October 15, the trip limit will increase to 360,000 pounds with a requirement for the vessel to call into DMF at least 48-hours prior to landing. Three fishery requirements adopted in 2023 also went into effect for the first time in 2024: purse seine net certification for any nets subject to size restrictions; vessel fish storage certification for any harvester or carrier vessel holding and landing menhaden in excess of 6,000 pounds; and daily electronic catch reporting for limited entry harvesters prior to landing.

Quota Transfers: Massachusetts received three transfers of commercial menhaden quota during the 2024 season to allow the mid-scale fishery to continue operating at the 25,000-pound trip limit while menhaden remained abundant in our local waters. Two transfers from Georgia (500,000 pounds) and South Carolina (700,000 pounds) in mid-July prevented the 90% quota use trigger from being reached (and the limited entry trip limit from dropping to 6,000 pounds) for several additional weeks in August. Another transfer from Rhode Island (500,000 pounds) in early September brought the quota use back below 90%, allowing the resumption of the 25,000-pound trip limit through 100% quota use. Ultimately, the fishery took about 98% of the quota in 2024 (significantly different from the 2023 fishery which left over 70% of the quota unused) thanks to the regulatory changes enacted in 2024 and a return to more typical local resource availability. Menhaden quota transfers require multi-state agreement and ASMFC approval per FMP requirements.

Atlantic Striped Bass

Recreational Striped Bass Regulations: DMF updated the state's rules concerning at-sea and shore-side filleting of recreationally caught striped bass to clarify existing possession standards and reflect new interstate management requirements. These changes more clearly defined the state's no-filleting rule for striped bass caught by anglers fishing from shore or a private vessel, and revised the conditions associated with the state's allowance for for-hire vessel operators to fillet striped bass for their customers. Addendum II to Amendment 7 of the interstate FMP required states that authorize filleting in the recreational fishery to require the retention of racks and the possession of no more than two fillets per legal fish. DMF first filed emergency regulations in order to comply with Addendum II's May 1 implementation deadline, and then filed final regulations after the completion of public hearings. Based on the comment received, the final rules included several changes from the emergency rules. Under the final rules, anglers fishing from a private vessel or shore may not fillet striped bass until ashore (unless for immediate consumption) and until all fishing has ceased and all gear is stowed. For-

hire captains may fillet striped bass for their patrons during a for-hire trip provided the racks are retained until the trip has ended and the patrons have departed the vessel. No more than two fillets per fish with a minimum two square inches of skin intact may be in possession by any person until they reach their domicile.

Commercial Striped Bass Regulations: DMF made several revisions to the commercial striped bass regulations for 2024 in response to a coastwide quota reduction, recent fishery performance, and enforcement and compliance concerns. Specifically, Addendum II reduced all states' commercial quotas by 7% beginning in 2024, the fishery closed in early August in both 2022 and 2023, and issues of commercially harvested fish being left at unattended dealer locations occurred in 2023. The resulting changes: (1) eliminated Monday as an open fishing day, reducing the number of open fishing days to start the season from three to two (Tuesdays and Wednesdays); (2) established a trigger to add Thursday as an open fishing day on August 1 should more than 30% of the quota remain available; and (3) required dealers to be present and tag fish immediately upon primary purchase from a commercial fisher.

Bluefish

Commercial Quota Transfers: Due to a 43% decline in the 2024 coastwide quota which resulted in a 40% decline in Massachusetts' state quota, DMF proactively sought out transfers to augment our starting allocation and prevent an early season closure. In cooperation with multiple donor and recipient states, Massachusetts received an additional 22,837 pounds of bluefish quota in July from New Jersey, Maryland, and Virginia combined. Ultimately, the fishery underperformed prior year landing levels and this additional quota was not needed. In December, Massachusetts transferred 65,000 pounds of unused quota to North Carolina to aid in their season length. Bluefish quota transfers require multi-state agreement and ASMFC and NOAA Fisheries approval per FMP requirements.

Groundfish

American plaice, cod, haddock, halibut, ocean pout, pollock, redfish, windowpane flounder, winter flounder, witch flounder, wolffish, and yellowtail flounder are managed as part of a federal multispecies FMP. DMF also includes monkfish in its definition of multispecies groundfish. Any management actions affecting these species are thus grouped.

Recreational Cod and Haddock Regulations: DMF matched federal rules for recreational Gulf of Maine (GOM) cod and haddock. For GOM cod, the recreational fishing season was set as September 1–October 31 with a 1-fish bag limit and 23" minimum size. This increased the minimum size by 1" compared to 2023. For GOM haddock, the recreational fishing season was set as April 1–February 28 with a 15-fish bag limit and 18" minimum size. This eliminated a split mode management approach taken in 2023 by managing for-hire vessels and private anglers under uniform rules, rather than having private anglers be subject to a 10-fish bag limit at a 17" minimum size.

Commercial Groundfish Regulations: DMF reduced the spatial extent of the May commercial groundfish closure by moving the southern boundary of the closure north from 42°20' N latitude (Boston) to 42°25' N latitude (Nahant). This action was taken in response to a request from a commercial gillnetter to provide additional access to available flounder resources without affecting known seasonal cod spawning aggregations. The northern boundary and seaward closure boundaries remained the maritime border between Massachusetts and New Hampshire and the state-federal waters line, respectively.

Commercial Groundfish Consecutive Daily Trip Limit Pilot Program: In mid-September, DMF initiated a new pilot program for commercial trawlers and gillnetters participating in the state-waters groundfish fishery to land

two daily limits of Gulf of Maine winter flounder and yellowtail flounder that were lawfully caught and retained over consecutive calendar days. The purpose of this pilot program is to enhance flexibility and safety for these small-scale vessels given the high cost of fuel, the long-distance vessels must travel between port and seasonal fishing grounds, and challenges related to accessing fish buyers in certain ports. This pilot program, requested by industry members, was modeled after the program DMF had authorized the past six years for the summertime mixed species trawl fishery, including the catch segregation and tagging and daily logbook requirements. The inclusion of winter flounder as an eligible species in the pilot program required DMF to develop a conservation equivalency proposal for review and approval by the Atlantic States Marine Fisheries Commission given that the interstate plan's trip limits are per trip. Seven Letters of Authorizations were issued to participate in the fishing year 2024 pilot program (running through April 30, 2025).

Horseshoe Crab

Commercial Horseshoe Crab Regulations: DMF implemented a series of new horseshoe crab management regulations which went into effect on April 26. Foremost is a complete ban on harvest by all sectors from April 15–June 7 to protect spawning horseshoe crabs. This replaced the previous lunar closures, which prohibited harvest for the five-days around each new and full moon from April 16 through June 30. DMF also adopted a uniform 300 horseshoe crab trip limit for all commercial fishers participating in the limited entry bait fishery regardless of the gear type. Regulations previously allowed a 400-crab limit for hand harvesters. This trip limit automatically increases to 400 horseshoe crabs should more than 50% of the quota remain available on August 1 and automatically reduces to 200 horseshoe crabs should 80% of the quota be taken before September 15. Lastly, DMF adopted a state regulation to match federal prohibitions on harvesting horseshoe crabs within the boundaries of the Monomoy National Wildlife Refuge and the Cape Cod National Seashore.

Lobster

Lobster Regulations: In late 2024, DMF promulgated a series of regulatory changes affecting the harvest and possession of lobsters by commercial and recreational fishers and the possession and sale of lobsters by seafood dealers. This included a series of changes to be phased in overtime (beginning in 2025) affecting minimum and maximum carapace size standards, v-notch possession rules, and minimum escape vent sizes for traps. This action was taken to comply with Addenda XXVII and XXXI to the Interstate Fishery Management Plan for American Lobster. These addenda were developed to increase the spawning stock biomass of the Gulf of Maine/Georges Bank lobster stock by proactively implementing measures in response to declining recruitment trends and an anticipated decline in stock abundance driven primarily by environmental factors.

Commercial Fishery. Beginning in 2025, permit holders authorized to fish traps in Lobster Conservation Management Areas (LCMAs) 1 and 3 will no longer be issued annual trap tags in excess of their trap allocation (i.e., an additional 10%) to pre-emptively cover trap loss. The adopted schedule for additional changes includes the following: effective July 1, 2025, a 1/16" increase to the LCMA 1 minimum carapace size to 3 5/16" and the establishment of a 6 3/4" maximum carapace size and v-notch possession standard of 1/8" depth with or without setal hairs for state-only Outer Cape Cod LCMA permit holders (matching federal rules); effective July 1, 2027, a 1/16" increase to the LCMA minimum carapace size to 3 3/8"; effective July 1, 2028, an increase in the minimum escape vent sizes for lobster traps in LCMA 1 to 2" by 5 3/4" for rectangular vents and 2 5/8" diameter for circular vents (consistent with the sizes used in other LCMA's with a minimum carapace size of 3 3/8"); and effective July 1, 2029, a 1/4" decrease in the OCC LCMA and LCMA 3 maximum carapace size to 6 1/2".

Seafood Dealers. With the above-described changes to the carapace size and v-notch rules affecting the commercial harvest of lobster, the corresponding standards for seafood dealers were also amended. However, a

three-month grace period applies after each change (i.e., through September 30 of that year) whereby seafood dealers are allowed to possess lawfully purchased non-conforming lobsters to allow them to liquidate existing inventory.

Recreational Fishery. Persons who recreationally fish in the Gulf of Maine (GOM) and Outer Cape Cod (OCC) Recreational Areas will also be subject to changing minimum and maximum carapace size standards and escape vent rules to match what is occurring in the commercial fisheries in LCMAs 1 and Outer Cape Cod. However, these recreational changes are scheduled to go into effect on May 1 of the applicable year—for the start of the recreational fishing season—rather than in-season on July 1, like the commercial fishery. The recreational v-notch possession standard was not scheduled to change because it is already at 1/8" with or without setal hairs.

Protected Species

Seasonal Fixed Gear Closure Declaration: To reduce the risk of right whale entanglement in fixed gear buoy lines, state regulations establish seasonal closures for gillnets and trap gear through May 15 that may be extended by Declaration beyond May 15 or rescinded after April 30 based on the presence or absence of right whales. In 2024, these gear closures were lifted effective May 8 as a result of aerial surveys demonstrating right whales had migrated out of state waters. With the lifting of the fixed gear closures, Mobile Gear Area 1A (Gloucester/Rockport) was also closed to mobile gear fishing until the next open period began on June 15.

Vessel Speed Limit Declaration: To reduce the risk of ship strikes on right whales, state regulations establish a speed limit of 10 knots for small vessels (<65' overall length) operating within Cape Cod Bay during March and April, although this timing may be adjusted by Declaration as reasonably necessary to prevent vessel strikes. In 2024, the speed limit was extended through May 7 given the continued presence of right whales in the area. A complementary federal speed restriction in the same area applied to vessels 65' and greater.

Protected Species Regulations: Effective January 3, the Division modified the state's protected species regulations to allow the use of a newly developed buoy line in the Massachusetts Mixed Species Pot/Trap Fishery as part of the state's North Atlantic right whale conservation program. This new buoy line is either red or red and white ("candy cane") and has a diameter of 3/8" or less, a breaking strength of 1,700 pounds, and a "MASS LOBSTER" tracer visible throughout the buoy line. The Massachusetts Lobstermen's Association and rope manufacturers worked to develop this fully formed weak rope that is uniquely identifiable to Massachusetts as a better alternative to placing inserts at certain intervals into a buoy line to comply with the breaking strength rule.

Sharks

Smooth Dogfish Commercial Regulations: DMF increased the smooth dogfish commercial trip limit from 100 pounds to 300 pounds by regulation. DMF had similarly increased the trip limit in 2023 through an in-season adjustment in response to a harvester request to enhance quota utilization and reduce regulatory discards.

Spiny Dogfish Quota Transfers: The Spiny Dogfish Northern Region (Maine–Connecticut) transferred 2 million pounds of FY 2023 commercial quota to Virginia in January/February and 2 million pounds of FY 2024 commercial quota to Virginia in December. These transfers helped Virginia avoid an early quota closure without impacting the Northern Region's fishery which primarily operates in the first eight months of the fishing year (i.e., May–December). All such transfers require multi-state agreement and ASMFC approval per FMP requirements.

Summer Flounder, Scup, and Black Sea Bass

Summer flounder (fluke), scup, and black sea bass are managed as part of a multispecies FMP; their management actions are thus grouped.

Summer Flounder Commercial Declarations: A Director's declaration was used to reduce the Summer Flounder Period I (January 1–April 22) commercial trip limit from 10,000 pounds to 5,000 pounds in time for the fishery's 2024 start. This responded to a 56% decrease in the state's commercial quota for 2024 and interest to avoid an early closure of the Period I fishery. This large reduction in the state's quota was driven by two factors. First, the coastwide commercial quota was being reduced by 42% in response to the most recent stock assessment finding that spawning stock biomass had been overestimated in recent years leading to overfishing occurring in the terminal year. Second, because the coastwide quota was being reduced below 9.55 million pounds, the state's quota allocation reverted to its baseline 6.82% share, rather than the near 9% share allocated in recent years under the provisions of Amendment 21 to the Fishery Management Plan that attempts to increase equity across states when the stock is in a strong condition. Despite the trip limit reduction, the Period I fishery was projected to take its 30% allocation by February 5, meaning the trip limit was further reduced to 100 pounds on February 6 according to the regulations.

Summer Flounder Commercial Regulations: DMF amended several trip limits and added a new trip limit trigger for the commercial summer flounder fishery in response to the coastwide quota reduction (see above) and recent fishery performance. DMF adopted the 5,000-pound trip limit for the Period I fishery (January 1–April 22) that was set by Director's declaration for 2024 into the regulations (first affecting 2025). For the summertime fishery beginning April 23 through September 30, DMF adopted a new trip limit trigger whereby the trip limits reduce from 600 pounds to 400 pounds for net fishers and from 400 pounds to 250 pounds for hook fishers should 75% of the annual quota be taken before August 1. (This trigger was not tripped in 2024, and the quota was taken and the fishery subject to closure on August 28.) Lastly, DMF reduced the fall fishery (October 1–December 31) trip limit from 10,000 pounds to 5,000 pounds while also increasing the trigger for this elevated trip limit from 5% of the quota remaining after September 30 to 10% (otherwise 800 pounds).

Summer Flounder Commercial Authorizations: The Director re-authorized the multi-state possession limit allowance for the 2024 Period I fishery. Per the regulations, this allowance is subject to an annual authorization by the Director. Under this allowance, commercial fishers who are permitted to land summer flounder in multiple states are authorized to possess non-conforming quantities of summer flounder while in Commonwealth waters and ports, provided the non-conforming quantities of summer flounder are clearly labeled with the state to be landed in, comply with that state's commercial summer flounder limit, and remain on the vessel while the Massachusetts limit is being landed. Commercial fishers were no longer required to obtain a Letter of Authorization or call into the Massachusetts Environmental Police prior to landing.
DMF also renewed the Consecutive Daily Trip Limit program that allows vessels participating in the summertime mixed species trawl fishery south of Cape Cod to possess and land two days' trip limits of summer flounder and other commonly caught species (e.g., horseshoe crabs, whelks, black sea bass) provided each day's catch is segregated and tagged (with a DMF-issued tag). Smooth dogfish was added to the eligible species for the first time in 2024, per industry request. Participation was granted by Letter of Authorization. Additional conditions include completion of a daily logbook. This program is designed to enhance economic efficiency and address on-the-water safety issues. Thirty-four LOAs were issued to participate in the 2024 program.

Summer Flounder Recreational Regulations: For 2024, there was a mandate to reduce coastwide recreational summer flounder harvest by 28%. To achieve this in Massachusetts, DMF increased the minimum size limit for vessel-based anglers by 1" (from 16.5" to 17.5") and shortened the season for all anglers by nine days (from May 21–September 29 to May 24–September 23). The possession limit remained 5 fish for all anglers, and the

minimum size limit 16.5" for shore-based anglers.

Scup Recreational Regulations: For 2024, there was a mandate to reduce coastwide recreational scup harvest by 10%. This was achieved on a regional basis among Massachusetts, Rhode Island, Connecticut, and New York through a 1/2" increase to the minimum size limit for vessel-based fishers (from 10.5" to 11"). In Massachusetts, this resulted in a May 1–December 31 open fishing season with a 30-fish bag limit and an 11" minimum size limit for vessel-based fishers and a 9.5" minimum size limit for shore-based fishers. The for-hire sector maintained its May 1–June 30 “bonus season” whereby fishers on for-hire trips have a 40-fish bag limit, and the limit is otherwise 30 fish. This adjustment was first adopted by emergency regulation in time for the start of the fishing season, followed by final regulations.

Black Sea Bass and Scup Commercial Pot Gear Pilot Program: DMF initiated a pilot program allowing black sea bass and scup pot permit holders to possess and land consecutive daily trip limits that were lawfully caught and retained over two consecutive open fishing days provided each day’s catch is segregated and tagged (with a DMF-issued tag). Access to this program was granted by Letter of Authorization in late July to promote quota utilization with more efficiency, as requested by industry members. The pilot program was modeled after the Consecutive Daily Trip Limit pilot program for trawl vessels participating in the summertime mixed species fishery south of Cape Cod. Eleven LOAs were issued to participate in the 2024 pilot program.

Black Sea Bass Recreational Regulations: DMF adjusted the recreational fishing season for black sea bass so that it would continue to open on the third Saturday of May. Under a status quo harvest mandate for 2024, this change was made through conservation equivalency, meaning days were taken off the end of the season to account for an opening earlier. This resulted in an open fishing season of May 18 through September 3 with a 4-fish bag limit and 16.5" minimum size limit. (The season otherwise would have been May 20 through September 7.) This adjustment was first adopted by emergency regulation in time for the start of the fishing season, followed by final regulations.

Commercial Quota Transfers: DMF accepted a total of 20,054 pounds of commercial summer flounder quota from other states in 2024. This included three mid-season transfers from Virgina (totaling 13,701 pounds) and one mid-season transfer from North Carolina (2,353 pounds) to account for landings made by vessels bound for those states but granted safe harbor in Massachusetts due to medical or mechanical issues, and one post-season transfer from Maine (4,000 pounds) to help offset a quota overage in Massachusetts. Additionally, DMF transferred commercial Summer Period scup quota to Connecticut to help augment their allocation with no impact on Massachusetts’ fishery: 200,000 pounds in April, and another 200,000 pounds in July. All such transfers require multi-state agreement and ASMFC and/or NOAA Fisheries approval per FMP requirements.

Shellfish

Shellfish Regulations: Several adjustments were made to the state’s shellfish harvest and handling regulations effective May 1, 2024. DMF clarified that only ice made from approved sources may be applied to shellfish for any purposes. Approved sources of ice include ice made from fresh potable water and ice made from seawater taken from shellfish growing areas classified as Approved or Conditionally Approved and in the open status. DMF adopted less prescriptive oyster icing standards during the *Vibrio* Control Season. Rather than having to surround oysters with specific dimensions of ice, the rules were changed to require oysters or bags thereof to be completely and continuously covered. Additionally, primary buyers may take on the burden of icing oysters should the oysters be landed and sold within the time-to-icing window. DMF also refined the shellfish tagging regulations to make clear that the harvester tag must include the most specific alpha-numeric sequence for the shellfish growing area. DMF also adopted a state-wide prohibition on harvesting shellfish at night, rather than relying on a myriad of state and local rules to accomplish this. Lastly, to accommodate congestion at landing

sites, DMF codified an accommodation to allow the primary sale of shellfish at approved municipally managed lots.

Whelk

Commercial Whelk Regulations: DMF postponed the next scheduled increase to the whelk minimum gauge width for a period of three years to accommodate additional evaluation of the management approach. This means that the 3⅛" minimum gauge width, in place since 2021, will remain in effect through April 14, 2027, and the pending increase to 3¼" will not occur until April 15, 2027. This applies to both knobbed and channeled whelks. The three additional ⅛" increases will occur every third year afterward, bringing the minimum gauge width size to 3⅝" in 2036, unless modified by future management action. In 2019, DMF implemented a schedule to gradually increase the whelk gauge width by ⅛" intervals to enhance spawning stock biomass by bringing the size-at-harvest closer to the terminal gauge width corresponding to the size at 50% female whelk sexually maturity. However, there are concerns about how this management program may result in the fishery harvesting exclusively female whelks, thereby skewing sex ratios in the population. DMF intends to gain insight from the results of a Management Strategy Evaluation that was anticipated to be conducted by the University of Massachusetts Dartmouth School for Marine Science and Technology (SMAST) during the pause to evaluate management alternatives.

General Matters and Other Species

Free Saltwater Fishing Days Declaration: DMF declared May 12 (Mother's Day) and June 16 (Father's Day) as the Commonwealth's free saltwater fishing days for 2024. This reflects a change from prior years in which the whole weekend of Father's Day comprised the free days. By statute, the Division may establish two such days per year when anglers need not have a saltwater recreational fishing permit to fish the marine waters of the state, out to 3 miles.

Commercial Permitting Regulations: DMF made several revisions to its commercial permitting regulations. First, the regulations were updated to allow for commercial fishers to carry and display their permit electronically, rather than having to produce a hard copy. This change was made possible through DMF transitioning to a new permitting system that can issue commercial fishing permits in a PDF format. Second, DMF modernized the definition of "immediate family" to be inclusive of step and adoptive relationships, and to accommodate the transfer of latent (but otherwise transferable) permits among immediate family members. Lastly, DMF lowered the transferability standards for summer flounder, black sea bass, and tautog regulated fishery permit endorsements. Whereas previously these endorsements had to be actively fished in four out of the past five years to be transferable, the requirement was reduced to two out of the past five years. This was done to enhance the transferability of these endorsements to allow existing commercial fishers to build more diverse permit portfolios and to accommodate new entrants.

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.

In 2024, DMF initiated two adjudicatory proceedings. The first matter dealt with a fisher whose commercial lobster permit was previously sanctioned for violations of the seasonal trap gear closure to protect right whales. This individual failed to comply with the conditions of their permit sanction. A settlement was reached allowing

this person to permanently transfer out of the commercial lobster fishery. The second matter dealt with a fisher who had abandoned their lobster trap gear and failed to remove it from the seasonal trap gear closure to protect right whales. A settlement was reached allowing this person to retain the commercial lobster permit subject to a probationary period, seasonal suspension, and reduced trap allocation.

Two proceedings that were initiated in 2023 were disposed of in 2024. One matter dealt with two commercial lobster permits held in the same family and one individual exceeding the commercial trap limit, fishing untagged traps, fishing gear belonging to the other permit holder, and submitting falsified catch reports. A settlement was reached with the individual actively fishing the gear permanently forfeiting their permit and the other permit holder retaining their permit with a reduced trap allocation. The second matter dealt with a *Vp* Illness Traceback Report that uncovered various reporting inconsistencies and violations. A settlement was reached that included a corrective action plan to enhance reporting and a three-year permit probation.

Offshore Wind

The Commonwealth of Massachusetts supports the co-existence of the offshore wind industry and the fishing communities of the Northeast. DMF engages with offshore wind development by working directly with developers to minimize impacts during project siting and layout, reviewing offshore wind project fisheries and habitat monitoring plans, organizing and participating in state and regional working groups to improve regional research efforts, contributing to preparation of federal guidelines for monitoring and fisheries compensation, and providing best management recommendations to state and federal agencies in response to developer permitting submissions.

Massachusetts Fisheries Working Group on Offshore Wind

The Massachusetts Fisheries Working Group on Offshore Wind (FWG) provides an important forum for maintaining a dialogue with key stakeholders, receiving their feedback and guidance, and identifying issues and concerns regarding offshore wind development and operation on the Atlantic outer continental shelf. The FWG is convened and managed by *Mass*CZM and DMF in coordination with the Massachusetts Clean Energy Center and includes a range of commercial and recreational fishery representatives, scientists, and state and federal agencies. Following the siting and leasing process, the FWG evolved into a forum for developers, state and federal agencies, and the fishing community to discuss topics relating to the offshore wind projects proposed for Lease Areas within the Wind Energy Areas (WEAs). Held quarterly, FWG meetings in 2024 covered topics including fisheries mitigation funds and claims processes, habitat and fisheries monitoring, construction updates, navigation and transit safety enhancements, Gulf of Maine wind energy siting, leases and research arrays, boulder relocation mitigation, and the regional fund administrator fisheries compensation initiative among 11 Atlantic U.S. States. Multiple initiatives were born out of FWG discussions, such as the Boulder Relocation Framework for Guidance and Policy.

DMF also lends expertise and resources to other state and regional panels, working groups, advisory councils and committees to further the responsible development of offshore wind and to guide useful research and mitigation projects. In 2024, DMF staff participated in meetings of the Massachusetts Habitat Working Group on Offshore Wind, the Eleven States' Regional Initiative Design Oversight Committee, Responsible Offshore Science Alliance's Advisory Council, the Regional Wildlife Science Collaborative, the Maine Offshore Wind Research Consortium, and the Interagency Offshore Wind Council, among others. Massachusetts' unique standing as an experienced participant in offshore wind development allows for a unique and informed perspective as further development and mitigation strategies are discussed.

Mitigation Funds

In 2024, DMF worked to improve access for impacted fishers to offshore wind compensatory mitigation funds and advised developers on how to improve communications and mitigation strategies with the fishing industry. Fisheries mitigation funds were made available by Ørsted and Vineyard Wind to Massachusetts fishers with various qualification criteria, and with differing compensation methods. Vineyard Wind offered a claims period in the spring, making over $19 million in direct compensation funds available to impacted fishers over the life of the project. Ørsted offered a fisheries direct compensation package (over $7 million over life of project) and a Navigational Enhancement and Training Program, which remain open, to impacted fishers. DMF aided in communicating the claims process and conducted outreach with the fishing industry. Progress was made towards designing and offering the Massachusetts Fisheries Innovation Fund, a mitigation package aimed at ensuring safe and profitable fishing continues as offshore wind is developed in North Atlantic waters. This fund, seeded with $1.75-million from Vineyard Wind's compensation package and which may be bolstered by other developers' funds, will support future fishing, research and safety initiatives that will create lasting benefits to the co-existence of offshore wind and the fishing industry. To address fisheries stakeholders left out of the existing mitigation process, two firms were selected to act as the Regional Fund Administrator for the Eleven States' Fisheries Compensation Fund. The regional approach was taken to simplify and streamline compensation package delivery to impacted fishing industries, and the claims process will be designed by a committee on which DMF will participate. It is expected that the claims process from the Eleven States initiative will take two years to complete. Even in a changing energy landscape, DMF continues to create partnerships, engage stakeholders and conduct analysis and project review in order to promote the development of offshore renewable energies while reducing conflict with existing marine industries.

Southern New England Wind Energy Area Developments

Offshore wind development in 2024 saw the completion of Ørsted's South Fork Wind project in March, making it the first utility-scale offshore wind project in the country. This 12-turbine array produces and delivers up to 130 megawatts (MW) of electricity to Long Island, New York. Ørsted also continued construction of their adjacent Revolution Wind project, which saw electricity export cables installed, and the first of up to 65 wind turbines completed on September 3. This array, projected to be completed and operational in 2026, will deliver up to 704 MW to consumers in Connecticut and Rhode Island.

Vineyard Wind 1, an Avangrid and Copenhagen Infrastructure Partners project, completed the installation of foundations for all 62 planned turbines in 2024. This project, which will deliver up to 800 MW of electricity to Massachusetts once completed, had also begun generating power to the Massachusetts grid in January, but a manufacturing deviation in the turbine blades being used led to a blade failure and subsequent work stoppage in July. An order from the federal Bureau of Safety and Environmental Enforcement mandated the suspension of all blade installations and power generation activities until a revised Construction and Operations Plan (COP) was submitted and approved. Vineyard Wind 1's revised COP, submitted in December, stated plans to replace all blades on 22 previously-completed turbines. This setback may delay the completion of Vineyard Wind 1 by over a year.

A third Ørsted project in the Massachusetts/Rhode Island offshore wind lease area, Sunrise Wind, received final project approval from BOEM in June of 2024. This project, which may build up to 94 wind turbines and deliver 924 MW of electricity to New York, is projected to be completed in 2027.

Two additional projects, New England Wind (formerly named Park City Wind and Commonwealth Wind) and SouthCoast Wind (formerly Mayflower Wind), require additional federal permits to begin in-water construction. New England Wind plans to build up to 141 wind turbines and deliver power into Cape Cod, Massachusetts.

SouthCoast Wind plans to build up to 155 wind turbines and deliver power to Somerset, Massachusetts. Neither project had established a Power Purchase Agreement, which provides the route to market for offshore wind-generated electricity, by the end of 2024.

Gulf of Maine Wind Energy Area Developments

DMF continued to participate in ongoing coordination with the Department of the Interior's Bureau of Ocean Energy Management (BOEM) to finalize siting for offshore wind Lease Areas in the Gulf of Maine. At the start of 2024, BOEM was assessing and incorporating comments to narrow down the existing Draft WEA. In March, BOEM announced a Final WEA in the Gulf of Maine consisting of roughly 2 million acres, approximately 23-92 miles off the coasts of Massachusetts, New Hampshire, and Maine. This represented an 80% reduction from the original Call Area and a 43% reduction from the Draft WEA. DMF, along with *Mass*CZM, submitted comments that incorporated input received through conversations with marine stakeholders and subject matter experts. This Final WEA, to which DMF also submitted comments regarding the Environmental Assessment, was pared down to the final Proposed Sale Notice, which was announced along with the Gulf of Maine lease area auction on April 30. As a result, the original Call Area (9.9 million acres) was reduced by 90% to eight Lease Areas totaling 970,000 acres after extensive comments and consideration of commercial fishing activities (both fishing and transiting), protected species, and other marine and coastal stakeholders (Figure 4). In late October, BOEM held the first commercial lease sale for floating offshore wind on the Atlantic coast. The auction resulted in two companies (Avangrid Renewables and Invenergy NE Offshore Wind) being awarded two lease areas each, totaling $21.9 million in bids and a potential to power more than 2.3 million homes. These awards also included binding commitments from the awardees to invest over $5 million in workforce and supply chain development, as well as fisheries compensatory mitigation.

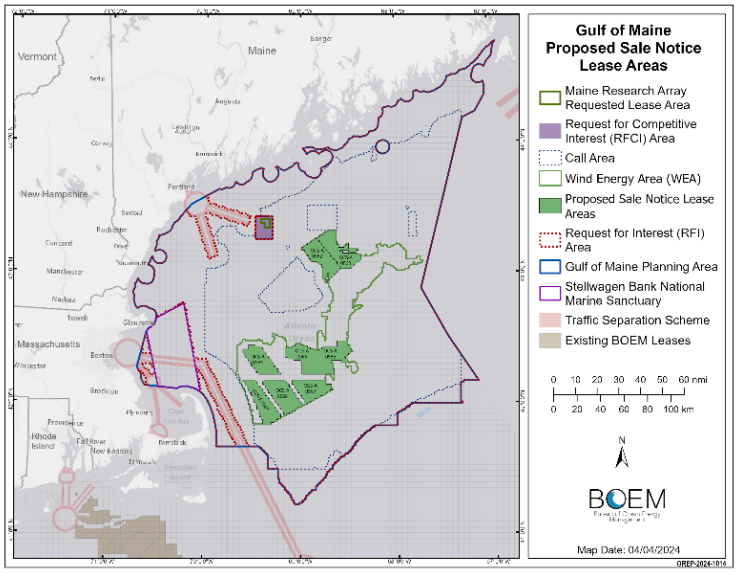

Figure 4. BOEM Gulf of Maine Proposed Lease Areas

Other Activities

Marine Fisheries Institute

The Massachusetts Marine Fisheries Institute (MFI) is a cooperative venture between DMF and SMAST. Founded in 2002, the MFI exists to promote sustainable fisheries through scientific study and the provision of timely information to protect, conserve, and manage Massachusetts and New England marine fisheries and their habitats in a manner that balances the economic, environmental, and cultural interests of the citizens of the Commonwealth. DMF's Director and SMAST's Dean co-chair the MFI with additional agency and university staff serving as research, education, and policy directors.

In 2024, the MFI continued its record of providing independent scientific research applied to regional, national, and international marine fisheries with an emphasis on cooperative research between scientists and fishermen.

Continuing to expand beyond traditional areas of focus on Northeast multispecies and Atlantic sea scallops, MFI researchers have been highly productive in a variety of areas, including shellfish modeling, nutrient analysis for anadromous fish habitat, shelf break upwelling dynamics, on-call fishing gear, and climate change effects on fishery catch rates.

In addition to MFI contributions to research, MFI has also been a vehicle for advancing graduate education in fisheries-related fields. This includes direct involvement by and support for students in MFI research and workshop activities, participation by DMF scientists in graduate and post-doctoral advising and development of courses, enrollment of DMF personnel in graduate programs, as well as other educational efforts. Additional details can be found in the 2023–2024 MFI Annual Report.

Striped Bass Conservation License Plate

During 2019, DMF and the Massachusetts Environmental Trust (MET) collaborated to develop a new Striped Bass Conservation Plate, from which the proceeds ($40 per issued plate every other year) would be dedicated to striped bass studies, fish passage improvement projects, and angler education through a grant process. The plate became available in 2022, and through the end of 2024, over 3,000 plates were issued. The grant review panel was scheduled to meet in early 2025 to review available funds and potential projects that could be supported by the License Plate proceeds.

Stellwagen Bank Sanctuary Advisory Council

Staff served as state representatives to the Stellwagen Bank National Marine Sanctuary's (SBNMS) Sanctuary Advisory Council (SAC), which included attendance at three SAC meetings in 2024. The SAC is a community-based body, established by the Secretary of Commerce per the National Marine Sanctuaries Act, that advises the sanctuary superintendent on issues relevant to the effective implementation of the Sanctuary management plan. In 2024, staff reported on DMF activities relevant to Sanctuary resources (e.g., right whale conservation, Commonwealth biodiversity initiative, fisheries research, and management actions), reviewed the Sanctuary's first draft Climate Vulnerability Assessment for SBNMS, served as advisor and co-applicant for a research proposal investigating impacts of offshore wind development on sand lance in SBNMS, and served on the SAC's subcommittee on offshore wind energy. The subcommittee met four times in 2024 to develop recommendations to the superintendent regarding best practices for offshore wind development occurring in or near the Sanctuary in order to protect sanctuary resources, minimize environmental impact, and support research-informed offshore wind development.

Permitting and Statistics Program

Personnel

Story Reed, Deputy Director
Anna Webb, Assistant Director
Kerry Allard, Permitting Program Coordinator
Kim Lundy, Dealer Reporting Coordination & Quota Monitoring
Erich Druskat, Fisheries Data Analyst
Scott Schaffer, Fixed Gear Data Analyst
Nicholas Buchan, Harvester Reporting & VMS Coordination
Mary Ann Fletcher, Fisheries Statistics Support
Matthew McLaughlin, Harvester Reporting Data Entry
Kiera Lawlor, Vessel Tracking Support (started in May)
Matthew Duggan, Permitting Specialist
Lynne Besse, Permitting Receiving Teller
George Davis, Permitting & Support for Fisheries Reporting
Luke Putaansuu, Permitting & Support for Fisheries Reporting
Vicky Oliviera, Permitting Receiving Teller
Ivy Guyotte, Permitting Receiving Teller & Support for Fisheries Reporting
Thomas Hoopes, Contractor

Overview

The **Permitting Project** is responsible for the issuance of commercial fishing, seafood dealer, recreational fishing, scientific, and other types of Division-issued permits; overseeing and approving the transfer of limited entry fishing permits and endorsements; issuing trap and fish tags; and issuing Letters of Authorization as needed. The project follows applicable laws, regulations, and policies relative to these activities. Project staff fulfill public data requests for non-confidential permit data and provide support to administrative staff as needed. Project staff also interact with the public on a routine basis to answer questions on permitting and regulations.

The **Fisheries Statistics Program** collects fisheries dependent data from both commercial harvesters and dealers involved in the initial sale of food and shellfish, and designated as primary buyers. Both data sets are collected in a standardized trip-level format from all commercial permit holders. These data have broad applications and uses, both within DMF and to fulfill requests made from outside the agency. Personnel also participate in the planning and development of the Atlantic Coastal Cooperative Statistics Program (ACCSP) and provide support to administrative staff for policy and permitting. In addition, staff act as a liaison to the Administration's Energy & Environmental Affairs Information Technology Group for the Division and the Gloucester facility and, along with other agency personnel, continue to maintain the agency's websites and Oracle databases.

Permitting Project

Commercial Fishing Permits

Anyone who lands and sells finfish, shellfish, lobsters, edible crabs, or other living marine resources in Massachusetts must have a DMF commercial fishing permit and must sell only to permitted Massachusetts dealers. All 2024 commercial and dealer permits were issued through DMF's new FISH permitting system (which

went online in January 2023) by DMF staff. DMF issued a total of 7,733 commercial fishing permits in 2024 (Table 1). Over the past decade, DMF has seen a slight increase in commercial fishing permit sales, particularly for small boats (0–59') in length (Figure 5).

Table 1. 2024 commercial fishing permit issuance.

Permit Type	Permits Issued (#)	
	Residents	Non-residents
Coastal Lobster	952	5
Offshore Lobster	268	77
Seasonal Lobster	78	2
Boat 99+'	16	10
Boat 60-99'	82	195
Boat 0-59'	3,855	443
Individual	174	3
Shellfish and Seaworm	720	0
Shellfish and Rod & Reel	378	0
Rod & Reel	445	30
Total	**6,968**	**765**

Coastal Lobster Permit allows the taking, landing, and sale of lobsters and edible crabs harvested from within the coastal waters of the Commonwealth. There is a maximum pot limit per vessel that is based on Lobster Management Areas and individual allocations. The permit may be endorsed to take and sell shellfish and finfish at no additional cost. In the case of skin or scuba divers, only the licensee is covered.

Offshore Lobster Permit allows the landing and sale of lobsters and edible crabs taken outside of the coastal waters of the Commonwealth pursuant to appropriate federal permit(s). If the permit is endorsed for the use of pots to harvest lobster, there is a maximum pot limit per vessel that is based on Lobster Management Areas and individual allocations. The permit may be endorsed to take and sell shellfish and finfish at no additional cost.

Seasonal Lobster Permit is issued to full-time students only (verification required) and allows the licensee only to take and sell lobsters and edible crabs from June 15–September 15. A maximum of 25 pots may be used. Diving is not permitted; sale of fish and/or shellfish is not permitted.

Boat Permit allows the taking, landing, and sale of finfish and may be endorsed for shellfish. The permit covers everyone aboard the vessel. Price varies with vessel size (0–59', 60–99', and 99+'). No lobsters or edible crabs may be taken.

Individual Permit allows the holder only to take, land, and sell finfish and may be endorsed for shellfish. No lobster or edible crabs may be taken.

Shellfish Permit allows an individual to take, land, and sell shellfish and seaworms. A Shellfish Transaction Card from DMF and a town permit are also required. A Shellfish Transaction Card allows the named individual holding a commercial permit endorsed for shellfish and seaworms to sell shellfish and seaworms when used in conjunction with a Registry of Motor Vehicles identification card.

Rod & Reel Permit allows the holder only, to catch and sell finfish caught by Rod & Reel only. No other gear types may be used.

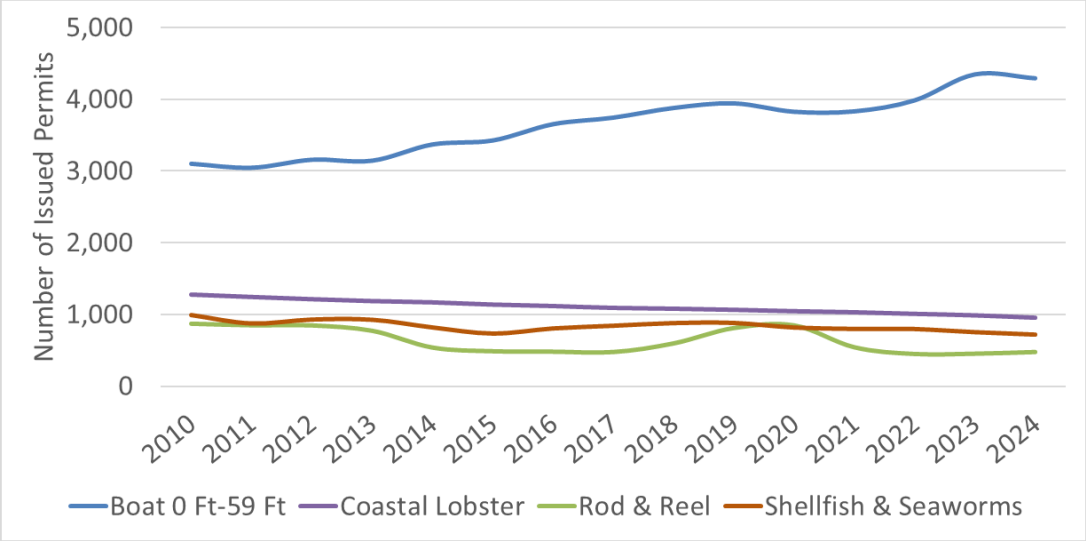

Figure 5. Trend in sales of four frequently issued commercial fishing permits, 2010–2024.

Dealer Permits

Anyone engaged in the wholesale or retail trade of raw fish, shellfish, lobsters, or bait, whether frozen or fresh, must have a DMF Dealer Permit and may be subject to inspection from the Massachusetts Department of Public Health (*Mass*DPH). Shellfish dealers must abide by *Mass*DPH regulations for tagging and record keeping. Seafood dealers who purchase seafood products, even if for bait purposes, directly from harvesters are considered primary buyers, and must be so endorsed on their dealer permits. DMF issued a total of 1,862 seafood dealer permits in 2024 (Table 2), a number relatively unchanged over the past ten years.

Table 2. 2024 dealer permit issuance.

Permit Type	Permits Issued (#)	
	Resident	Non-resident
Wholesale Dealer	368	3
Wholesale Truck	76	119
Wholesale Broker	27	5
Retail Dealer	901	0
Retail Truck	34	1
Retail Boat	176	3
Bait Dealer	122	13
Retail Farmer's Market	9	2
Biomedical Dealer	1	0
Biomedical Processor	2	0
Total	**1,716**	**146**

Wholesale Seafood Dealer Permit allows the holder to acquire, handle, store, distribute, process, fillet, ship, or sell raw fish and shellfish, whether frozen or unfrozen, in bulk or for resale. It also allows retail sales from the same single, fixed location. An approved inspection from *Mass*DPH must be submitted with the application to DMF. The name and address must be the same on the inspection report and permit. This permit may be endorsed for bait (excluding shellfish), with an inspection specifically stating, "Approved for retail and bait

license." A Hazard Analysis and Critical Control Points plan is also required.

Wholesale Seafood Truck Dealer Permit allows the holder to acquire, handle, distribute, ship, or sell raw fish, whether frozen or unfrozen, in bulk or for resale from a truck only. It does not allow the holder to process raw fish, whether frozen or unfrozen, lobster, or shellfish. Nor does it allow the holder to purchase shellfish or shuck, relabel, or repack shellfish. An approved inspection from the Division of Food and Drugs must be submitted with the application to DMF.

Wholesale Seafood Broker Permit allows the holder to act as an agent who negotiates contracts of purchase and sale of seafood. The brokerage activities will not involve the actual handling, processing, or reshipping of finfish, shellfish, or other marine resources. A "broker only" waiver must be filed in lieu of a health inspection.

Retail Seafood Dealer Permit allows the holder to sell raw fish (frozen or unfrozen), shellfish, and lobsters at one retail location. The holder must purchase shellfish only from a holder of a wholesale dealer or wholesale truck permit, or a certified out-of-state wholesale dealer. It does not allow the holder to shuck, relabel, or repack shellfish. An approved inspection from the Division of Food and Drugs must be submitted to DMF. The name and address must be the same on the inspection report and permit. This permit may be endorsed for bait (excluding shellfish). The inspection must specifically state "Approved for retail and bait license."

Retail Seafood Truck Dealer Permit allows the holder to sell fish or lobsters at retail from a mobile unit (does not include shellfish). It does not allow the holder to process, fillet, shuck, cook, etc. An inspection is required from a town or county Board of Health. A copy of the inspection must be submitted with the application. The name and address must be the same on the inspection report and permit. A Hawkers and Peddlers permit may be required.

Retail Boat Seafood Dealer Permit allows the holder to sell whole fish and lobsters from his/her boat only (does not include shellfish). A commercial permit is required in addition to this permit. A boat waiver must be filed in lieu of a health inspection.

Bait Dealer Permit allows the holder to take and sell marine bait. No inspection is required. Local regulations (i.e., on worms, eels) may apply.

Retail Seafood Farmer's Market Dealer Permit allows the holder to sell certain raw fish and fish products at a farmer's market subject to written approval by the Department of Public Health, or the municipal or county board of health.

Biomedical Horseshoe Crab Dealer allows an entity affiliated with a biomedical processor to obtain and hold biomedical horseshoe crabs and sell biomedical horseshoe crabs to the affiliated biomedical processor. The biomedical dealer permit may be authorized as a primary buyer to allow for the primary purchase of horseshoe crabs directly from a biomedical fisher.

Biomedical Horseshoe Crab Processor Permits allows an entity to process horseshoe crabs for biomedical purposes including, but not limited to, the bleeding of horseshoe crabs for the production of Limulus Amebocyte Lysate. The biomedical processor permit may be authorized as a primary buyer to allow for the primary purchase of horseshoe crabs directly from a biomedical fisher. The Director may limit access to the Biomedical Horseshoe Crab Processor permit.

Special Permits & Regulated Fishery Endorsements

Special Permits are required for certain activities in the marine environment, as described below. DMF issued a total of 24,385 special permits and regulated fishery endorsements in 2024 (Table 3).

Table 3. 2024 special permit & regulated fishery endorsement issuance.

Permit Type	Permits Issued (#)	
	Resident	Non-resident
Non-commercial Lobster	5,154	95
Regulated Fishery Endorsements	17,267	1,390
Master Digger	1	0
Subordinate Digger	0	0
Scientific Collection	66	20
Shellfish Propagation & Aquaculture	392	0
Total	**22,880**	**1,505**

Non-commercial Lobster Permit is required to fish for or take lobsters and edible crabs for personal use. This authorizes the holder and members of the holder's immediate family (defined as spouse, parents, children, grandparents, and siblings), residing in the same residence, to fish for and take lobsters using 10 pots only. This permit may be endorsed for diving by the permit holder only. Other family members may purchase additional permits for diving only.

Regulated Fishery Endorsement is required for certain commercial fishing activities in addition to a commercial fishing permit. Regulated Fishery Endorsements are required for dragging, gillnetting, netting in inshore net areas, setting fish pots in waters under the jurisdiction of the Commonwealth, and the commercial harvest of northern shrimp, surf clam/ocean quahog, sea herring, sea urchins, summer flounder, black sea bass, scup, striped bass, dogfish, American eel, horseshoe crab, groundfish, tautog, menhaden, and Atlantic mackerel.

Master Digger Permit is required for an individual who wants to harvest contaminated clams from areas classified as "restricted." Shellfish are depurated at the Shellfish Purification Plant in Newburyport in accordance with regulations and established procedures. In addition to the application form, applicants must include a $1,000 surety bond, sign a master digger affidavit, have their vehicle inspected and approved by *Mass*DPH Division of Food and Drugs, must be at least 18 years of age, and may not possess an "open" area commercial shellfish license at the same time as a Master Digger Permit.

Subordinate Digger Permit is required for the harvest of contaminated clams from areas classified as "restricted." Shellfish are depurated at the Shellfish Purification Plant in Newburyport in accordance with regulations and procedures. Subordinate diggers must work for a Master Digger, be at least 18 years of age, and may not possess an "open" area commercial shellfish license at the same time as a Subordinate Digger Permit.

Other Special Permits are required for activities including aquaculture, scientific collection, shellfish propagation, and shellfish relay.

Recreational Saltwater Fishing Permits

DMF began issuing recreational saltwater fishing permits in 2011. DMF issued a total of 187,438 recreational saltwater fishing permits in 2024 (Table 4).

Recreational Saltwater Fishing Permit is required of all fishers aged 16 and over. Exceptions have been made for anglers fishing aboard legally permitted for-hire vessels, individuals that are disabled, and for those fishers with a valid recreational saltwater fishing permit from another coastal state (NH, RI, and CT) that has entered into a reciprocity agreement with Massachusetts. The permit is free for fishers aged 60 and over.

Charter Boat Permit is required for a for-hire vessel that can carry up to six persons fishing as passengers.

Head Boat Permit is required for a for-hire vessel that can carry seven or more persons fishing as passengers.

Table 4. 2024 recreational saltwater fishing permit issuance.

Permit Type	Permits Issued (#)	
	Resident	Non-resident
Recreational Saltwater, Age 16–59	107,012	16,329
Recreational Saltwater, Age 60+	56,288	6,938
Charter Boat	750	72
Head Boat	45	4
Total	**164,095**	**23,343**

Limited Entry Permit Transfer Program

State regulations prohibit the transfer, loan, lease, exchange, barter, or sale of any permit without DMF permission. Limited entry permits (commercial permits and endorsements that are restricted in distribution to renewals) may be transferable according to criteria established by regulation and policy. Transfer criteria include two key components: the permit's activity and the transferee's experience. Limited entry permits and endorsements include, but are not limited to, coastal lobster, fish pot (scup, conch, and black sea bass), gillnetting, surf clam/ocean quahog, mobile gear coastal access, summer flounder, horseshoe crab, groundfish, black sea bass, and menhaden.

The transfer process begins with pre-application forms through which the permit holder and potential transfer recipient can determine their eligibility to participate in a transfer. Pre-approval is followed by the completion of a transfer packet, and final approval. See Table 5 for a summary of transfers administered by DMF during 2024.

Table 5. 2024 Preliminary Limited Entry Permit Transfer Statistics.

Permit/Endorsement Type	Permits Transferred (#)	
	Resident	Non-resident
Coastal Lobster	24	0
Mobile Gear Coastal Access	4	5
Fish Pot	6	0
Fluke	17	6
Black Sea Bass	17	6
Groundfish	1	1
Surf Clam/ Ocean Quahog	1	0
Quahog Dredge	0	0
Horseshoe Crab	4	0
Menhaden	2	1
Tautog	10	1
Inshore Net	1	1
Total	94	23

Fisheries Statistics Program

Dealer Landings Data Collection

Landings or purchases of all marine species by seafood buyers from commercial harvesters were collected as part of the dealer reporting program. Since 2005, all primary buyers not already required by federal law to report electronically have been required to report under state regulations. Through 2019, all data from these state-reporting dealers were submitted to DMF via paper forms and entered into the ACCSP Standard Atlantic Fisheries Information System (SAFIS) database by project personnel or entered directly into SAFIS electronically by the dealers. A mobile SAFIS eDR application was also used by a few small dealers who buy from a handful of harvesters. This application utilizes a harvester's shellfish transaction card to consummate a point-of-sale transaction between the harvester and dealer, promoting a single-ticket commercial data collection system. Beginning January 1, 2020, all state-reporting dealers were required to submit data electronically via SAFIS applications, the file upload method, and/or a certified third-party vendor.

In 2024, 1,862 businesses obtained a Massachusetts seafood dealer permit. Of those, 511 (or 27%) were categorized as primary buyers. These dealers were required to report their primary purchases, including products retailed themselves. Of the 511 dealers, 259 had a federal dealer permit and the remaining 252 dealers were categorized as "state-reporting." Compared to 2023, there were 5% less primary buyers in 2024. The number of primary buyers has relatively stabilized since its peak in 2020.

As is the case every year, all primary buyers were required to complete paperwork to confirm their buying intentions and their commitment to the dealer reporting requirements. This registration process not only provided a signed statement for enforcement purposes, if necessary, but also provided the means to monitor reporting compliance and track quotas.

Throughout the year, 124,298 dealer reports were entered into the SAFIS database, an approximate 1% increase over 2023. Total landings (in whole pounds), as reported through the SAFIS database or other federal reporting programs, amounted to 372 million pounds valued at $533 million (ex-vessel; calculated from price paid to harvesters). Total landings and value in 2024 were lower than the prior five years (Figure 6, Figure 7), driven primarily by a reduction in sea scallop landings.

The top five species in order of value were sea scallop, American lobster, Eastern oyster, Atlantic surf clam, and haddock, totaling $433 million or 81% of the total value. Offshore shellfish (sea scallop, Atlantic surf clam, and ocean quahog) made up 52% of the total value, whereas inshore and intertidal landings of shellfish, such as soft shell clam, northern quahog, blue mussel, and oyster amounted to 9% of total value. Landings of invertebrate species (lobster, crabs, and whelk) amounted to 25 million pounds, valued at $125 million, or 24% of the total value. Cumulative finfish landings, including both pelagic and benthic species, made up 15% of the total value with the multispecies groundfish species complex amounting to 7% of the total value. Landed species with an individual gross value over $2 million are shown in Table 6; in aggregate, these species accounted for approximately 97% of the total value of all species landed.

Species managed by quota in Massachusetts were monitored using the dealer-reported landings in the SAFIS database. Automated analyses ran on a nightly basis and the results were displayed on both the DMF internet website (Figure 8) and the Statistics Project intranet website. As of fall 2024, the public-facing data were displayed via an interactive dashboard powered by Power BI. This work was done in collaboration with DFG's GIS and IT program. On a weekly basis during the open season, staff reviewed compliance and estimated projections for each quota-managed species. An estimated closure date was calculated based on a regression analysis run at least once per week for each open fishery.

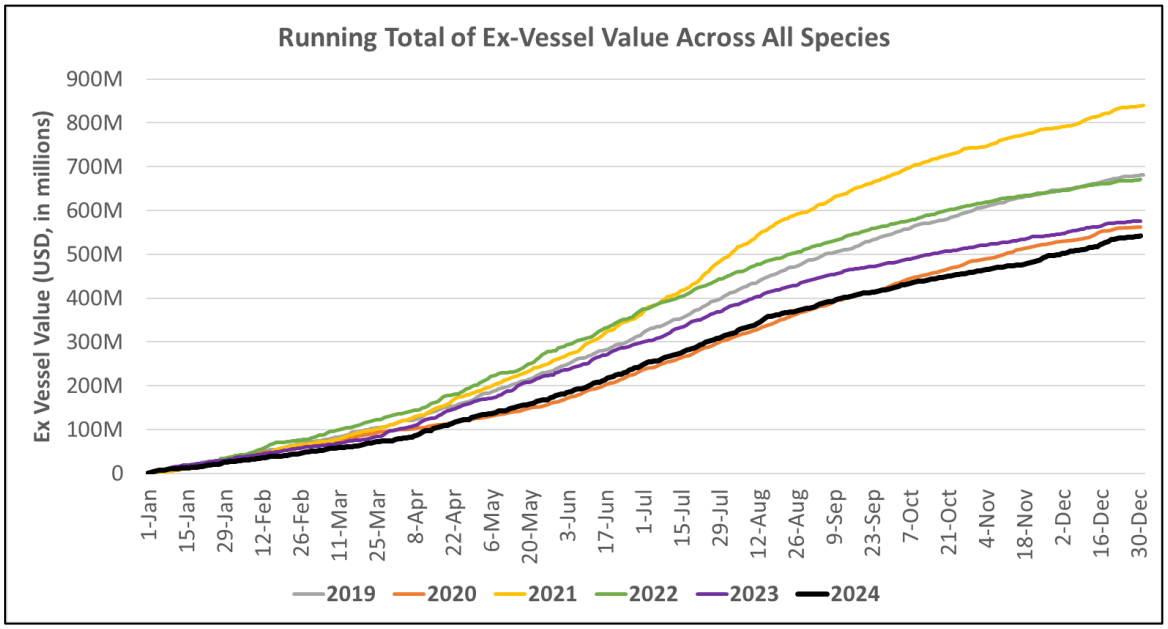

Figure 6. Daily running total ex-vessel value for 2019–2024. Value is not adjusted for inflation.
Source: ACCSP Data Warehouse; 4/12/2025.

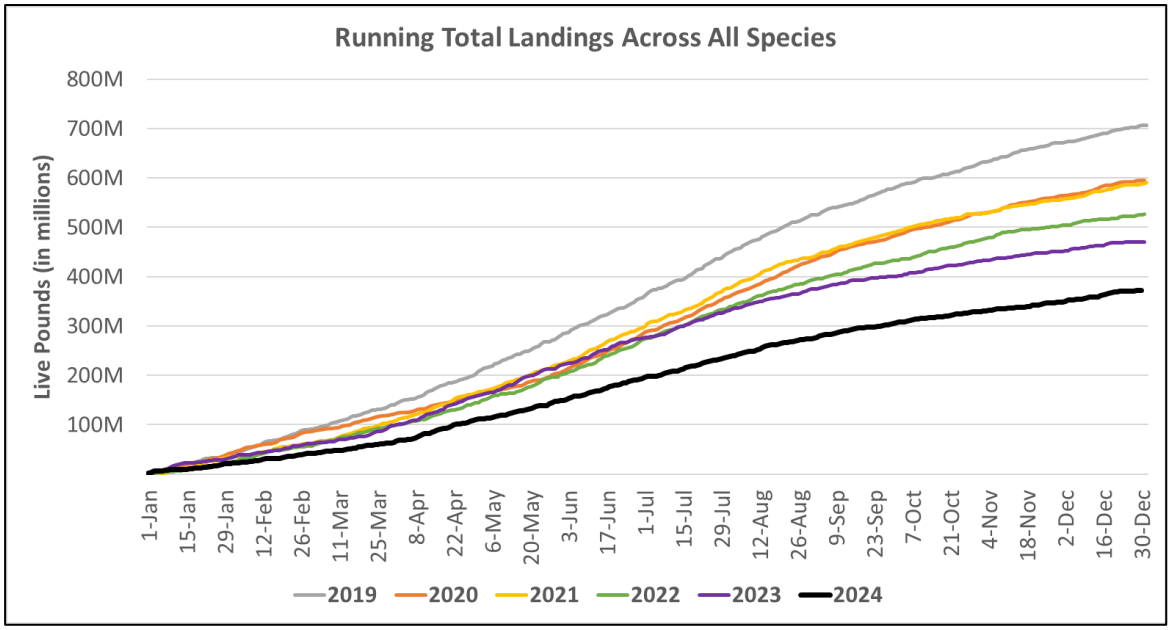

Figure 7. Daily running total landings in live pounds for 2019–2024.
Source: ACCSP Data Warehouse; 4/12/2025.

Table 6. 2024 MA-landed species with ex-vessel value greater than $2 million.
Source: ACCSP Data Warehouse, 4/12/2025.

Species*	Landings (whole pounds)	Ex-Vessel Value (USD)
Sea Scallop	138,902,401	$263,140,955
American Lobster	16,490,477	$115,424,549
Eastern Oyster	10,196,389	$35,178,890
Atlantic Surf Clam	35,664,388	$10,011,235
Haddock	6,852,473	$9,031,238
Acadian Redfish	12,854,596	$7,878,389
Goosefish	10,046,852	$6,575,402
Soft Clam	2,588,409	$6,270,553
Pollock	5,772,941	$5,441,650
Northern Quahog	3,689,677	$5,113,279
Bluefin Tuna	1,042,928	$4,843,189
Silver Hake	5,736,756	$4,775,065
Jonah Crab	5,427,481	$4,758,840
White Hake	3,253,489	$4,379,080
American Plaice	2,458,978	$4,165,341
Winter Skate	10,196,607	$3,765,477
Winter Flounder	1,858,478	$3,636,321
Witch Flounder	2,099,855	$3,017,686
Menhaden	12,346,376	$2,933,950
Striped Bass	662,810	$2,851,288
Atlantic Cod	1,298,568	$2,571,155
Black Sea Bass	945,972	$2,408,441
Atlantic Herring	7,606,317	$2,309,510
Summer Flounder (Fluke)	640,663	$2,138,554
Channeled Whelk	715,712	$2,034,695

* Ocean Quahog is also in this list, but the data are confidential.

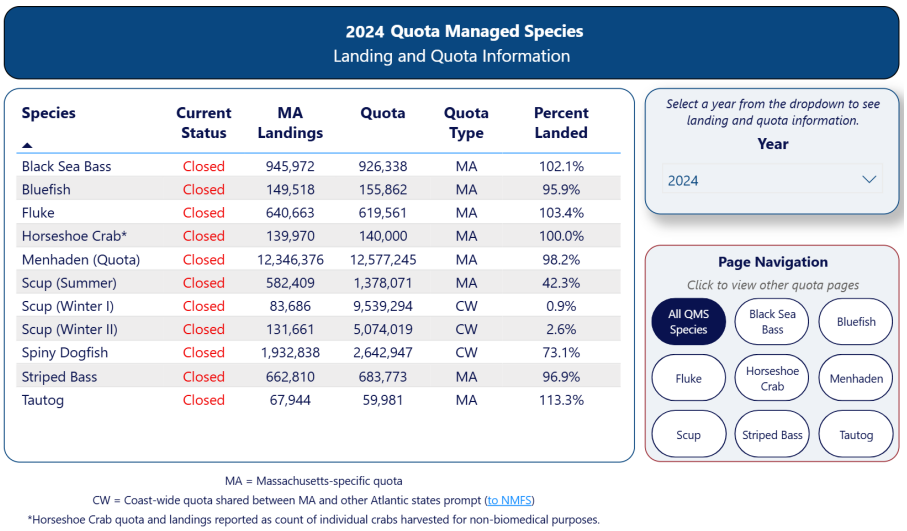

Figure 8. Example of quota monitoring data available on DMF's website.

Harvester Catch and Effort Data Collection

Trip Reporting: Since 2010, all commercial harvesters have submitted—on a monthly basis—comprehensive, standardized trip-level data for all commercial trips conducted under the authority of a Massachusetts commercial fishing permit. Those individuals holding a federal permit with reporting requirements to NOAA Fisheries (e.g., Vessel Trip Report or VTR), were exempt from reporting to DMF for those activities occurring on their federally-permitted vessel as were those vessels commercially fishing solely for bluefin tuna who were already required to report landings to NOAA Fisheries Highly Migratory Species Division. All other individuals were required to report to DMF.

Harvesters either submitted their trip-level reports in paper form or entered their fishing activities themselves using SAFIS eTRIPS Online or eTRIPS Mobile. Project staff used the eTRIPS Online application or a bulk upload process called eTRIPS Upload to enter data submitted on paper forms. Thus, the primary repository for all trip-level data, except those reported to NOAA Fisheries, was the SAFIS database. However, in late 2023, NOAA Fisheries VTR data began to be pushed to SAFIS nightly, creating a comprehensive real-time dataset available to managers. Data were easily accessed from the SAFIS database and used for compliance and fisheries analyses by project staff; harvesters also have easy access to their own landings within SAFIS. Since 2021, eTRIPS Online has collected additional fixed gear specific fields including but not limited to effort specific ten-minute squares and number of buoy lines, enabling DMF and other partners to meet the requirements set forth in recent addenda to both the lobster and Jonah crab interstate FMPs.

In 2024, DMF issued 7,733 commercial harvester permits, of which 18% were for federal reporting vessels, and the remaining 6,334 commercial permits were designated as “state-reporting.” Forty-five percent of all permit holders chose to report electronically using the SAFIS eTRIPS Online or Mobile applications, which was a 10% increase over 2023. This left 37% of all harvesters submitting paper reports to DMF. For the first time, GARFO required all federal lobster permit holders to report on federal VTRs as of April 1, 2024, thus reducing the number of permits and trips reported to the state. Of the almost 80,000 commercial trips that were entered into the SAFIS database to date for state reporting harvesters for the 2024 calendar year, approximately 42% were entered by commercial permit holders using one of the SAFIS eTRIPS applications, with the remaining trips entered by DMF staff. This percentage of electronically entered trips is expected to decrease slightly (to about 40%) as the final reports submitted for 2024 are entered. Compared to 2023, the percentage of trips entered electronically in 2024 is projected to be approximately 5% higher. Additionally, the total number of trips reported for 2024 is expected to be slightly reduced, in line with the reduction in landings highlighted in Figure 7 and the shift to federal reporting for some lobster permit holders.

Vessel Tracking: Massachusetts federal lobster trap permit holders for areas 1, 2, 3, 4, 5, and OCC are required to install an Atlantic States Marine Fisheries Commission (ASMFC) approved vessel tracking device onboard their vessel in accordance with Addendum XXIX to Amendment 3 to the American Lobster Fishery Management Plan. Massachusetts was the first state to implement the ASMFC-mandated program, with a start date of May 1, 2023. In 2024, DMF managed approximately 300 federal lobster trap permit holders who are subject to this regulation and completed its first full year of collecting vessel location data.

DMF continued to notify permit holders of the vessel tracking requirement and discuss the details of the requirements. This included a reimbursement program that provided each permit holder with funds to purchase and install a device and cover the initial operating service fees. Federal funding remained available throughout 2024 to support the program’s implementation, including reimbursement for device expenses and the hiring of an additional DMF staff. The addition of a Spatial Analyst played a key role in improving the agency’s ability to monitor fishing activity through vessel tracking data and use such data to support enforcement and management.

Permit holders were required to return the signed affidavit stating they understood the requirement, intended or did not intend to fish lobster traps, and if they intended to fish, document the installation of a tracking device. As of December 2024, 280 permit holders certified that they purchased and installed an ASMFC-approved vessel tracking device. This was an approximate 11% increase from 2023. 34 permit holders certified that they did not intend to fish lobster traps and were therefore exempted from installing a device. During 2024, a device vendor's type approval was removed by ASMFC; this led to the replacement of 71 devices for the Massachusetts fleet. This replacement process required DMF staff to work with permit holders and track device installations, ultimately resulting in 47 devices successfully replaced in 2024.

Monitoring compliance and data quality remained a top priority in 2024. Location data were reviewed regularly for accuracy and consistency; permit holders were notified if their device failed to transmit or otherwise malfunctioned. Trip reports and dealer reports from all permit holders in the program were monitored daily for compliance. Permit holders identified as fishing lobster trap gear without an approved tracking device aboard their vessel were contacted and advised to come into compliance. Despite data gaps during periods of device replacements, 87% of the vessel trip reports submitted in 2024 that indicated the use of trap gear had corresponding vessel tracking location data.

Project staff collaborated with ACCSP and other state partners to enhance the ACCSP Vessel Tracking Application used to access tracking data and conduct compliance checks. These improvements focused on improving data access and usability, which enabled more efficient and accurate oversight.

In addition to federal lobster tracking, staff launched a pilot program tracking surf clam dredge vessels. Four devices were distributed to volunteer vessels and installations were confirmed. A geofence alert system was created through collaboration with the device vendor Viatrax and input from permit holders. Test exclusion areas were created off Cape Cod and email alerts were sent to DMF when vessels entered the excluded areas. This pilot project was created to support future spatial management measures in the surf clam dredge fishery.

Data Analysis and Dissemination

Project staff were frequently asked to present on in-season landings, quota monitoring, and value trends throughout the year. Additionally, significant time was dedicated to routine activities such as ensuring correct harvester reporting methods and maintaining compliance metrics for harvester and dealer reporting. Lastly, significant time was spent working with ACCSP to validate landings for a variety of species throughout this time as stock assessments and other data heavy projects continued. A few additional projects are highlighted below.

Incidental Take Permit Habitat Conservation Plan Fishery Data Updates: In the summer of 2024, the final draft of the Massachusetts Habitat Conservation Plan's Incidental Take Permit (ITP) was filed after more than two years of preparation. Extensive analyses were conducted by Fishery Statistics Project staff on inshore fixed gear fisheries, and ultimately more than 40 figures and tables were created to include in the application. The document was collaborative across multiple projects within DMF and required hundreds of hours of dedicated time analyzing complex fixed gear data sets and designing analyses that would support our conservation goals within state waters. This document provides a more detailed look into the Commonwealth's lobster, conch and fish pot fisheries than ever before. Each analysis will be repeated in future iterations of the ITP and project staff are working on ways to improve data quality and the integrity of the analyses to ensure successful issuance of the permit at every three-year renewal period. More details about the Incidental Take Permit Habitat Conservation Plan can be found in the Protected Species section on page 85.

Cape Cod Commercial Fishermen's Alliance Data Request: As part of a collaborative initiative to support sustainable, community-based fisheries, DMF provided the Cape Cod Commercial Fishermen's Alliance with detailed data on landings, ex-vessel value, and permit activity. A wide range of species vital to the Cape Cod

region were analyzed with a breakdown by port, gear type, and vessel size included. By providing detailed and actionable data, DMF strengthened the capacity of the Alliance to advocate for the economic and ecological sustainability of the region's small-boat fisheries. This partnership highlights the role of data transparency and regional engagement in supporting vibrant, resilient coastal communities.

Ten-Minute Square Lobster Analysis: Project staff updated their analysis of spatially-explicit fixed gear fishing effort at the 10-minute square level (as initiated in 2023 using the additional data elements collected from harvester reports beginning in 2021)—as seen in Figure 9. This exercise encompasses federal waters only as the 10-minute square field requirement only applies to those trips occurring in federal waters. Prior to 10-minute square data collection, analyses involving spatial distribution of effort were restricted to Statistical Reporting Areas, which range from hundreds to thousands of square miles. The more spatially refined trends in trap gear effort available with these data support management efforts surrounding marine spatial planning and protected species interactions.

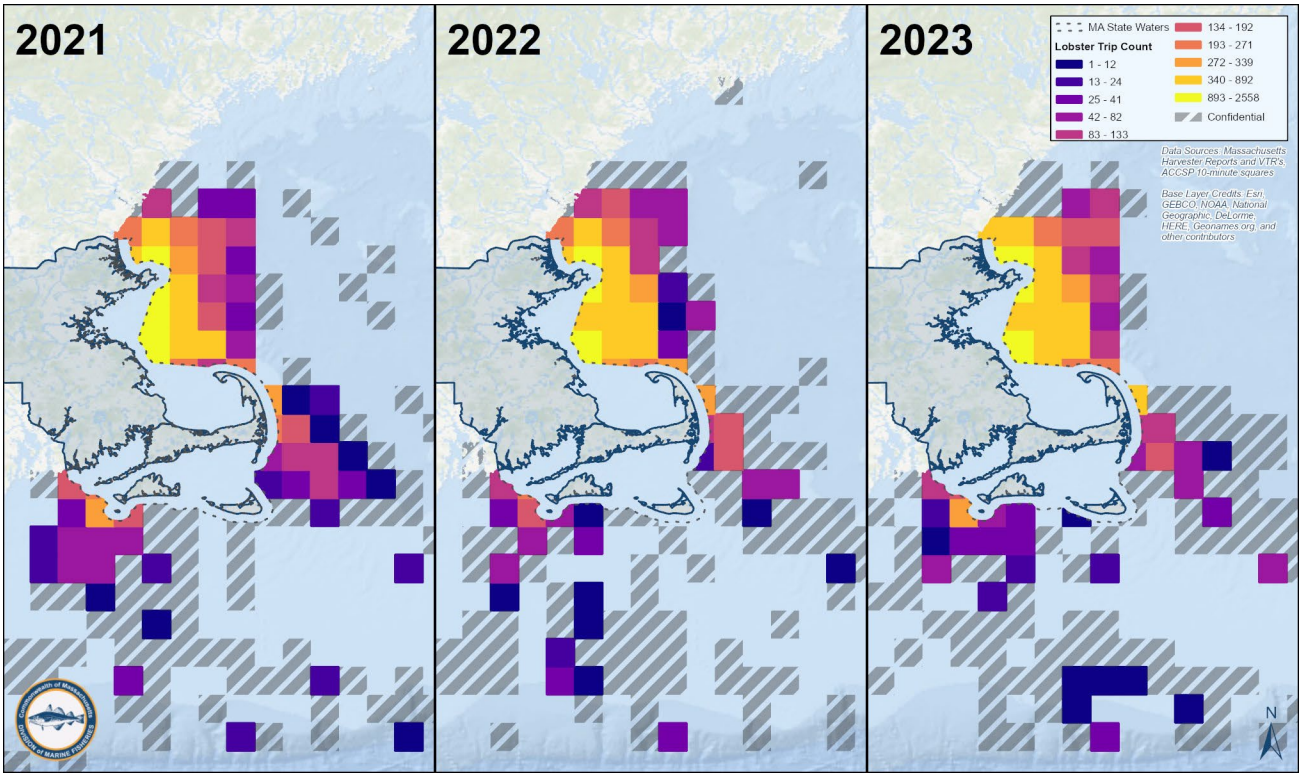

Figure 9. Heat maps of the number of lobster trap trips occurring in federal waters and landing in MA in 2021 through 2023. Number of trips was used as a general proxy of effort; however, additional more accurate metrics for describing effort were in development. Statistical Reporting Areas east of 521 are excluded. Source: ACCSP SAFIS eTRIPS and federal VTR data; 10/2023.

Striped Bass Tagging Program: 2024 was the eleventh year of a commercial striped bass fishery tagging program mandated by ASMFC to reduce poaching coast-wide. This program is conducted at the dealer level in Massachusetts (Table 7). Program staff estimated the 2024 tags required for individual dealers and distributed tags prior to the season and throughout as needed. At the end of the season, unused tags and an accounting report were required to be submitted to DMF. Program staff were responsible for identifying any discrepancies and following up with dealers as needed.

Table 7. 2024 striped bass tagging statistics (as of April 2025)**.**

# of Dealers Receiving Tags	# of Tags Purchased by DMF	# of Tags Distributed	# of Tags Returned	# of Tags Used	# of Tags Missing
129	65,000	51,240	20,606	30,109	525

Tautog Tagging Program: 2024 was the fifth year of a commercial tautog fishery tagging program mandated by ASMFC to reduce poaching coast-wide. Per the FMP, this program is conducted at the harvester level in all states (Table 8). Commercial harvesters must tag their commercial tautog catch through the operculum prior to offloading the fish from the fishing vessel and selling the fish into commerce. The tautog tags are single use metal tags inscribed with the calendar year, state of issuance, and sequential tag number. Program staff are responsible for program oversight from tag distribution to tagging accountability and reporting to ASMFC.

Table 8. 2024 tautog tagging statistics (as of April 2025)**.**

# of Eligible Harvesters	# of Harvesters Receiving Tags	# of Tags Purchased by DMF	# of Tags Distributed	# of Tags Returned	# of Tags Used
204	154	40,000	37,750	15,004	21,922

ACCSP Participation and Planning

DMF staff continued to participate in all partner-based committees within ACCSP. Staff served on the Operations (as chair), Information Systems, Commercial Technical (as chair), and Standard Codes committees, while staff from the recreational program served on the Recreational Technical committee and staff from the Fish Biology Program served on the Biological and Bycatch Technical committees. Staff worked with programmers to address application bugs and long-term solutions to ongoing issues as well as provided technical advice in areas such as data quality and standards, application design, outreach, policies, and vessel monitoring (as described above). ACCSP tasks demanded significant time from project staff throughout the year, and this is expected to continue moving forward as their applications continue to expand.

Local IT Management

Information systems/technology is primarily conducted through the Executive Office of Energy and Environmental Affairs' Information Technology Group (EOEEA-IT) under the larger direction of the Executive Office of Technology Services and Security (EOTSS). During 2024, project staff assisted EOEEA-IT on local information systems issues when needed and worked on several specific tasks outlined below.

Website Maintenance: The Quota Monitoring webpage is one of the agency's most visited. Quota information is also displayed on a Statistics Project intranet site, along with reporting compliance and both harvester and dealer reporting information. Maintaining the automated process that updates the data displayed on both sites and accommodating changing requirements was an ongoing task, made more time consuming due to automation failures. The project worked with the Department's GIS team to modernize this platform in 2024 ultimately releasing two dashboards in the fall to dynamically update each day. Power BI was used to develop two interactive dashboards, the first for visualizing commercial landings of quota-managed fish species in Massachusetts. The primary goal was to provide harvesters and dealers with clear, up-to-date information on how much of each quota remains, promoting transparency and helping support informed decision-making on the water. The dashboard used landings reported by Massachusetts dealers and automatically updated daily to include new data as they became available. Power BI's data modeling capabilities enable accurate tracking of

landings against quota allocations by species and seasons. The second dashboard presents permit information for dealers, primary buyers, harvesters, vessels, and shellfish farms.

Oracle Database/Application Development & Maintenance: DMF transitioned away from two production Oracle databases and associated applications during 2024: Lobster Sampling and Shellfish Sampling & Area Management. Additionally, enhancements to the Permitting application released in January 2023 continued in collaboration with EOEEA-IT, and it launched externally in late 2024 for the 2025 renewal season incorporating online credit card permit sales.

DMF's project manager moderated projects with both the aquaculture lead and the invertebrates lead as well as checked in with the shellfish application development undertaken by the Department's GIS team. Additionally, DMF's project manager frequently met independently with developers to discuss questions on the requirements for various pieces of the applications. Testing each application release prior to the new version going live in production was labor intensive and staff contributed where needed.

Significant enhancements to the permitting application were needed to open it to external users in December. Security protocols were enhanced, and the application was improved to be as user friendly as possible. The application successfully launched for online credit card sales on December 19, 2024 for the 2025 permit year.

Additionally, the Program's Oracle database, GADUS, continued to be enhanced throughout the year accommodating changes as required after changes to the permitting application. Development and testing of the enhancements to the database required monthly meetings with project staff familiar with Oracle and database design or management.

The Invertebrate application launched mid-year and all 2024 data collection was entered into the new system. Several enhancements were necessary after launch and after users began to use the entry application regularly. The applications is keyboard friendly and accommodates several new features as compared to the older Oracle system, namely the ability to store additional invertebrate sampling program data as well as enhanced bycatch data collected through these programs.

SHELLFISH AND HABITAT SECTION

Robert Glenn, Deputy Director, Section Leader

Shellfish Sanitation and Management Program

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Alyson Mello, Bacteriologist I

Overview

The Shellfish Sanitation and Management Program focuses on public health protection, as well as the management of the Commonwealth's molluscan shellfish resources. Public health protection is ensured through sanitary classification, monitoring of marine biotoxins and implementation of a *Vibrio parahaemolyticus* Control Plan within state waters, including state-managed federal waters such as Nantucket Sound.

Nationally, the harvest and handling of all bivalve molluscan shellfish entering interstate commerce is regulated by the National Shellfish Sanitation Program (NSSP). The NSSP was established in 1925 by the U.S. Public Health Service and is administered today by the United States Food and Drug Administration (USFDA) and the Interstate Shellfish Sanitation Conference (ISSC), a federal/state cooperative. Massachusetts is a voting member of the ISSC.

Shellfisheries management is accomplished by a multipronged approach including direct DMF regulation of the commercial surf clam, ocean quahog, and quahog dredge boat fisheries; and indirect management of other shellfish resources through partnerships with coastal communities by providing technical assistance to local management authorities in the development of management plans and local regulations for control and conservation. In addition, DMF regulations cover safe harvest and handling practices for market-bound shellfish, the harvest of contaminated shellfish for depuration and relay, and establish minimum size, trip limit, and season for many shellfish species. DMF also regulates commercial shellfish aquaculture and is required to certify that operation of private shellfish aquaculture projects at sites licensed by coastal municipalities will not have an adverse impact on shellfish or other natural resources.

Shellfish Sanitation and Public Health Protection Project

Shellfish Growing Area Classification

Surveys: Public health protection is accomplished with the use of sanitary surveys to determine a shellfish growing area's suitability as a source of shellfish for human consumption. Sanitary surveys include: 1) identification and evaluation of all actual and potential pollution sources which may affect a shellfish growing area; 2) evaluation of meteorological, hydrodynamic, and geographic characteristics that may affect distribution of pollutants; and 3) assessment of overlying water quality. Each shellfish growing area must have a complete sanitary survey evaluation every 12 years, a triennial evaluation, and an annual report to maintain a classification allowing shellfish harvest. Minimum requirements are set by the ISSC and outlined in the NSSP *Guide for the Control of Molluscan Shellfish* (a.k.a., Model Ordinance).

To satisfy NSSP requirements in 2024, staff biologists completed 256 annual reports, 41 triennial evaluations, and 23 sanitary surveys (Table 9). Additionally, 128 conditional area management plans/MOUs were re-evaluated. A total of 11,169 water samples were collected and analyzed for fecal coliform bacteria from 230 shellfish growing areas in 60 cities and towns of the Commonwealth. All samples were tested at one of the Division's shellfish laboratories using the mTEC method. During the annual USFDA evaluation for compliance with NSSP requirements, shellfish growing area files were reviewed with regards to standards for sampling frequency, completion of required reports, conditional area management plan updates, and conformity with appropriate water quality criteria.

Table 9. Summary of 2024 shellfish growing area report and sampling activity.

	Total
Annual Reports	256
Triennial Evaluations	41
Sanitary Surveys	23
Management Plans/MOUs Reviewed	128
Total Water Samples	11,169
Shellfish Growing Areas Sampled	230
Classification Sub-Areas sampled	481
Cities/Towns Sampled	60

Classification and Status: The Shellfish Program uses two methods to control harvest access to shellfish growing areas. Classification is assigned according to the NSSP's five categories: Approved, Conditionally Approved, Restricted, Conditionally Restricted, and Prohibited (defined below). If water quality within a growing area trends toward permanent improvement or impairment, its Classification is upgraded or downgraded based on

those data. If water quality within a growing area suddenly demonstrates degradation from emergency or unexpected conditions, the growing area can be closed until water quality improves and the contamination has abated. All Classifications except Prohibited may be in the Open status or placed in the Closed status for cause.

1. APPROVED: Open to shellfish harvesting for direct human consumption subject to local rules and regulations. Closed only during major coast-wide events (e.g., hurricane, oil spill, harmful algal bloom/biotoxin event).
2. CONDITIONALLY APPROVED: Closed some of the time due to rainfall, seasonally poor water quality, or other predictable events. When in Open status, it is treated as an Approved area.
3. RESTRICTED: Contains a limited degree of contamination at all times. When Open and with a contaminated relay permit, shellfish can be relayed by municipalities to a less contaminated area (Approved or Conditionally Approved) for natural contaminant reduction or harvested for depuration processing.
4. CONDITIONALLY RESTRICTED: Contains a limited degree of contamination at all times, subject to intermittent pollution events and may be closed some of the time due to rainfall or seasonally poor water quality. When Open, it is treated as a Restricted area.
5. PROHIBITED: Closed to the harvest of shellfish under all conditions, except the gathering and culture of seed for commercial shellfish aquaculture and municipal propagation programs under a DMF permit.

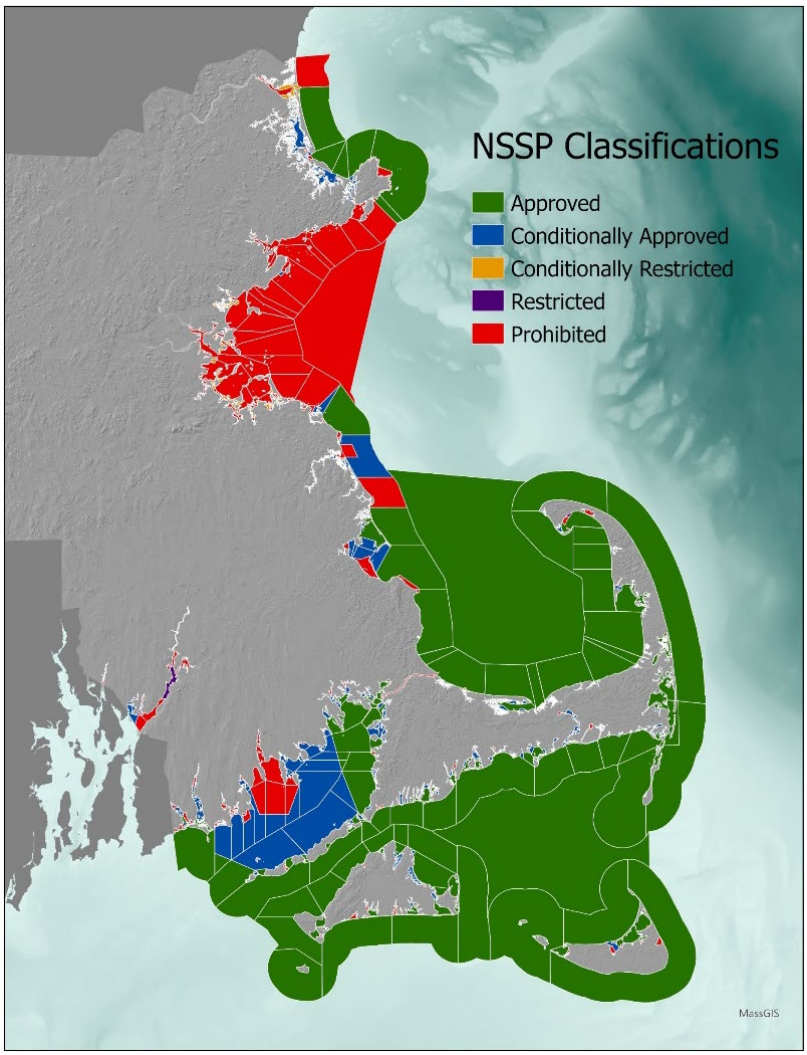

Figure 10. 2024 Classification of MA Growing Areas

In 2024, a total of 1755,570 acres were assigned a Classification (Figure 10, Table 10). The total acreage of Approved and Conditionally Approved areas decreased, and the total acreage of Restricted and Prohibited areas increased slightly over 2023. Much of this change can be attributed to a more accurate shoreline delineation methodology implemented in 2023 and 2024 rather than classification changes. Some of the areas that were downgraded were because of implementation of new NSSP requirements for classifying areas adjacent to Wastewater Treatment Plant (WWTP) Outfalls.

Classification of shellfish growing areas around WWTP outfalls continues to be a challenge for DMF and affected shellfishers. Because WWTP effluents pose a potential threat to public health from both microbiological and

chemical contaminants, the NSSP requires state shellfish authorities to perform dilution analyses on shellfish growing area waters directly receiving effluent discharges, as well as adjacent waters potentially impacted. In addition to assessing WWTP performance (e.g. peak flow, contaminant concentrations), the dilution analyses must assess the hydrodynamics that influence effluent dispersion in the area. Because DMF lacks the necessary physical oceanographic expertise, we successfully sought funding through the Marine Fisheries Institute to partner with SMAST faculty Dr. Changsheng Chen to model WWTP effluent discharges and inform DMF decisions when assigning shellfish growing area classifications. This collaboration was ongoing at year's end. In 2024, Dr. Chen's modeling work indicated that the long-standing Prohibited area around the Ipswich WWTP outfall was too small and would need to be increased significantly. Preliminary modeling results were received for the Dartmouth outfall but because this discharge is in offshore waters away from active harvest areas, the impact appears to be minor. Coupled with last year's similar outcome around the New Bedford and Fairhaven outfalls, DMF spent considerable time managing the fishery and political impacts of these classification changes. Similarly, due to a new public notification law, DMF started receiving new information on the size and scope of the combined sewer overflow (CSO) problem statewide, which required new and frequent emergency CSO closures to long-standing fisheries adjacent to these pollution sources.

A legal notice is required for each change in a shellfish growing area's classification, and in many cases also required for a change in status. These notices reflect the type of opening or closure, the dates, the reason, and other pertinent descriptive information. Copies are sent to municipal managers, Massachusetts Environmental Police (MEP), *Mass*DPH, USFDA, and other interested parties. In 2024, staff generated 517 legal notices which were distributed for sanitary reclassification, rainfall closures and re-openings, paralytic shellfish poisoning (PSP) events, oil spills, and more typical emergency closures (e.g., extreme rainfall, flooding, sewage discharge).

Table 10. Change in Massachusetts shellfish growing area classification, 2023 to 2024.

Area Classification	Acreage		
	2023	2024	Change
Approved	1,430,711	1,341,672	-89,038
Conditionally Approved	50,621	129,064	78,443
Restricted	1,516	1,516	0
Conditionally Restricted	5,115	5,017	-98
Prohibited	267,607	278,301	10,694
Total	1,755,570	1,755,570	

Biotoxin Monitoring

Phytoplankton Monitoring: There are many kinds of microscopic algae that potentially pose a public health risk due to production of potent biotoxins. Though paralytic shellfish poisoning (PSP), caused by the dinoflagellate *Alexandrium*, has historically been the primary threat in the northeast and is the subject of routine toxin monitoring in shellfish meats, DMF monitors the phytoplankton community for the presence of many other potentially toxic algae and/or nuisance species that can form Harmful Algal Blooms (HABs). Phytoplankton monitoring occurs year-round on both the North Shore (4 primary stations) and South Shore (10 primary stations; Figure 11). Two stations, Orleans and Chatham, were added as South Shore primary stations for 2024.

When elevated concentrations of HAB cells are observed, the sampling frequency at a given monitoring station increases and adjacent areas are sampled. In 2024, 516 phytoplankton samples were collected at primary stations for analysis at the New Bedford and Gloucester offices. An additional 95 samples were collected in response to high cell counts at primary stations or reports of discolored water or potential cyanobacteria blooms

throughout the region.

North Shore biologists collected 220 samples from the four primary regional stations in Newburyport, Ipswich, Essex, Gloucester and two secondary stations. There was very little phytoplankton activity in the winter months. There were low abundances of *Alexandrium* in late spring/early summer, but no toxicity was observed through weekly mussel samples. A small cell *Pseudo-nitzschia* bloom, which may cause amnesic shellfish poisoning (ASP), was observed from May–June and then another small and large cell *Pseudo-nitzschia bloom* in November; ASP screening kits revealed little to no toxicity during these events. During the May *Pseudo-nitzschia* bloom the highest concentrations were observed at all four sites the third week of May. Biologists ran six AquaBC ASP screening kits throughout the bloom event and all results were negative. Relative to the second bloom, on November 18 a positive ASP screening test in Essex triggered shellfish sampling in Essex and Ipswich the following day. Both ASP shellfish tests were negative for toxin, but samples were sent to Bigelow to confirm results, with both samples being below detection level. Ad hoc samples collected in Marblehead and Scituate indicated the bloom was limited to North of Cape Ann. *Dinophysis acuminata* and *Dinophysis norvegica,* which produce toxins that cause diarrhetic shellfish poisoning (DSP), were the only two *Dinophysis* species observed on the North Shore in 2024 at relatively low abundances and primarily May through October. The highest abundances of *Dinophysis norvegica* occurred just after the May *Pseudo-nitzschia* bloom event. There were no other noteworthy species seen on the North Shore in 2024.

Figure 11. Map of phytoplankton monitoring stations.

The South Shore processed a total of 391 phytoplankton samples in 2024; 296 from the ten primary stations and an additional 95 samples from secondary and ad-hoc stations. An anomalously early winter *Alexandrium* bloom was detected in the Nauset System on Cape Cod in late November 2023 with steady presence observed through May 2024. Peak concentration in the spring bloom was observed on April 29. This continued the trend of an early winter bloom start in the Nauset system which closes annually due to PSP. Toxicity in shellfish was not detected in early winter, presumably due to cold water temperatures (32–49°F) and low likelihood of substantial shellfish pumping activity. Shellfish tissues were screened via Gold Standard Diagnostics ELISA in January (negative) and at the end of March prior to annual PSP monitoring.

Varying abundances of small and large *Pseudo-nitzschia* were observed at all South Shore monitoring stations. Generally, small cells were more abundant. On several occasions, abundances exceeded 30,000 cells/L; Hyannis and Mattapoisett in January and Eastham in May (system was already closed due to PSP/DSP). Replicate screening kits for ASP were used to test water samples from Hyannis and Mattapoisett in January with negative results. No closures were required.

Dinophysis presence was observed in low abundances at all South Shore stations and at various times/seasons throughout year. The Nauset System experienced a bloom in June. Shellfish tissues were screened repeatedly with AquaBC DSP screening kits, Gold Standard Diagnostics PP2A kits, and additional samples were sent to

Bigelow Laboratories for Ocean Sciences for LCMS/MS. All tests indicated positive for Okadaic Acid. The area was closed due to PSP prior to the *Dinophysis* bloom, which prolonged the closure until early August.

Some HAB organisms do not pose a threat to human health but can have adverse impacts on ecosystem and fish/shellfish health. Some of these organisms previously identified in South Shore samples include *Margalefidinium polykrikoides* (formerly genus *Cochlodinium*), *Karenia mikimotoi*, *Akashiwo sanguinia* and *Amphidinium* species. There were no blooms of such species during 2024.

In addition to monitoring of primary stations for biotoxins and potentially toxic algae, Shellfish staff respond to reports of discolored water and potential cyanobacteria blooms throughout the state. In most cases, non-toxic algal blooms are identified, and no further action is necessary. Staff presented a synopsis of 2024 MA HAB/biotoxin events at the 2025 Gulf of Maine HAB Science Symposium.

Paralytic Shellfish Poisoning Monitoring in Shellfish: A major aspect of the Shellfish Program is monitoring for PSP biotoxins in shellfish. Consumption of shellfish containing high levels of PSP toxin can cause severe illness and even death. Blue mussels are used as our sentinel species, because they tend to take up and bioaccumulate toxins quicker than other shellfish species. Staff collect shellfish from 11 primary stations weekly April through October. Samples are analyzed at the DMF Gloucester lab where bioassays determine the levels of toxin in shellfish. If toxin is found, both the frequency of sampling and the number of sample sites are increased. Shellfish areas are closed if toxin levels approach or exceed safe limits. A total of 345 shellfish samples from state waters were processed for PSP during 2024.

A PSP closure of the Nauset system on Cape Cod is a nearly annual event, whereas PSP closures elsewhere in Massachusetts occur more sporadically. In 2024, the Nauset system closure (Figure 12) was issued on March 19 and remained in effect for all areas in Nauset until June 12, except for Salt Pond, which due to the overlap with a DSP closure, didn't reopen until approximately two months later on August 9. Additionally, a precautionary closure was also instituted in Pleasant Bay (Figure 12). This closure was based on *Alexandrium* cell counts observed at our monitoring station in Meetinghouse Pond. *Alexandrium* population growth began in Meetinghouse Pond in March, which caused DMF to issue a closure of Meetinghouse, Frostfish Cove, and the Namequoit River on March 19. The oyster farms to the east of the closure line continuously tested negative for PSP toxins, and the closure was lifted in mid-May after several species of shellfish within Meetinghouse and Lonnie's Pond tested negative and cell counts throughout the system continued to fall.

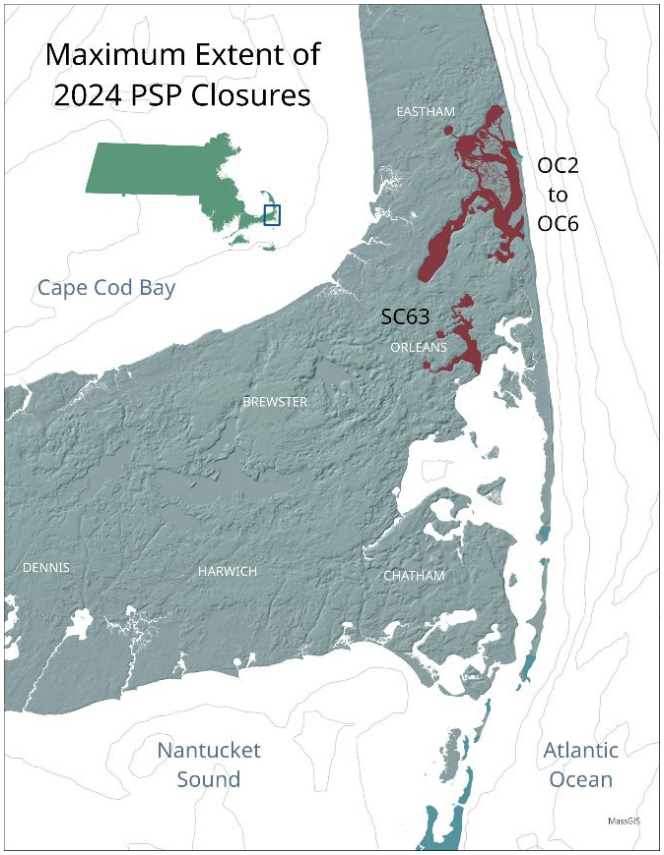

Figure 12. Map of 2024 PSP Closures

Shellfisheries Management Project

Contaminated Shellfish Resources

DMF directly manages contaminated shellfish resources for commercial bait harvest, relay, and depuration.

Commercial Bait Harvest: Dredge boat permits were issued for the contaminated surf clam bait fishery off Nantasket Beach in Hull. Because fewer than three vessels participated in this small fishery, landings cannot be reported for confidentiality reasons.

Contaminated Relay: DMF permits municipalities to relocate (between and within communities) bacterially contaminated shellfish to Approved and Conditionally Approved waters for natural purification (depuration) and municipal propagation. All activities are conducted under strict NSSP guidelines and are heavily supervised by state and local enforcement authorities. No shellfish can be harvested from the receiving relay sites until bacterial (fecal coliform) testing of the shellfish meats has been completed. Generally, after the completion of the transplant, the Division requires shellfish remain in the water for a minimum of 60 days but recommends they stay in the water through at least one spawning season.

Quahogs were the only shellfish species transplanted throughout 2024 (Table 11). A single dredge boat was contracted by 11 permitted towns to harvest quahogs from Restricted areas in the Taunton River for contaminated relay planting. Prior to harvest, shellfish veterinary disease testing was conducted on quahogs from several locations within the donor site (pathology conducted by Kennebec River Biosciences in Richmond, Maine). Relay harvesting in the Taunton River began on April 25 and the spawning season requirement for post-transplant harvest was waived, with a minimum 60-day depuration period required prior to harvest. Acceptable fecal coliform levels in shellfish meat samples were required prior to reopening for harvest. The dredge boat harvested a total of 9,325 bushels of quahogs for the 11 communities during the season which ended early on December 3 due to low water temperatures. In addition to the contaminated relay out of the Taunton River, Barnstable conducted in-town contaminated relay, transplanting quahogs from Bumps River to East Bay.

Table 11. 2024 Municipal Relays of contaminated quahogs.

Harvest Site	Receiving Municipality	Transplant Site	Classification Area	Bushels	Last Day Planted
Taunton River	Wellfleet	Inner Harbor & Harbor	CCB11, CCB13	1,061	May 23
Taunton River	Swansea	Outer Cole River	MHB4.12	300	June 1
Taunton River	Dennis	Bass River Center	SC34.23	140	July 3
Taunton River	Truro	Pamet Harbor	CCB7.1	300	June 6
Taunton River	Sandwich	Sandwich Harbor	CCB37.0	301	June 13
Taunton River	Yarmouth	Lewis Pond	SC28.7	700	June 27
Taunton River	Wareham	Broad Cove	BB42.2	800	July 24
Taunton River	Scituate	North/South Rivers	MB5, MB6	100	September 11
Taunton River	Marshfield	North/South Rivers	MB5, MB6	100	September 11
Taunton River	Fairhaven	Round Cove	BB21.20	600	October 2
Taunton River	Westport	East Branch	BB4	4,823	December 3

Depuration: DMF has operated the Shellfish Purification Plant in Newburyport since 1961. The commercial harvest of mildly contaminated softshell clams is made possible through depuration at the plant. During the purification process, seawater pumped from a saltwater well is used to flush pathogens (disease-causing bacteria) out of the shellfish, making them safe for market, as verified through daily testing of shellfish and tank water in the on-site NSSP certified laboratory. Clams harvested from Conditionally Restricted areas can only be transported to the Plant by licensed and bonded Master Diggers under strict enforcement. Upon completion, clams are returned to the harvesters who pay a depuration fee. The purified clams are then sold into commerce.

The management and oversight of this process has been a sizeable activity for the Division. However, the Purification Plant was temporarily closed on November 26, 2023 due to damage from a coastal storm which destroyed its seawater system. Subsequently, the Plant itself flooded on December 14, 2023 following another storm and remained closed throughout all of 2024. As a result of the closure, there was no harvest at all in this fishery in 2024 which resulted in a significant loss of softshell clams landed in Massachusetts as the Plant typically processes between 2–9% of total landings statewide each year.

In an effort to get the Plant back online, DMF commissioned a study from an engineering firm to investigate the feasibility of re-locating the water supply wells and the long-term viability of the plant to be completed. The report was completed in September 2024 and concluded that it would require an estimated $712,000 to make the plant operational again. More importantly, the study also assessed the vulnerability of the site and concluded that the Plant was highly vulnerable to routine flooding and that retreat from the site would be needed within the next 20-25 years due to sea level rise and coastal erosion. As a result of this analysis, the Commonwealth made the difficult decision to close the Plant permanently in December 2024.

As a result of this closure, DMF instituted two emergency relief programs to support displaced fishers. First, an economic relief program was approved to compensate participants for the amount of income lost due to the closure based on the average income over the prior three-year period. Second, a support program was developed to cover the additional costs of utilizing a similar depuration facility in nearby Eliot, Maine so the fishery could continue in 2025.

Shellfish Purification Plant Laboratory

Although the Shellfish Purification Plant did not depurate any clams in 2024, its laboratory remained a critical component of the Shellfish Program as it is the only laboratory in Massachusetts certified to analyze samples for Male Specific Coliphage (MSC). MSC are a group of bacteriophage that infect piliated *Escherichia coli* bacteria and have been utilized within the NSSP as an indicator to evaluate the potential viral contamination of shellfish and their associated growing areas impacted by sewage discharges from CSOs and WWTP outfalls. The Plant lab's MSC testing totaled 215 shellfish and wastewater treatment plant samples. Additionally, the Plant analyzed seven shellfish samples for fecal coliform bacteria. MSC testing was especially critical for Buzzards Bay aquaculturists and wild harvesters impacted by emergency CSO discharge closures. Without the MSC testing, emergency closures would be required to last 21 days. Favorable MSC results allow emergency CSO closures to be lifted after 8 or 9 days. Even with the earlier opening because of the MSC testing, these impacted growing areas suffered over 200 days of emergency closures in 2024, including most of the major holidays. Throughout 2024, preparations were made to transfer MSC testing capability to DMF's Gloucester and New Bedford laboratories so that the Plant's laboratory could be closed once those laboratories could become certified for MSC.

Aquaculture and Propagation Project

The management of marine aquaculture and shellfish propagation activities is a major responsibility of DMF. This

includes managing the introduction, culture, and harvest of all marine species in the Commonwealth. Currently the vast majority of marine aquaculture in Massachusetts consists of municipally licensed private molluscan shellfish aquaculture. DMF's duties involve three major areas of concern: 1) certifying the issuance of aquaculture licenses by municipalities; 2) permitting of aquaculturists, towns, and hatcheries to obtain, possess, and sell sub-legal shellfish (seed) for transplant and grow-out to legal size; and 3) reviewing shellfish pathology reports to add hatcheries to DMF's list of approved seed sources to prevent new introductions and spread of shellfish diseases in Massachusetts waters.

Shellfish License Certification

Under state statute, DMF is required to certify that municipally issued aquaculture licenses and associated culture activities will cause no substantial adverse effects on the shellfish or other natural marine resources of the city or town where they are located. Project staff review proposed aquaculture projects and survey sites to determine a project's potential to impact important or protected marine resources. Staff also review projects to evaluate potential conflicts with existing recreational and commercial fisheries and other public uses. If it is determined that a project presents a risk to marine resources or may limit public access, DMF may deny certification or require the town to condition the license to minimize such impacts.

In 2024, Project staff certified 10 sites for new shellfish aquaculture licenses or extensions to existing sites. This involved surveying 21.6 acres of tidelands (Table 12).

Table 12. New License Certifications in 2024.

Town	License Sites	Acres
Falmouth	2	7
Mashpee	1	1.1
Plymouth	3	6.5
Provincetown	2	2
Rowley	1	2
Yarmouth	1	3
Total	**10**	**21.6**

Permitting

DMF issues permits for all marine aquaculture activities in the Commonwealth. Permits require holders to manage their culture activities in a manner that minimizes impacts to the environment and other user groups, and prevents the introduction of diseases, non-native species, and other pests or predators that could harm both aquaculture and wild commercial fisheries. Additionally, permits may be conditioned to ensure food safety standards are met.

In the case of shellfish, a propagation permit is issued annually to both private growers and municipalities conducting shellfish planting activities. The permit allows the possession, transplant, and grow-out of seed shellfish from approved sources. In 2024, DMF issued shellfish propagation permits to 399 private aquaculture license site holders (Table 13), and 29 municipalities (for public propagation activities) operating shellfish aquaculture projects in 37 coastal municipalities throughout the Commonwealth. DMF also issued several aquaculture permits for the culture of sugar kelp and horseshoe crabs—solely for the purpose of wild population enhancement.

Aquaculture Program staff dedicated an extensive amount of time assisting with the development of a new DMF permitting system and database. DMF now offers the option of electronic filing of propagation and aquaculture permit applications and requisite annual reports.

Table 13. 2024 private aquaculture and shellfish propagation permits and acreage under cultivation by municipality.

Municipality	# Propagation Permit Holders	Acres*	Species Cultivated
Aquinnah	1	2.6	Quahog
Barnstable	51	158	Oyster, Quahog, Softshell Clam, Surf Clam
Bourne	7	17	Oyster, Quahog, Softshell Clam, Bay Scallop, Sugar Kelp
Brewster	11	11.5	Oyster, Quahog, Softshell Clam, Surf Clam
Chatham	2	7	Oyster, Quahog, Sugar Kelp
Chilmark	7	20	Oyster, Blue Mussel, Bay Scallop
Dartmouth	2	1	Oyster
Dennis	24	32	Oyster, Quahog, Softshell Clam, Surf Clam
Duxbury	28	79.1	Oyster, Quahog, Softshell Clam, Surf Clam, Bay Scallop
Eastham	28	49.6	Oyster, Quahog, Blue Mussel, Softshell Clam, Surf Clam
Edgartown	12	20	Oyster
Fairhaven	4	44	Oyster, Quahog
Falmouth	16	54	Oyster, Quahog, Surf Clam, Bay Scallop, Horseshoe Crab
Gosnold	1	32	Oyster
Harwich	1	0.01	Bay Scallop
Ipswich	1	1	Softshell Clam
Kingston	3	8.5	Oyster, Quahog
Marion	3	1.5	Oyster, Quahog
Mashpee	5	22	Oyster, Quahog, Bay Scallop
Mattapoisett	3	60.4	Oyster, Bay Scallop
Nantucket	7	73	Oyster, Quahog
Oak Bluffs	1	4	Oyster, Quahog, Sugar Kelp
Orleans	13	18.5	Oyster, Quahog, Blue Mussel, Surf Clam
Plymouth	34	98.3	Oyster, Quahog, Softshell Clam, Surf Clam, Bay Scallop
Provincetown	14	42	Oyster, Quahog, Softshell Clam, Surf Clam
Rowley	3	26	Oyster, Quahog, Softshell Clam
Scituate	3	3	Oyster
Tisbury	3	4	Oyster, Bay Scallop
Truro	4	20	Oyster
Wareham	6	83	Oyster, Quahog, Sugar Kelp
Wellfleet	91	270.6	Oyster, Quahog, Softshell Clam, Surf Clam, Blood Arc
Westport	5	80	Oyster, Quahog
Yarmouth	8	39	Oyster, Quahog, Sugar Kelp
Grand Total	402	**1382.61**	

*Acreage based on best available data. DMF intends to verify and ground truth grant acreage in coming years.

Aquaculture Landings

Aquaculture landings and value for oysters and quahogs are presented in Table 14. Oyster culture continued to dominate the aquaculture industry in Massachusetts. Landings value of aquacultured oysters in 2024 increased

by 13% compared to 2023. Quahog aquaculture revenue continued to be dominated by landings from growers in Barnstable and Wellfleet with a total value of over $1.3 million. The value of other cultured shellfish species including bay scallops, softshell clams, and surf clams, and kelp does not substantially add to aquaculture landings value and are not reported here due to confidentiality issues.

Table 14. 2024 Aquaculture Landings and Value for Oysters and Quahogs.

Eastern Oyster		
Town or Region	**Pieces**	**Reported Value**
Barnstable	11,779,534	$6,787,236
Brewster	768,150	$452,364
Dennis	2,395,334	$1,366,247
Duxbury	11,270,875	$6,647,969
Eastham	1,511,890	$858,961
Edgartown	1,639,468	$1,016,916
Falmouth	3,048,060	$1,690,902
Nantucket	757,246	$591,115
Orleans	585,200	$371,994
Other Buzzards Bay Towns	2,916,446	$1,567,369
Other Cape Cod Towns	833,327	$491,724
Other Island Towns	677,121	$560,435
Plymouth/Kingston	2,075,095	$1,173,720
Provincetown	66,700	$54,162
Rowley	*	*
Scituate	*	*
Truro	37,400	$20,349
Wareham	1,239,850	$764,193
Wellfleet	11,324,805	$6,725,921
Yarmouth	762,100	$425,932
TOTAL	53,688,601	$31,567,506
Quahog		
Town or Region	**Pieces**	**Reported Value**
Barnstable	1,638,352	$472,412
Dennis/Orleans/Provincetown	23,076	$6,590
Duxbury/Mashpee/Wareham	219,534	$85,129
Wellfleet	2,752,631	$757,461
TOTAL	4,633,593	$1,321,592
Total Aquaculture Landings Value		**$32,859,773**

*Confidential data; totals reflect only displayed values. Source: SAFIS Dealer Reports as of April 2025 and staff edits.

Aquaculture staff engaged in outreach activities including providing guest lectures for the Fundamentals of Shellfish Farming course sponsored by Cape Cod Cooperative Extension and Woods Hole Sea Grant.

Vibrio Management

A major component of the Shellfish Program's public health protection responsibilities is the implementation of control measures intended to limit the human health risks associated with exposure to *Vibrio parahaemolyticus* bacteria (*Vp*; *Vibrio*) from the consumption of raw oysters. Consumption of raw shellfish exposed to high levels of *Vibrio* can cause severe gastrointestinal illness, and in rare cases can be lethal. As a result, the USFDA requires NSSP member states with a history of *Vibrio* illness outbreaks to monitor conditions in oyster harvest areas, implement *Vibrio* control measures, and respond in the event of a *Vibrio* illness associated with shellfish consumption. DMF is also responsible for the closure of harvest areas following the notification of a *Vibrio* outbreak from *Mass*DPH.

DMF first implemented its Vibrio Control Plan in 2012, after two confirmed cases of illness in 2011 (Table 15). DMF and *Mass*DPH continually evaluate the effectiveness of the *Vibrio* controls and work with industry and other stakeholders to make improvements and incorporate state-specific data where possible. Changes to the *Vibrio* regulations or Vibrio Control Plan in 2024 included more specific tagging requirements related to harvest area, icing exemptions for specific situations related to dealers or harvester/dealers, and changes to the icing requirements and the definition of "adequately iced".

Table 15. Single-source *Vibrio* cases related to the consumption of MA-harvested shellfish.

Year	# of Cases
2011	2
2012	9
2013	33
2014	11
2015	28
2016	10
2017	14
2018	10
2019	8
2020	11
2021	16
2022	16
2023	15
2024	21

The *Vibrio* Control Season in Massachusetts currently runs from May 19 to October 19, when the risk of *Vibrio* illness is highest. During this period, commercial oyster harvesters are required to ice oysters to prevent the post-harvest growth of *Vibrio* bacteria; tag containers of oysters with the time of harvest and time of icing; shade oysters during harvest and transportation; and maintain a harvest logbook. Additionally, certain aquaculture activities related to the culling and processing of oysters are subject to *Vibrio* related restrictions. DMF, in cooperation with local Shellfish Constables and the Massachusetts Environmental Police, works with harvesters and growers to educate them on and verify compliance with the *Vibrio* Control Plan through routine compliance monitoring and industry training meetings. With the exception of the pandemic anomaly in 2020, oyster landings have exhibited an increasing trend over the last decade but the number of illnesses per million oysters landed has remained relatively constant since 2016 (Figure 13).

*Mass*DPH and DMF investigated 25 confirmed *Vp* illnesses involving consumption of raw oysters in 2024 (Table 16). Katama Bay continued the trend of shrinking illness numbers during the 2024 *Vibrio* season with no single source *Vibrio* illnesses. Prior to 2023, Katama Bay had been implicated in the most illnesses. Sporadic single-source illnesses from other areas occurred in Cape Cod Bay, south of Cape Cod, and Buzzards Bay. Six multi-source confirmed *Vp* illness tracebacks involved oysters from only MA growing areas, and nine cases implicated both in-state and out-of-state growing areas.

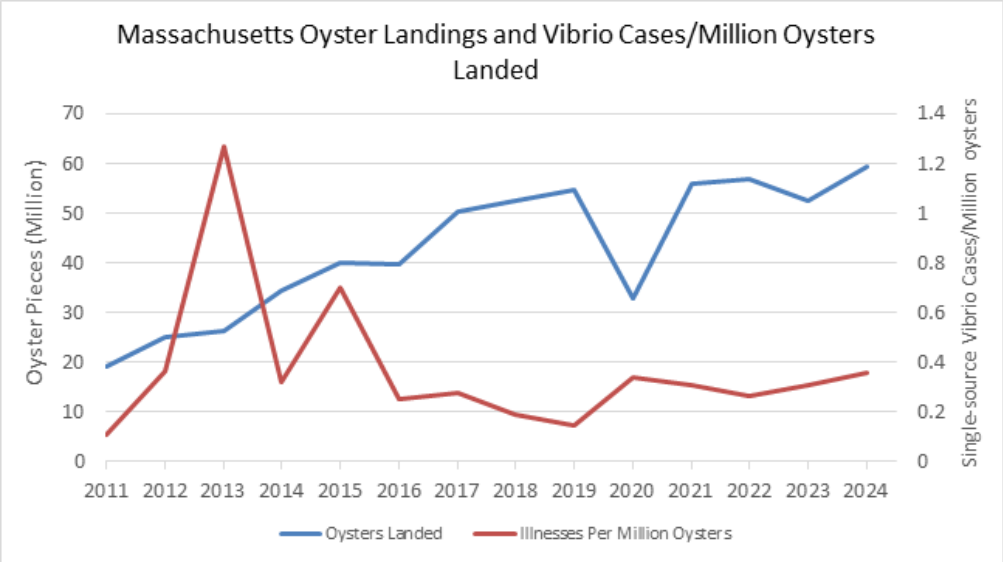

Figure 13. Trends in *Vibrio* Illnesses Relative to Quantity of Oysters Landed.

Table 16. 2024 Vp Illnesses (Raw Oysters) Traced Back to Specific Growing Areas.

	MA Growing Areas or State/Country for Out-of-state Traceback
MA Single-source (10)	BB4 (1 case); BB23 (1 case); BB36 (2 cases); CCB11 (1 case); CCB23 (1 case); CCB31 (1 case); CCB45 (1 case); SC21 (1 case); SC50 (1 case)
MA Multi-source (6)	[SC28 & SC50]; [CCB14 & CCB31]; [CCB9 & CCB45]; [BB3 & CCB45]; [SC61, CCB11, & CCB45]; [BB37 & CCB20]
Both Out-of-state and In-state Multi-source (9)	[CCB14, CCB23, CCB31, OC5, & Canada]; [CCB31 & WA]; [CCB11 & Canada]; [CCB14, CCB31 & ME]; [CCB23, BB21, BB18, NH, & Canada]; [CCB45 & WA]; [BB36 & Canada]; [CCB45 & ME]; [CCB31, NY, & ME]

An additional 15 investigations and trace backs were completed for illnesses associated with raw oyster consumption that were confirmed *Vibrio* genus, but species was not identified. Ten involved single-source trace backs to MA growing areas (CCB9, CCB14, CCB45, BB23, BB36, SC50, SC61, OC4, and V2), one implicated multiple in-state growing areas, and three involved in-state and out-of-state sources. CCB11 and CCB14 (Wellfleet Harbor System) represent one hydrographically connected area that is managed as a single-source for the purposes of *Vibrio* tracebacks. In 2024, there was a significant decrease in the number of *Vibrio* cases associated with this area. Wareham (BB36 and BB37) saw an increase in *Vibrio* cases with two single-source confirmed *Vp* illnesses and one additional single-source *Vibrio* sp (one of which was confirmed *Vibrio cholera*) illnesses as well as three multi-source illnesses. While the growing number of illnesses linked to Wareham oysters did not require any closures, the relatively small number of aquaculturists and rising illnesses has caused increased concern and will be monitored closely in 2025. In 2024, there was one confirmed *V. vulnificus* case associated with oyster consumption, which was multi-source and included out-of-state oysters.

Confirmed *Vp* and *Vibrio* sp. illness cases were highest for oysters harvested in the month of August, but illness cases remained sporadic in nature in 2024 and the number of cases did not reach thresholds that required shellfish growing area closures during the 2024 *Vibrio* Control Season. The last year in which shellfish growing area closures were required due to *Vibrio* illnesses was 2018.

Illness Outbreak Investigations

In addition to *Vibrio* illness investigations, aquaculture staff investigated two illness outbreaks associated with oyster consumption that required growing area closures in 2024. In accordance with the NSSP Model Ordinance, when an illness outbreak is linked to shellfish consumption, an investigation must be completed within 24 hours of notification or the growing area where the shellfish originated must be closed until an investigation can be completed.

In January, DMF was notified of a Norovirus outbreak from a restaurant in North Carolina possibly related to consumed oysters that were traced back to Barnstable (CCB31). On January 22, DMF implemented a closure of CCB31 and initiated an investigation of the growing area to determine if any potential cause of the outbreak was present. Efforts to deduce the potential cause of this Norovirus contamination event included contact with the grant site holder where the consumed oysters originated, the Director of the Barnstable Health Division, and the Barnstable shellfish constable; a site visit of the grant location as well as the surrounding area; and a review of oyster harvest records from CCB31. Given the high virulence and extremely high transmissibility of Norovirus along with the vast quantity of oysters harvested from CCB31, DMF concluded that it is exceedingly unlikely that the growing area was the source of Norovirus illness for this outbreak.

In July, DMF was notified of four *Campylobacter* illnesses (two confirmed *Campylobacter jejuni*) epidemiologically linked to oysters harvested from two aquaculture sites in Yarmouth (SC28), which qualified as an outbreak. A closure was immediately implemented on July 19 and an investigation was conducted. Two aquaculture sites in SC28 (one implicated in illnesses and one adjacent to the other implicated site) that utilize floating gear showed signs of bird activity including droppings, empty shells, and presence of birds. DMF could not definitively rule out the consumed oysters as the cause of the illnesses due to this bird activity on floating aquaculture gear, and as a result, the investigation was considered inconclusive, and the area could not be reopened.

DMF staff then collected oyster samples from both aquaculture sites implicated in the illnesses to be tested for the presence of *Campylobacter* by the Rhode Island Department of Health State Health Laboratory. Results of this testing included one site being positive for *Campylobacter lari* and the other being negative. A second round of testing was expanded to include oysters from all four active aquaculturists in SC28. The results for the implicated sites flipped, with the first site being negative and the second being positive for *Campylobacter lari*. Based on the inconclusive test results, it was determined that additional testing was necessary, and aquaculture sites would be reopened individually as they received negative results. In total, four rounds of testing were conducted before all sites could be reopened on August 26.

Additionally in July, three confirmed *Campylobacter* illnesses were reported that involved consumption of oysters from Nantucket. While determining that the illnesses reached the level of an outbreak and closing the growing area was considered, it was determined that the consumed oysters could not be directly linked. This was because all three cases also consumed a chicken liver pâté dish from one restaurant, and some of the consumed oysters had been cooked.

Other Activities

Staff participated in professional organizations and meetings including the Shellfish Advisory Panel, the Massachusetts Shellfish Officers Association, the 2024 Northeast Aquaculture Conference & Exposition, the 2024 Gulf of Maine Harmful Algae Bloom Conference, the Northeast Shellfish Sanitation Association, and several in-state conferences/events (e.g., Plymouth Blue Future Conference and Wellfleet Oyster Fest). Staff also served on the Woods Hole Sea Grant Marine Outreach Guidance Group and MIT Sea Grant Aquaculture Advisory Panel;

and served on several competitive grant review panels (MIT Sea Grant, Woods Hole Sea Grant).

Preparations continued in both the Gloucester and New Bedford laboratories to establish the capability to test for biotoxins utilizing High Performance Liquid Chromatography (HPLC). Instruments acquired in 2023 were set up in each lab and training for staff occurred at the Bigelow Laboratory for Ocean Sciences in Maine, as well as on-site by the HPLC manufacturer's representatives. It is hoped that the HPLC will replace the current mouse bioassay methodology by 2026.

In 2024, DMF applied for and was awarded a sixth FDA Milk and Shellfish Grant to purchase Shellfish Program equipment. DMF used the $19,695 received to purchase needed supplies and equipment for the laboratory and classification program elements. Program equipment and supplies consisted of a platform shaker, a refrigerator/freezer combination unit, a centrifuge rotor, a MicroRX station with accompanying sensors, and a balance.

DMF also applied for and was awarded a training grant through FDA Milk and Shellfish Grant for $37,690. This grant funded travel and attendance to several trainings and meetings relevant to the Shellfish Program including FD242 Sanitary Survey of Shellfish Growing Areas, FD342 Advanced Shellfish Growing Areas, Seafood Alliance HACCP, NESSA, and FD248 Shellfish Risk Assessment Risk Management. DMF is grateful for the support of the FDA, ISSC, NCIMS, and AFDO National Shellfish Sanitation Grant Program for providing over $80,000 to the Shellfish Sanitation and Management Program in equipment and educational funding over the last several years.

Habitat Program

Personnel

Mark Rousseau, Program Manager

Gloucester
Kate Frew, Marine Fisheries Biologist
Dr. Forest Schenck, Marine Fisheries Biologist
Iris Seto, Marine Fisheries Biologist
Evan Connors, UMASS Undergraduate Student Intern (May–September)

New Bedford
Dr. John Logan, Marine Fisheries Biologist
Steve Voss, Marine Fisheries Biologist
Amanda Davis, Marine Fisheries Biologist
Malik Neron, Contract Assistant
Kara Falvey, Contract Assistant
Sasha Milsky, Seasonal Contract Technician (February–June)
Heather Cyr, Contracted Seasonal Employee (April–October)
Tessa Peixoto, Contracted Seasonal Employee (May–October)

Overview

The Habitat Program protects and enhances marine fisheries resources through its Technical Review and Fisheries Habitat Research projects. The **Technical Review Project** reviews permits submitted to municipalities, the Commonwealth, and the federal government for construction projects occurring in waters with fisheries and habitats under DMF jurisdiction. The reviewers provide recommendations to avoid and minimize impacts to marine fisheries resources. In addition, staff participate on various working groups to provide technical analysis and policy input on a variety of topics including ocean planning and offshore wind development. The **Fisheries Habitat Research Project** conducts state- and grant-funded research related to marine fisheries habitats. Research studies focus on marshes, embayments, artificial reefs, eelgrass, and food webs.

Technical Review Project

Technical Review

DMF reviews coastal construction projects and provides information to municipal, state, and federal agencies to ensure projects avoid, minimize, or mitigate potential impacts to marine fisheries resources and habitats. Projects from the Town of Plymouth north to the New Hampshire border are reviewed by program staff stationed at the Annisquam River facility, while South Coast office staff review projects from the Town of Bourne south to the Rhode Island border, including the Islands.

In 2024, staff reviewed 886 permit filings associated with 664 projects in 100 municipalities (Figure 14). Of these, 419 were new projects, which is slightly above the average of 384 new projects per year over the past decade. The dominant new project type was residential docks. Not all projects reviewed represent new construction or new impacts; 249 projects (38%) were specific to replacements or repairs of previously permitted structures. For example, 102/149 hardened shoreline, 98/223 residential docks, and 39/65 commercial/public docks projects

addressed the replacement of existing structures. Of all projects reviewed, 129 projects occurred in or near salt marsh (19%) and 41 in or near eelgrass (6%) habitats. In 2024, DMF recommended time-of-year restrictions (TOYs) for 149 projects and received waiver requests for nineteen projects.

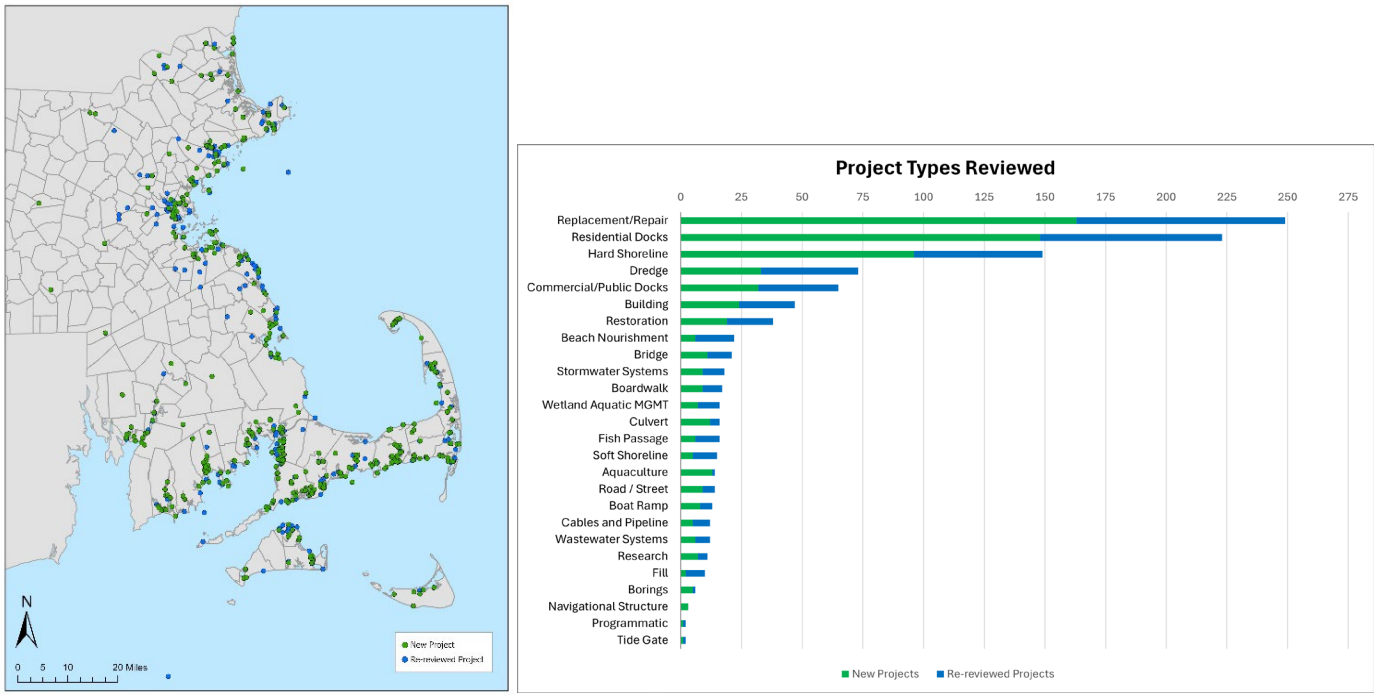

Figure 14. Coastal alteration projects reviewed in 2024 by location (left) and type (right). A single project can include multiple project types.

Notable projects reviewed in 2024 include Collier Ledge, Herring River Restoration, Temple Street Dam Removal, Carbon Sequestration (LOC-NESS), and Neptune LNG Decommissioning. Major dredging projects included Popponesset Bay in Barnstable and Manchester Harbor. Erosion control and nourishment projects included Crescent Beach in Chatham, East Chop Drive in Oak Bluffs, and Duxbury Beach High Pines in Duxbury, and seawall repairs to various stretches of coastline along Scituate.

Data Management

Data management and archiving are important parts of Technical Review. Program staff continue to improve these systems as technologies improve. In 2024, Habitat Program staff continued to use the DMF Review Database (v. 2.1) to track project location, type, impact size, potential habitat impacts, and other project attributes. Program staff utilize the database to track the number of projects reviewed and the number of reviews associated with each project (Table 17). Additionally, NPDES permits have been added, and habitat staff will coordinate with the shellfish program during review.

Table 17. Number of applications or documents reviewed by Habitat staff in 2024.

Review Document	Permit Associated	# Documents Reviewed	Agency that Comments are Due To
Notice of Intent (includes ERP NOIs, revised NOIs, OOC amendments)	Order of Conditions	328 (37%)	City/Town Conservation Commission
Public Notice of Chapter 91 Waterways License or Permit Application	Waterways License or Permit	215 (24%)	MA Department of Environmental Protection (DEP)
Preconstruction Notification Form	General Permit	127 (14%)	U.S. Army Corps of Engineers (ACOE)
Environmental Notification Form	Secretary's Certificate*	65 (7%)	MA Environmental Policy Act (MEPA) Office
Notice of Project Change		12 (14%)	MEPA Office or ACOE
Environmental Impact Report or Reviews**		25 (2.8%)	MEPA Office
Public Notice	Individual Permit	19 (2%)	ACOE
401 Water Quality Certification Public Notice	401 Water Quality Certification	6 (0.45%)	DEP
Other (information or pre-app meeting requests)		89 (10%)	

*The MEPA review is not a permitting process but is instead a forum for public study of a proposed project.

**MEPA Review may result in the issuance of a Certificate with a Scope for Environmental Impact Reports or Reviews.

In Lieu Fee Program

In 2014, a Massachusetts-wide In Lieu Fee Program (ILFP) sponsored by *Mass*DFG was developed to address unavoidable resource impacts statewide under both the USACE General Permit and Individual Permit. *Mass*DFG initiates an annual selection process for identifying coastal restoration projects to submit to the USACE for funding approval. Projects approved for funding are typically required to include monitoring for five years or more. Program staff participate in the ILFP's proposal review for projects submitted annually for funding consideration, the tracking of payments received, and credits sold, and the development and review of the Department's annual reports on the program. DMF has also received ILF funding for projects restoring eelgrass and enhancing hard bottom habitats in the Commonwealth's marine waters. While no new DMF proposals were funded through the ILFP in 2024, the Habitat Program continued work on two active ILF-funded projects during the year. Additional information on Eelgrass Restoration Site Selection Project is further described on page 61; and Marine Habitat enhancement, Artificial Reef- Yarmouth on page 58.

Ocean Planning

In 2021, the Massachusetts Ocean Management Plan (MOP)—the Commonwealth's blueprint for the protection and sustainable use of state ocean waters—completed the plan's five-year review and revision. In 2024, Program staff participated in the Science Advisory Council and the Ocean Advisory Commission meetings. DMF continued to participate in the Northeast Regional Ocean Council and the Northeast Habitat Assessment team. Both entities work to improve regional coordination of the management and permitting of offshore activities.

DMF staff participate in an interagency ocean management team to inform *Mass*CZM's expenditure of funds from the Ocean Resources and Waterways Trust established for the MOP. In 2024, the team approved a

$300,000 expenditure from the Trust to advance seafloor mapping to support the Commonwealth's energy and transmission goals in the Gulf of Maine Wind Energy Area. The funding served as a match for $700,000 NOAA funding to deploy acoustic technologies for high resolution multibeam bathymetry and back scatter data from the OCS-a 0567-lease area to inform future resource management decisions significant to MA. Characterization work was completed in 2024. Results were pending at year's end.

Fisheries Habitat Research Project

Artificial Reefs

Massachusetts has five permitted artificial reefs in its waters. Staff perform surveys to identify new reef sites for permitting, conducts compliance and biological monitoring, coordinates materials acquisitions and deployments, and provides technical guidance to advance responsible artificial reef development and uses in Massachusetts coastal waters.

Reef Monitoring: In 2024, all reef sites were monitored for community composition, biomass, invasive species presence, permit compliance, and temperature. Acoustic receivers were utilized year-round to assess the patterns of tagged fish. We documented fish visiting multiple reef sites and returning to the same reef site over multiple years. Work continued on the development of protocols to guide future reef monitoring efforts.

DMF continued a study using Baited Remote Underwater Video Stations (BRUVS) comparing reef productivity of artificial reefs in Nantucket Sound (Figure 15). BRUV units were deployed on natural and artificial habitat types between May and October. The BRUVS were used to measure species richness, diversity, abundance, and age structure of black sea bass and scup and compare fish aggregations on artificial reefs to those on nearby natural reefs and sand bottom habitats. Staff utilize BRUVS to assess structured habitat connectivity to determine appropriate spacing of new artificial reefs.

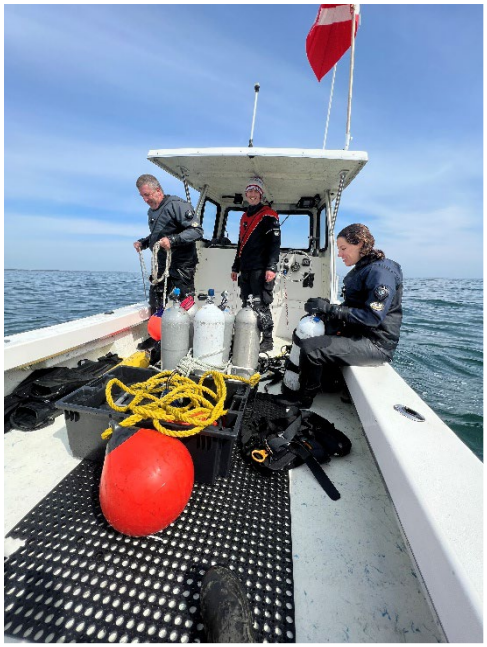

Figure 15. DMF divers prepare to monitor the Yarmouth Artificial Reef.

Side scan sonar surveys were conducted for pre- and post-artificial reef deployments and for selecting sites to permit. The surveys are used to demonstrate compliance with permit conditions and provide a snapshot of material footprints of new materials added to the reef sites.

Material Storage and Procurement: Efforts to obtain surplus materials from MA Department of Transportation (*Mass*DOT), MA Division of Ecological Restoration (*Mass*DER), Massachusetts Bay Transportation Authority (MBTA), and other parties remained ongoing. DMF works with *Mass*DOT, MBTA, *Mass*CZM, and local municipalities to identify suitable storage areas for artificial reef materials, focusing on port areas capable of handling the weight and volume of reef materials. No suitable long-term storage locations for artificial reef materials were identified in 2024.

Cape Cod Bay Site Selection: In 2018, DMF began exploring the potential for four to five new artificial reef locations in lower Cape Cod Bay between Sandwich and Barnstable. In 2021, project staff met with Massachusetts Environmental Policy Act (MEPA) representatives from EEA to discuss the appropriate permitting pathway for these sites. Proposed sites in Brewster and Dennis were under review as potential sites to explore

for permitting.

Deployments: In February, DMF, the Town of Yarmouth, and the USCG deployed retired ATON mooring blocks to the Yarmouth artificial reef site at no cost to the Commonwealth. USCG cutter Ida Lewis conducted "Operation Sinker Dump", deploying 16 concrete blocks ranging between 1,000 and 8,500 pounds to a designated location on the Yarmouth reef site as part of the USCG maritime stewardship efforts in support of local coastal communities (Figure 16).

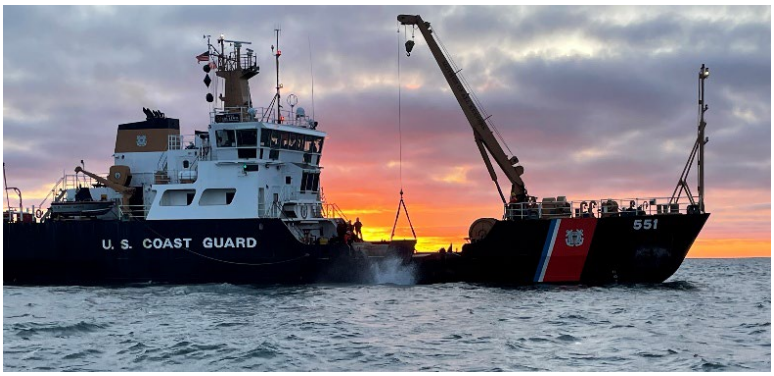

Figure 16. USCG Deployment to Yarmouth reef. February 2024.

Outreach: Habitat staff presented updates on DMF artificial reef activities to various groups, including DMF's Marine Recreational Fisheries Development Panel, the Cape Cod Commercial Charter Boat Association, and the Cape Cod Salties. Project staff collaborated with the National Marine Fisheries Service (NMFS) staff and other state reef program managers on a 2024 publication in Nature Sustainability entitled Artificial Reefs in the United States.

Climate Change

Climate change is an area of active research and policy development in New England. DMF's primary focus is on harnessing existing research efforts and ensuring that data relevant to climate change are collected in a standardized way and made accessible to all research entities.

Temperature: Project staff compile all marine and coastal continuous bottom temperature monitoring records collected by DMF. The database contains over 7 million records from 1986 to present, inventorying more than 30 seafloor stations and over 40 estuarine and riverine sites where bottom temperature data are collected seasonally, typically March to October. Approximately 200,000 temperature records statewide are collected annually. Efforts to advance the database to a publicly accessible platform were ongoing. DMF receives requests for information from the bottom temperature database from researchers and scientists exploring data relevant to regional climate and fisheries management issues. In 2024, data were provided to DMF, ASMFC, and NMFS scientists for lobster and winter flounder management plan stock assessments.

Food Webs: Project staff have been researching the processes by which ocean warming and other physiological changes from climate change may alter food webs. Staff have been involved in diet and stable isotope studies of tunas in New England shelf and offshore waters in collaboration with the University of Maine and Gulf of Maine Research Institute. DMF staff assisted with drafting a manuscript that explores recent changes in Atlantic bluefin tuna diet in the Gulf of Maine (in peer review).

A study initiated in 2012 to examine the interplay between eutrophication and transfer of contaminants into Cape Cod estuarine food webs continued in 2024. Undergraduate students and faculty from the Harvard T.H. Chan School of Public Health performed additional lab and data analyses to measure the total mercury concentration of Atlantic silversides and mummichogs collected from estuaries with different nitrogen loads in Falmouth, MA. Harvard and DMF Habitat Program staff were preparing a scientific manuscript of these results to be submitted for peer review at year's end.

DFG Strategic Planning Initiative: In 2024, Program staff participated in the biodiversity and climate working

group for the development of "Connections: Working Together for Nature"—a five-year strategic plan for *Mass*DFG. The working group included members from all *Mass*DFG Divisions and was responsible for developing goals, objectives, action items and key results for the Department to achieve by 2030. Key DMF relevant goals aimed at addressing climate change and biodiversity include building climate resilience in coastal and marine habitats, natural solutions for storing and sequestering carbon with nature, and scaling actions and growing capacity to keep pace with the biodiversity and climate crisis. In addition to biodiversity and climate, Connections includes other key themes including environmental justice, relevance, visibility and capacity. Connections was finalized in 2024 and will inform DMF's efforts in working with *Mass*DFG to meet the goals outlined in the plan through 2030.

Eelgrass Monitoring and Restoration

Eelgrass (*Zostera marina*) is a critical marine fisheries habitat. Project staff conduct research, monitoring, and restoration of eelgrass in Massachusetts. The eelgrass experts at DMF also play an important role advising other groups studying eelgrass and protecting eelgrass through technical review of construction projects.

Eelgrass Monitoring: Project staff completed the 17th year of dive surveys at a site off West Beach, Beverly in Salem Sound as part of the international SeagrassNet monitoring program and *Mass*CZM's Marine Invader Monitoring and Information Collaborative. Long term monitoring at this site provides the region with data on the response of eelgrass to changing temperature and resilience to storms, algal blooms, and eelgrass wasting disease.

Project staff completed coordination of a 7th year of the Citizen Science Eelgrass Rapid Assessment Program. The program primarily relies on volunteers to collect eelgrass presence and condition data using a standardized protocol and the iSeaGrass web app to document eelgrass distribution and health at locations throughout the state. The program's focus in 2024 remained in the Duxbury-Kingston-Plymouth embayment (DKP), where the final year of a collaboration with the Massachusetts Bay National Estuarine Partnership, EPA, and North and South Rivers Watershed Association supported by mitigation funding from *Mass*DEP and Veolia was completed. A total of seven volunteers contributed to the eelgrass assessment in DKP, sampling at 86 locations in July or August. Overall, these data continue to suggest eelgrass area remains well below the historic baseline in DKP. The program is expected to continue in 2025.

Project staff completed the first year of work associated with grants received from the EPA Southern New England Program and WHOI Sea Grant to assess the timing and distribution of eelgrass seed production in Massachusetts in partnership with the Rhode Island Division of Marine Fisheries, Massachusetts Bay National Estuary Partnership, and Salem Sound Coast Watch. Work is scheduled to continue in 2025 (Figure 17).

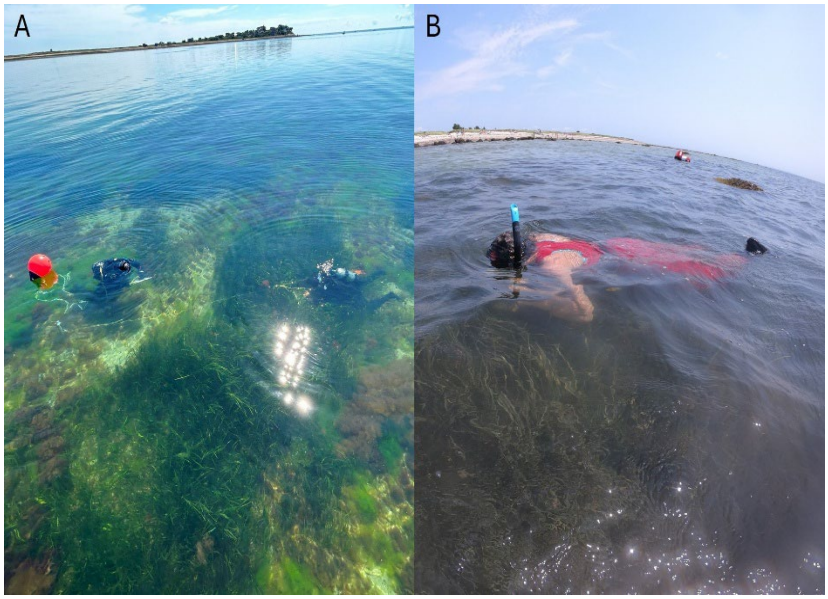

Figure 17. DMF divers and snorkelers monitoring the timing and distribution of eelgrass seed production over the summer of 2024 in (A) Plymouth, MA and (B) Fairhaven, MA.

Eelgrass Restoration Site Selection Project: Project staff continued efforts to identify suitable locations for future eelgrass restoration with funding from the MassDFG ILF Program. In 2024, this work included permitting, planting, and monitoring test plots at three additional locations where field monitoring suggested suitability. None of the seven test plots planted over the course of the project have been successful. Project staff plan to conclude these efforts with a final report to be submitted in 2025.

Developing Capacity for Seed-Based Eelgrass Restoration: Project staff received funding through the Massachusetts Bay National Estuary Partnership to develop capacity to support seed-based eelgrass restoration utilizing the seawater system and tanks at DMF's Cat Cove Lab in Salem (Figure 18). Project staff collaborated with researchers from Massachusetts Bay National Estuarine Partnership, Salem State University, Northeastern University, and Salem Sound Coast Watch to trial seed storage and processing methodologies, producing over 100K seeds. This work is planned to continue in 2025.

Figure 18. DMF staff and collaborators process eelgrass seeds at DMF's Cat Cove Lab in August 2024.

Mooring impacts to Eelgrass: Project staff published a scientific manuscript in *Estuaries and Coasts* describing the recovery of eelgrass following conversion of conventional chain moorings to conservation mooring systems in Massachusetts.

Float Impacts to Eelgrass: Project staff have assumed a leadership role in an ongoing project in collaboration with Salem Sound Coast Watch to assess the impact of floats on eelgrass. This work will inform our environmental review comment letters pertaining to dock and pier construction. In 2024, project staff drafted a scientific manuscript associated with the project to be submitted for peer review in 2025.

Town Neck Beach, Sandwich Eelgrass Surveys: Project staff, in a partnership with the Woods Hole Group (WHG) continued its annual eelgrass survey along Town Neck Beach in Sandwich. This partnership is entering its 11th year with annual surveys. DMF is responsible for the boat-based side scan sonar and drop camera surveys for the deeper eelgrass extents, while WHG conducts the wading survey for the near shore shallow areas. This site is of particular interest due to continued beach nourishment activities and the potential impacts to eelgrass and habitat in the area. The surveyed eelgrass bed has persisted following nourishment based on surveys to date.

Oyster Habitat Restoration

Habitat Program staff collaborated with the DMF Shellfish Program, The Nature Conservancy (TNC), and the Cape Cod Conservation District (CCCD) on a United States Department of Agriculture - Natural Resources Conservation Service (NRCS) funding opportunity entitled "Shellfish, Salt Marsh, and Eelgrass Restoration in Massachusetts". This project, led by TNC, will result in a first-of-its-kind statewide critical coastal habitat restoration plan, lay the groundwork to expand aquaculture supported habitat restoration, and develop shovel ready projects to improve the condition of coastal ecosystems. DMF deliverables under the NRCS grant include the planning and permitting of five new restoration sites and the completion of a comprehensive statewide coastal habitat restoration plan over five years. DMF, with collaborative input, developed a job description for a

new Shellfish Habitat Restoration Specialist position and initiated the hiring process to fill the position in October. The position was expected to be filled in January 2025.

Bay Scalloping Impacts to Eelgrass

Bay scallops are found predominantly in eelgrass meadows. To better understand if a winter bay scallop fishery was impacting eelgrass, DMF started studying the impact of dragging for bay scallops on eelgrass in 2018 and continued field monitoring through 2022. Analyses were completed in 2024, and plans being made to present final results to a variety of stakeholder groups and submitted for peer review to a scientific journal in 2025.

The first study relied on a natural experiment. In fall 2017 to winter 2018, the Westport River supported a large and prolonged bay scallop harvest for the first time in decades, presenting a unique opportunity to characterize eelgrass meadows during multiple growing seasons following a single season of scalloping. In the following four years, the Habitat team surveyed an eelgrass meadow that was the site of intensive scallop dragging as well as several nearby unfished beds that served as references for comparison. Eelgrass bed area and percent cover significantly declined in the bed where scalloping occurred previously, but this decline appears to have been the result of an unrelated local algal bloom. The observed decline did not occur in the growing season immediately following the scalloping event, but rather in the two subsequent years, coinciding with an inundation of cyanobacteria that carpeted much of the bed (Figure 19).

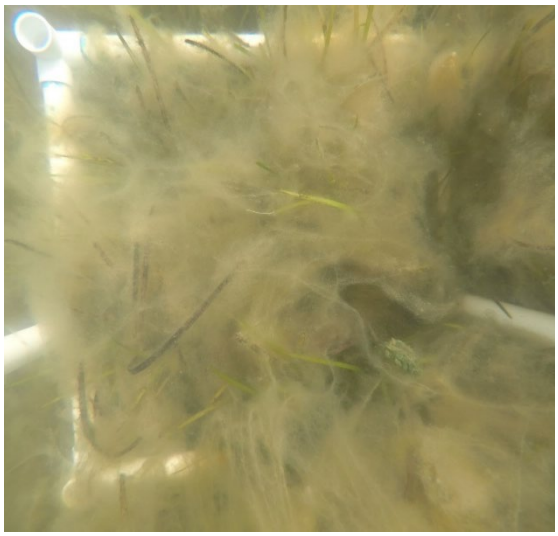

Figure 19. Representative image of the eelgrass bed subject to intensive bay scallop dragging, two growing seasons later. The remaining eelgrass is coated by a cyanobacteria observed throughout the bed in the second and third years of monitoring.

The second study was a controlled impact assessment whereby DMF established experimental scallop dragging sites in an eelgrass meadow in Nasketucket Bay in Fairhaven and in the West Branch of the Westport River. In each area, high and low intensity dragging was conducted during the November–December bay scalloping season for three consecutive years, followed by subsequent summer season measuring of eelgrass density in both the fished sites and adjacent unfished reference sites. No impacts to eelgrass were detected in any of the monitoring years or seasons in the Westport River. Minor declines were observed in a single year in the Fairhaven study area, but no long-term effects were detected.

Environmental (eDNA)

Winter Flounder: Winter flounder spawn demersal, adhesive eggs in winter months. These eggs are sensitive to turbidity and burial so dredging projects in all Massachusetts embayments are limited by time-of-year (TOY) restrictions during the spawning and larval development periods as an impact minimization strategy. Because detailed information on the timing and location of spawning within embayments is lacking, the winter flounder TOY spawning recommendation is broad and long. When combined with user conflicts during summer months, this generally restricts the dredging window to the fall and early winter. There is great interest in better understanding how to adequately protect winter flounder while providing more flexibility for dredging projects in time and space.

In response, DMF initiated a combined eDNA and fyke net survey of winter flounder in Waquoit Bay in 2023. This combined survey was replicated for a second field season during winter 2023–2024. Fyke nets were installed in four locations in Waquoit Bay in December and monitored weekly through April. Winter flounder collected in fykes were counted, measured, and assessed externally for reproductive status prior to release (Figure 20). During this period, eDNA samples were collected from 13 sampling stations biweekly to directly compare eDNA data with fyke catch-per-unit-effort.

Spatial and temporal patterns of winter flounder catches were consistent with results from the initial 2023 field season. The majority of winter flounder were caught in January and February with the highest percentage of fish caught at our fyke stations at the head of Waquoit. Timing of peak catches aligned with the periods of peak eDNA detections from the previous winter. eDNA samples collected in 2023 were processed in 2024 to allow for direct comparison to catch data from the same year. eDNA results from 2023 closely matched fyke catches with the exception of a secondary peak in eDNA detections in late April. This secondary peak likely reflects young-of-year winter flounder, which are not typically part of fyke catches. Both male and female winter flounder in active spawning condition were observed during the 2024 survey providing direct evidence of spawning within this estuarine environment. eDNA samples collected in 2024 will be analyzed in 2025.

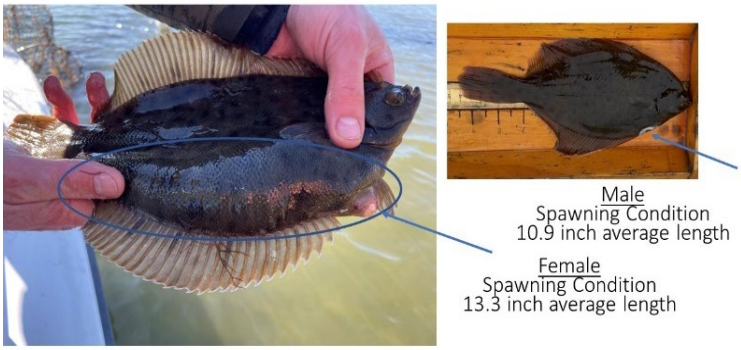

Figure 20. Examples of spawning condition winter flounder caught during the fyke survey in Winter 2024. Ripe females were characterized by distended abdomens and males actively expressed milt during handling.

In collaboration with DMF Resource Assessment Survey staff, the Habitat Program collected additional water samples for winter flounder eDNA analysis in Waquoit Bay in June during the DMF young-of-year winter flounder seine survey. eDNA results will be analyzed in 2025 for comparison with seine catch data.

Additional eDNA sampling targeting young-of-year winter flounder was conducted in summer and fall 2024 in four Cape Cod estuaries: Waquoit Bay, Great Pond, Little Pond, and Bourne's Pond. Sampling was designed to track young-of-year eDNA across the growing season in systems that currently have eelgrass habitat (Little Pond, Bourne's Pond) as well as those without vegetation (Waquoit Bay, Great Pond). Samples will be analyzed in 2025 to assess whether winter flounder presence, inferred from eDNA, persists further into the growing season in systems currently supporting eelgrass habitat. In 2024, eDNA samples were also collected on Nantucket Sound artificial reef and reference sites to compare finfish species presence data with monitoring results from BRUV and Underwater Visual Census (UVC) reef surveys. Sample analysis is expected to begin in 2025.

Offshore Wind: DMF Habitat Program staff collaborated with GMGI on a pilot eDNA study in 2023 focused on the offshore wind lease areas off the Massachusetts coast. This sampling effort was repeated for a second consecutive year in 2024. From May to November, Habitat Program staff collected monthly surface and bottom water samples from 40 fixed stations both within lease areas permitted for development and in nearby reference areas not currently under development (Figure 21). Stations in active development were located within the South Fork and Revolution Wind lease areas as well as the Vineyard Wind 1 lease area with most stations aligned closely with an existing acoustic telemetry array maintained by the New England Aquarium's Anderson Cabot Center for Ocean Life to allow for comparison of eDNA results with the presence of acoustically tagged fish species. Sample analysis by GMGI of vertebrate eDNA was completed in 2024. eDNA metabarcoding methods are being used to characterize the biodiversity of fishes, invertebrates, marine mammals, sea birds,

and sea turtles in these offshore wind lease areas. A total of 100 unique species were identified in the 2023 dataset. Preliminary results were presented at the Northeast Fish & Wildlife Agencies (NEAFWA) annual conference in summer 2024. These data will provide an important baseline of marine biodiversity prior to large-scale construction in this region.

MA DMF Monitoring Surveys: Habitat Program staff partnered with the Resource Assessment Survey to continue collecting water samples on the annual state bottom trawl survey. Samples were collected at 72 stations during the Spring survey in 2024. eDNA metabarcoding analysis of fishes is being conducted to estimate fish biodiversity for comparison with trawl catches.

Figure 21. DMF Habitat Program staff Steve Voss collecting a bottom water sample for vertebrate eDNA at the Revolution Wind offshore wind lease area.

Water samples for eDNA analysis were also collected alongside the Habitat Program's artificial reef monitoring program. Surface and bottom water samples were collected in association with baited remote underwater video surveys conducted at artificial reefs off Yarmouth and Harwich as well as reference hard and soft bottom sites in Nantucket Sound during three sampling events in Spring and Summer 2024.

Other Activities

Committee Work: Program staff continued to serve on a variety of habitat-related committees, including the ASMFC Habitat and Artificial Reef Committees, the Atlantic Coastal Fish Habitat Partnership (ACFHP), the ACFHP Science and Data Committee, the NEFMC Habitat Plan Development Team, the NROC Ocean Planning Committee and Habitat Classification and Ocean Mapping Subcommittee, the MA State Interagency Aerial Spraying Technical Committee, NEFMC/MAFMC Northeast Regional Habitat Assessment Team, MA Climate Change Vulnerability Assessment Team, the Massachusetts Bay Management Committee, Massachusetts Bays National Estuarine Program Tide Gates Science Advisory Committee, the MassMarsh Long-term Salt Marsh Resilient Research and Monitoring Program, the Buzzards Bay National Estuary Program, the Boston Harbor Habitat Coalition, the Gulf of Maine Climate Network's Sentinel Monitoring Project, the Marine Invader Monitoring and Information Collaborative, the MA DFG ILF Steering Committee and Project Proposal Review Team, DEP salt marsh restoration working group, Chappaquiddick Salt Marsh Restoration Project Advisory Team, and the MIT Sea Grant Advisory Committee.

Executive Order 618: Biodiversity Conservation in Massachusetts: In 2023 Governor Healey signed Executive Order 618, directing *Mass*DMF to conduct a review of existing biodiversity conservation efforts and establish goals and strategies to achieve a nature-positive future for Massachusetts. In August, DMF staff began working with representatives from *Mass*Wildlife, *Mass*DER, OFBA and other agencies in the development of a plan for the Commonwealth to address biodiversity conservation. Several Habitat Program staff participated in a BioEO workshop held in Westborough in April. Program staff also played an active role on the DFG Biodiversity Steering Committee in the development of biodiversity goals for the Commonwealth using a whole-of-government approach. A final report and recommendations were expected to be completed and released in 2025.

Regulatory Revisions: In 2024 Habitat Program staff assisted the Shellfish Program and DMF Policy and Statistics staff in developing a pilot program to update the state's surf clam and ocean quahog regulations for the purpose of installing trackers on vessels participating in the state surf clam fishery. Program staff met with representatives from industry to interpret existing boundary lines initially codified in the 1980s and to develop new regulatory boundaries for the fishery that would address potential impacts to existing uses and protect eelgrass (Figure 22). Proposed new boundaries were planned for presentation to municipalities, industry, and other state agencies for review, with the goal of finalizing new regulations in 2025.

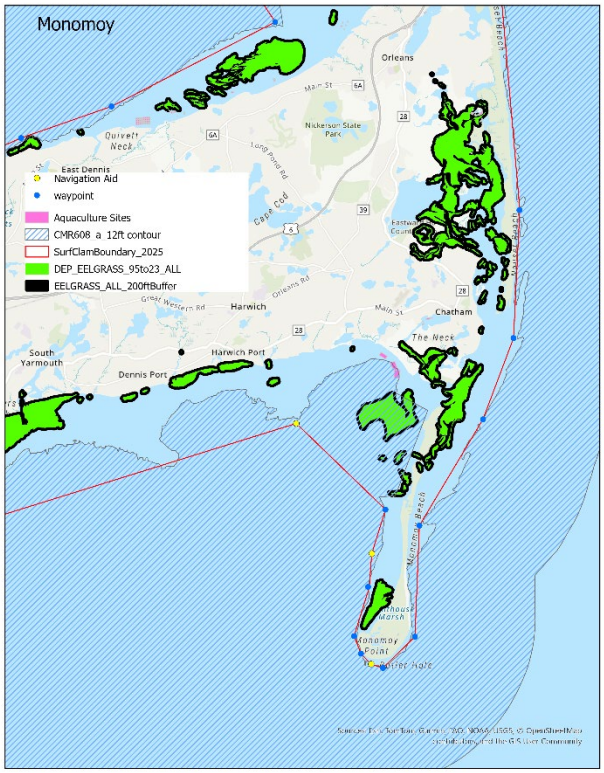

Figure 22. Boundary revisions developed by Habitat Program staff for use in vessel tracking of the in-state surf clam and ocean quahog fishery.

Publications: In 2024, the Habitat Program continued to develop a Fisheries Habitat Publications webpage to provide access to white papers, standard operating procedures, and peer reviewed publications written by program staff. Topics covered by the Publications page include artificial reefs, climate change, eelgrass, ILF project reports, ocean planning, offshore wind, salt marshes and estuaries, and seafloor studies. Additionally, staff authored several peer-reviewed articles.

Support Activities: Staff reviewed proposals for NOAA, MIT Sea Grant, ACFHP, and performed peer review for nine academic journals and served as an editor for one paper of Frontiers in Marine Science. Staff represented the agency at the NEAFWA Conference, AFS Conference, DMF seminar series, and DEP permitting workshop. Staff provided presentations to MFAC, MSOA, NEAFWA, NEERS, and the SAC. Staff also participated on thesis committees for PhD and master's candidates at UMass Boston, MIT, UMaine, and UNH. Project staff advised one UMASS Amherst undergraduate intern.

FISHERIES BIOLOGY SECTION

Fish Biology Program

Personnel

Dr. Gary Nelson, Program Manager

Age and Growth
Scott Elzey, Biologist
Kimberly Trull, Assistant Biologist
Christy Draghetti, Ageing Technician
Kara Duprey, Ageing Technician

Fisheries Research and Monitoring
William Hoffman, Senior Biologist
Brad Schondelmeier, Biologist
Joe Holbeche, Assistant Biologist
Michelle Heller, Assistant Biologist

Resource Assessment
Steven Wilcox, Senior Biologist
Mark Szymanski, Biologist
Jack Wilson, Biologist (beginning in April)
Vin Manfredi, Biologist (retired in January)

Fish Stock Assessment
Dr. Micah Dean, Senior Biologist
Dr. Tara Dolan, Senior Biologist
Elise Koob, Senior Biologist

Overview

The objectives of the Fish Biology Program are to collect, process, and analyze biological data on recreationally and commercially important fishes needed for effective, science-based management of Massachusetts' fishery resources. Biological data collected from harvested and released fish include age structures, length frequencies, maturity stages, and bycatch levels. All data are used in stock assessments to determine the status of those resources. In addition, information on catch and effort of recreational anglers are collected via volunteer surveys. Special research projects are also conducted to address specific management needs. Staff also contribute to and assist with field and laboratory activities of other DMF programs. These activities are organized under five projects: Age and Growth, Fisheries Research and Monitoring, Resource Assessment, Fish Stock Assessment, and Striped Bass.

Age and Growth Project

In 2024, staff aged over 9,000 hard-part structures from many species important to Massachusetts recreational and commercial fisheries. Table 18 shows the number of samples processed and aged by species. Several focus

areas for 2024 are highlighted below.

Table 18. Samples processed for ageing in 2024.

Species	Process	Structures aged	2nd structures aged
Alewife and blueback herring	Whole otoliths extracted and aged	3927	
American shad	Whole otoliths extracted and aged, scales mounted and aged	107	120
Atlantic cod	Otoliths sectioned and aged, first annulus measured	22	
Black sea bass	Otoliths thin sectioned and aged	335	
Bluefish	Otoliths thin sectioned and aged	101	
Summer flounder	Otoliths thin sectioned and aged	160	
Haddock	Otoliths thin sectioned and aged	63	
Menhaden	Scales cleaned and mounted, sent to NMFS for ageing, Otoliths archived	195	
Rainbow smelt	Scales cleaned, mounted, and aged	360	
Scup	Otoliths thin sectioned and aged	309	
Striped bass	Scales cleaned, pressed into acetate and aged, Otoliths thin sectioned and aged	1595	406
Tautog	Pelvic spines cleaned, cross sectioned, and aged, Otoliths thin sectioned and aged	299	76
Weakfish	Otoliths thin sectioned and aged	24	
Winter flounder	Otoliths thin sectioned and aged	934	

Striped Bass: Progress was made in 2024 on a project to investigate the growth rates of striped bass based on annulus measurements and environmental and population factors. Water temperature data was gathered and organized. These data will be included in modeling efforts to better understand population dynamics. During striped bass carcass processing, staff measured total length with the tail in multiple positions (fanned out and pinched) to help better understand the implications of tail position in relation to slot limit length regulations.

Quality Control: The Age and Growth Project takes care to ensure the best quality data are put forward for stock assessment purposes. As part of this effort, staff attended the annual ASMFC quality control and quality assurance workshop. This workshop was a great opportunity to ensure that age determinations are consistent among all states providing data on ASMFC managed species, and also provided a networking environment where agers from different agencies and educational labs shared ideas and asked questions.

Knowledge Sharing: Part of the mission of the Age and Growth Project is to share our knowledge and aid other fish ageing entities. In April, staff attended the 2024 Northeast Fish and Wildlife Conference (Figure 23). Presentations were made regarding preliminary

Figure 23. Age and Growth staff Kara Duprey presenting flounder research at the Northeast Fish and Wildlife Conference.

results from the striped bass growth project as well as work that was done in 2021–2023 on winter flounder daily growth. In December, staff participated in a field trip taken by the 4th graders from a Beverly elementary school. We taught them how and why we age fish through a variety of hands-on visuals.

Fisheries Research and Monitoring Project

The Fisheries Research and Monitoring (FRM) Project is a result of merging the former Fisheries Dependent Sampling and Special Fisheries Research projects. This project is responsible for the at-sea and shore-side sampling of commercial fisheries that occur in and adjacent to Massachusetts territorial waters, as well as conducting applied fisheries research to improve the management and assessment of the Commonwealth's marine resources. These tasks are completed through collaboration with various industry, state, university, non-profit and federal organizations. The FRM Project also provides substantial field and vessel support to other Division projects and conducts fisheries data analysis and summarization for fisheries policy staff.

Commercial Fisheries Monitoring

Project staff collect data and biological samples from commercial fisheries to document and characterize fishery performance, support stock assessments and research, and address specific management questions. These data also strengthen DMF's participation on, and contributions to, the regional fishery management councils and the Atlantic States Marine Fisheries Commission. Project staff maintain close contact with commercial industry members, stakeholders, and managers to gather and document important fisheries information outside of sampling activities.

In late 2021, DMF allocated resources to bolster the port and sea sampling of the Commonwealth's commercially harvested marine resources. In late 2023, FRM lost two biologists to other DMF projects. While backfilling these positions, FRM had to make concessions on which field projects to proceed. In 2024, port sampling of commercial catches—primarily menhaden, Atlantic herring, winter flounder and striped bass—was prioritized in partnership with the South Shore Recreational Fisheries Program staff and continued (Table 19). Of note, port sampling of winter flounder landings during the spring spawning period was expanded in support of the larger Boston Harbor Winter Flounder Study; from early February through early May, 805 fish were sampled for sex, maturity, and spawning status, and 485 fin clips taken for future genetic analysis.

Table 19. Number of port sampling events, or trips, made to intercept commercial vessels or seafood dealers where information was collected in 2024.

Species	Intercepts	Number individuals	Number of samples
Menhaden	19	195	195 (scales & otoliths)
Winter flounder	30	803	485 (fin clips)
Striped bass	11	180	180 (scales, otoliths & fin clips)
Atlantic herring	4	400	100 (maturity observations)

In 2024, FRM continued to cultivate a state-federal partnership with NMFS Greater Atlantic Regional Fisheries Office's (GARFO) Northeast Port Biological Sampling Program (NEPBSP) to supplement biological samples available for federal stock assessments. Annually, project staff receive sample requests of species/stock/market categories provided by Northeast Fisheries Science Center (NEFSC) Population Dynamics Branch. Working with commercial seafood dealers, and members of the commercial fishing industry, species-specific biological samples are collected. The primary ports sampled are Gloucester, Boston, and New Bedford.

After receiving positive feedback, and developing a productive working relationship with NEPBSP, FRM was

approached by NOAA's Northeast Fisheries Science Center Cooperative Research Branch to collaborate on a new project, CONVFCT (Conversion Factor), that focused on re-evaluating conversion weights of eight groundfish species by sampling at-sea and portside. The data collected will update gutted-to-whole weight conversion factors and length-weight relationships.

Since the start of the project in September, FRM and NESFC staff conducted 27 trips to nine different fish dealers, collecting 1,061 individual lengths and weights and 774 otoliths (Table 20). The species include Atlantic cod, haddock, pollock, winter flounder, American plaice, witch flounder, yellowtail flounder, and summer flounder. Funding, which is received through a federal Interjurisdictional grant, will continue into 2025.

The CONVFCT project requires samples to be collected at a higher resolution and as such, FRM staff had difficulty completing sampling requests due to the division of stock areas and requested species within those stock areas. Regardless, DMF had a productive first quarter, with 44.39% of length frequencies measured and 40.84% age structures collected.

Table 20. Number of lengths, weights, otoliths collected across the 72 different strata.

Species	Length/ Weight	Otoliths	Length Strata Complete	Otolith Strata Complete
Atlantic cod	134	104	3/19	3/16
Haddock	227	226	6/9	6/9
Pollock	150	60	3/3	3/3
Winter flounder	76	76	2/14	2/14
Yellowtail flounder	76	75	3/14	3/14
American plaice	128	101	5/8	5/8
Witch flounder	113	57	2/3	2/3
Summer flounder	157	75	2/2	2/2
Total	**1061**	**774**	**26/72**	**26/72**

To collect more biological port samples from areas that are difficult to source, FRM initiated a pilot project called Opportunistic Sampling (OPSAMP). Collaborating with industry, fisheries sector managers, the Northeast Seafood Coalition, and the Conservation Law Foundation (CLF), FRM staff identified four boats and provided supplies and training on collection protocols. Funding, provided by CLF, was given to the vessels to support this effort with the intention of developing a system that could be applied by other port sampling programs. In 2024 only four Atlantic cod were sampled from Eastern Gulf of Maine, and three from Georges Bank area 56; however, these are extremely valuable to stock assessment scientists as they are some of the only ones that will be available from these statistical areas.

Monitoring of the state's coastal lobster fishery remained a major priority. Sampling occurred between June and November and was conducted out of four ports: Rockport, Gloucester, Beverly, and Boston. A summary of 2024 commercial sampling efforts is covered in the Invertebrate Fisheries Program section.

FRM staff conducted two sea sampling trips aboard contracted bottom trawl vessels out of Gloucester and Scituate to characterize the spawning seasonality of winter flounder during spring in Massachusetts coastal waters. Standard commercial and survey-style tows were conducted to tag winter flounder with acoustic tags, and length, weight, sex, maturity and a fin clip samples were collected from all fish tagged.

FRM staff continued vessel support to other Division projects and external collaborations and included multiple sea days aboard R/V *Michael Craven* and R/V *Alosa.* These efforts included collecting water quality samples for the Shellfish Program, supporting dive operations for the Habitat Program, setting and hauling acoustic receivers

dedicated to white sharks, and supporting Massachusetts Environmental Police removal of non-compliant commercial fishing gear as well as supporting on-the-water lobster fishery enforcement training.

Fisheries Research Projects

DMF continued its commitment to applied fisheries research to improve the management and assessment of the Commonwealth's marine resources through various collaborations with university, non-profit, state, and federal organizations.

Atlantic Herring Research Track Stock Assessment

A major overhaul of the assessment of US Atlantic herring was conducted in 2024, with a peer review scheduled for early 2025. This represents the first-time herring have been assessed using the new Woods Hole Assessment Model (WHAM), a modern state-space modeling framework that can account for environmental effects, as well as observation and process errors. Throughout the assessment, significant efforts have been made to incorporate environmental influences on the stock, including: temperature effects, prey abundance (copepods), and predator abundance (haddock). Staff served on the assessment workgroup and led the effort to describe the impact of haddock predation on herring eggs and co-led the development of an index of juvenile abundance based on long-term monitoring of herring in sea bird diets. A scientific journal article is in preparation, based on the sea bird diet analyses.

Ecosystem Approach to Menhaden Management

Atlantic menhaden support the largest fishery by volume on the US East Coast, while also playing an important role as a forage species. Managers' and stakeholders' increasing concerns about the impact of menhaden harvest on ecosystem processes led to an evolution in the assessment and management of this species from a purely single-species approach to an ecosystem approach. The Atlantic States Marine Fisheries Commission in 2020 formally adopted an ecological modeling framework as a tool to set reference points and harvest limits for Atlantic menhaden that considers their role as a forage fish, notably for striped bass. A benchmark re-assessment of this process began in 2024, which is scheduled to be completed in late 2025. Staff have played a significant role in the development of this approach over the past 15 years, and during this assessment cycle has led the efforts to account for bluefin tuna predation of menhaden as well as the inclusion of bay anchovies as an alternative prey species for menhaden predators (Figure 24).

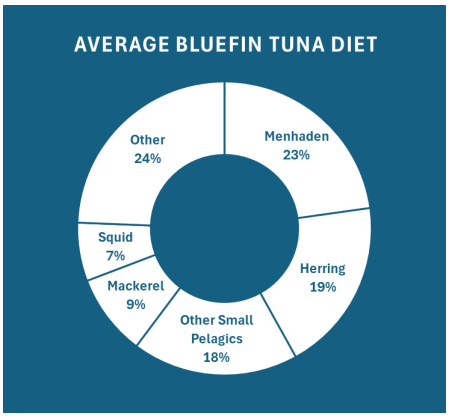

Figure 24. Average diet composition of western Atlantic Bluefin Tuna across six different studies.

Boston Harbor Winter Flounder Study

Beginning in 2021, DMF and University of Massachusetts–Amherst began a multi-year study with the objectives to generate additional information on the spatial and temporal habitat use, distribution, and residency of juvenile and adult winter flounder in Boston Harbor. The data collection period of this effort ended in 2023, with analysis and manuscript development underway in 2024 by our UMass partners.

Although the concerted effort in Boston Harbor has concluded, many of the acoustically tagged winter flounder

remain active. Capitalizing on the longevity of those tags, FRM staff maintained an acoustic array of 14 receivers in Boston Harbor as well as a coastal array of 40 receivers with the objective to track movements of adult winter flounder and document immigration, emigration, and residence time inside the estuary. This array, along with DMF's Large Pelagic Program's array, provides comprehensive coverage of Massachusetts state waters and is instrumental in tracking year-round movements of adult winter flounder. This information will also be valuable to help inform future winter flounder time-of-year restrictions and will be useful in obtaining future funding.

Resource Assessment Project

2024 Trawl Survey

The 46th annual spring and fall surveys were successfully completed aboard NOAA's *R/V Gloria Michelle* in 2024. The spring survey completed 103 stations during May 6–23 and the fall survey completed 95 stations during September 15–October 3 (Figure 25). Both surveys provided weights, counts, and measurements for over 100 different species of fish and invertebrates. The collections of over 2,400 otoliths and over 3,000 sex and maturity observations from Atlantic cod, haddock, summer flounder, winter flounder, yellowtail flounder, black sea bass, scup, tautog, weakfish, American lobster, and Jonah crab aid cooperative fisheries assessments.

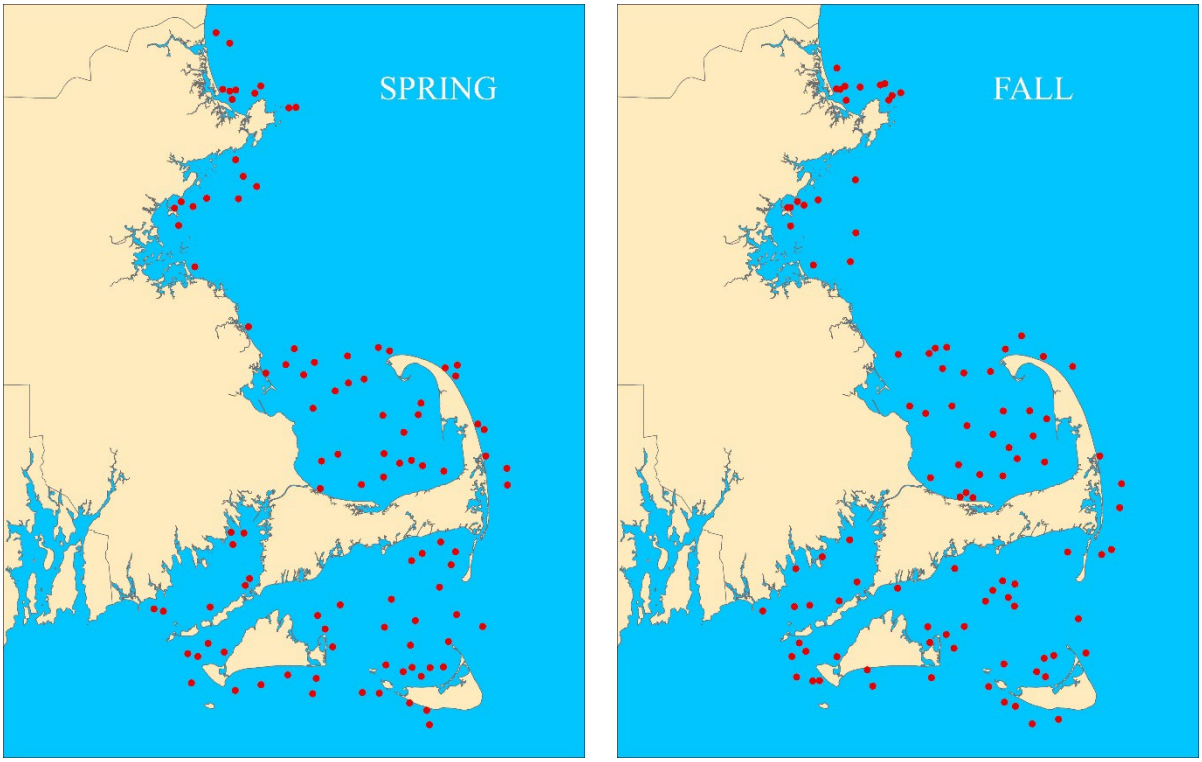

Figure 25. Completed 2024 spring (left) and fall (right) trawl survey station locations.

Many volunteer scientists assisted in making both trawl surveys successful this year. Twenty-nine Division employees participated in the spring survey along with two biologists from NOAA, one biologist from UMass–Amherst, one biologist from UMass–Dartmouth, one biologist from Responsible Offshore Science Alliance, one biologist from *Mass*DEP, and one biologist from Gloucester Marine Genomics Institute. Twenty-three Division employees participated in the fall survey along with one biologist from NOAA, two biologists from UMass–Dartmouth, one biologist from *Mass*DEP, one biologist from Woods Hole Aquarium, and one biologist from

Center for Coastal Studies. Full survey staffing allowed for increased otolith extraction and collection as well as the documentation of additional sex and maturity observations (Figure 26).

The spring survey had some noteworthy records. The largest tow for Atlantic menhaden abundance and biomass was observed east of Great Point. The largest tow of Atlantic sturgeon biomass and abundance was observed just east of the Merrimack River. Little skate, fourspot flounder, and sea raven set record lows for abundance and biomass, while Atlantic cod set a record low for biomass. This survey saw a record low in biomass for longfin squid following a record high biomass in 2023. Yellowtail flounder were observed at the lowest percentage of stations in the time-series history.

Except for longfin squid, survey-wide species trends followed those of recent spring surveys. Scup dominated the catches south of Cape Cod and accounted for 44% of all catch by number and 52% of all biomass throughout the survey. Northern sea robins were the second most common species and comprised 22% of all catch by number and biomass, though most came from one station south of Nantucket. Regions north of Cape Cod had moderate catches of winter flounder, longhorn sculpin, yellowtail flounder, silver hake, red hake, Atlantic herring, and alewives.

Fall survey highlights included new record high abundance and biomass for spot and striped cusk eels. Atlantic menhaden had the highest biomass to date, and longhorn sculpin had the second highest biomass and abundance observed. Scup abundance was a record low, and longfin squid abundance and biomass were the second lowest recorded. General catch trends followed a similar pattern to recent surveys. While lower than typical, scup still dominated the catches south of Cape Cod and accounted for 49% of all catch by number and 18% of all biomass. Scup, butterfish, longfin squid, and bay anchovies comprised much of the total catch by number, and scup, butterfish, and smooth dogfish comprised much of the total catch by weight for stations south of Cape Cod. Regions north of Cape Cod had moderate catches of winter flounder, silver hake, red hake, and longhorn sculpin.

Figure 26. Photo collage from the 2024 spring (left) and fall (right) trawl surveys.

2024 Seine Survey

The 49th Nantucket Sound Estuarine Winter Flounder Young-of-Year (YOY) Seine Survey was completed from June 12–July 3. This survey provides an index of abundance for YOY winter flounder in the Southern New England/Mid-Atlantic stock. All commercially and recreationally important finfish and invertebrates were

counted, and presence/absence for all other species was recorded. Forty species were encountered in this year's seine survey hauls. The 2024 stratified mean index for YOY winter flounder abundance was below the time-series median (Figure 27). The age 1+ winter flounder index was below the time-series median for the 16th consecutive year. The 2024 stratified mean index for YOY summer flounder for all sites combined was slightly above the time-series median after last year's record high. However, age 1+ summer flounder abundance was the highest in the time series.

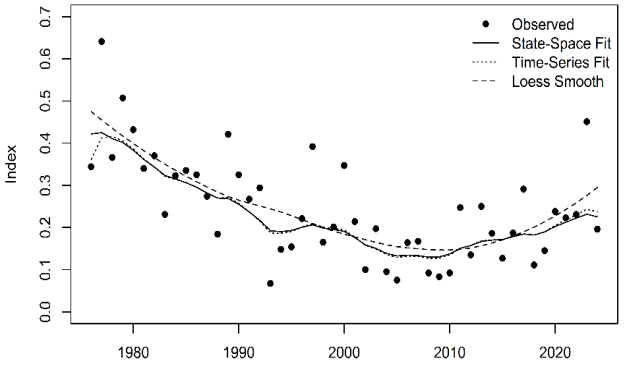

Figure 27. Winter flounder YOY index from the seine survey.

Fish Stock Assessment

Staff represented DMF on ASMFC and MAFMC technical committees for bluefish, black sea bass, scup, and summer flounder. In addition, staff served on the NEFMC monkfish plan development team, the groundfish plan development team (including two subgroups: the Cod Transition and ABC Control Rules), the NEFSC winter and yellowtail flounder research track assessment, the Atlantic herring plan development team and technical committees, and ASMFC striped bass technical and stock assessment committees, menhaden technical committee, multispecies committee, and age and growth committees.

Staff served as biologists on the DMF Resource Assessment survey project, helped collect striped bass commercial samples, developed protocols for commercial striped bass otolith sampling, developed several proposals related to black sea bass tagging and genetics, completed ASMFC compliance reports, served on M.S. and Ph.D. thesis committees for UMass–Amherst, State University of New York–Stony Brook, and Virginia Institute of Marine Science students, and reviewed papers for peer-reviewed academic journals.

Striped Bass Research Project

Without a doubt, Atlantic Striped Bass are the backbone of the Massachusetts recreational fishing industry and provide enjoyment to hundreds of thousands of recreational anglers each year. The Commonwealth is also home to one of the largest commercial fisheries for Striped Bass in the country. Accordingly, this important resource is given a high level of attention by conducting many special investigations and monitoring programs designed to support the regional management process.

Striped Bass Circle Hook Study

In response to declining striped bass stocks, the ASMFC mandated states require all recreational anglers use an in-line circle hook when targeting striped bass with natural bait beginning in 2021 (which DMF had already adopted for anglers fishing from shore and private vessels in 2020 and expanded to anglers aboard for-hire vessels in 2021). Circle hooks have been shown to have a positive effect on post-release mortality in many small and big game fisheries, but surprisingly little work has been done estimating their benefit in the striped bass fishery.

Recognizing this paucity of information, DMF initiated a multi-year study in 2020 using acoustic telemetry to monitor the fate of recreationally caught striped bass caught via circle hooks and conventional "J" hooks (Figure 28). This approach was designed to assess several widely used hook types, as well as calculate post-release mortality rates for fish caught and released in the striped bass recreational fishery using specific hook types.

Striped bass field studies were concluded in 2021 and analyses were completed in 2023. Preliminary results demonstrated that a semi-quantitative score of fish release condition was the best predictor of post-release survival. A broader dataset that included untagged fish (n = 716) was used to identify the best predictors of fish release condition, which included hook location, handling time, and water temperature. Contrary to expectations, the circle hooks used in this study did not result in lower release mortality than conventional "J"-style jooks. A scientific article was published in the journal Marine and Coastal Fisheries in January of 2024.

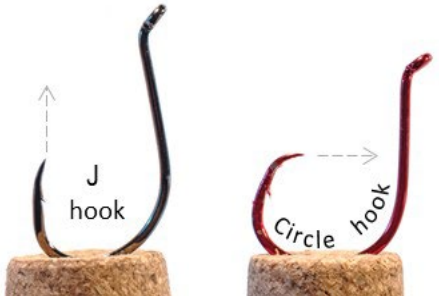

Figure 28. A circle hook differs from a conventional "J" hook in that the point is perpendicular to the shaft.

Striped Bass Citizen Science

Due to regulations and conservation-minded anglers, most striped bass are released back to the water after being caught. Even though most of these fish survive, post-release mortality from recreational anglers causes more striped bass deaths than any other source some years. As a follow-up to the circle hook study, DMF has expanded its investigation of release mortality to include striped bass caught via artificial lures and flies. During the summers of 2023 and 2024, we partnered with volunteer anglers to collect information when they go striped bass fishing to help us understand what factors influence post-release mortality (Figure 29).

Over 1200 people signed up to participate in the program, greatly exceeding our expectations. Volunteer anglers were supplied with some basic equipment (a digital thermometer, a stopwatch, and a tape measure) and asked to record a variety of data including: air and water temperature, fish size and hooking location, injury and swimming ability, fight and handling time, as well as some details about the tackle used. Active participants were entered into regular raffle drawings and 46 lucky anglers took home prize packs that included fishing rods & reels from Shimano and Penn, fishing lures from Hoagy, Al Gag's, and 24-7 Lures, as well as Costa sunglasses. Over two seasons of fishing, these citizen scientists collected valuable information from over 8,000 striped bass.

Figure 29. Hundreds of volunteer anglers of all ages participated in the Striped Bass Citizen Science program.

Here are some initial observations from the data that have been submitted so far: 1) 75% of striped bass were caught via artificial lures, 25% were caught via baited hooks; 2) the greatest level of injury resulted from baited hooks, and lures with multiple treble hooks; 3) fish were much weaker when kept out of water for more than two minutes; and 4) fish caught in water over 75 degrees had a much harder time recovering. These and many other preliminary results can be found on a live data portal: madmf.shinyapps.io/striper/ generously sponsored by our partners at Backcountry Hunters & Anglers.

Migration and Residence Study

During 2015–2019 staff conducted a study that examined how mortality of striped bass is influenced by habitat selection and migratory routes to and from Massachusetts waters. The design combined analysis of fish tagged

with acoustic transmitters and estimates of population composition of summering aggregations derived from genetics. DMF was awarded a grant from ACCSP in the fall of 2021 to analyze 5,000 DNA samples collected from Massachusetts recreational and commercial fisheries during 2015–2019. In late 2023, DMF received the genetic data for the fish tagged in the acoustic telemetry study and the 5,000 fish samples. In 2024, DMF collaborated on a submitted peer review journal article detailing the creation of a powerful 233 Single Nucleotide Polymorphism panel GTSeq panel for performing mixed stock analysis of striped bass caught in coastal fisheries. A final report was submitted to ACCSP detailing the utility of the panel, as determined through simulation and empirical investigation. The panel produces highly accurate and precise estimates of stock composition for samples of 300 individuals (Figure 30). The report recommends instituting a state-by-state sampling program to describe reporting unit specific (i.e., Delaware-Chesapeake Bay, Kennebec-Hudson, and North Carolina) mortality in coastal fisheries.

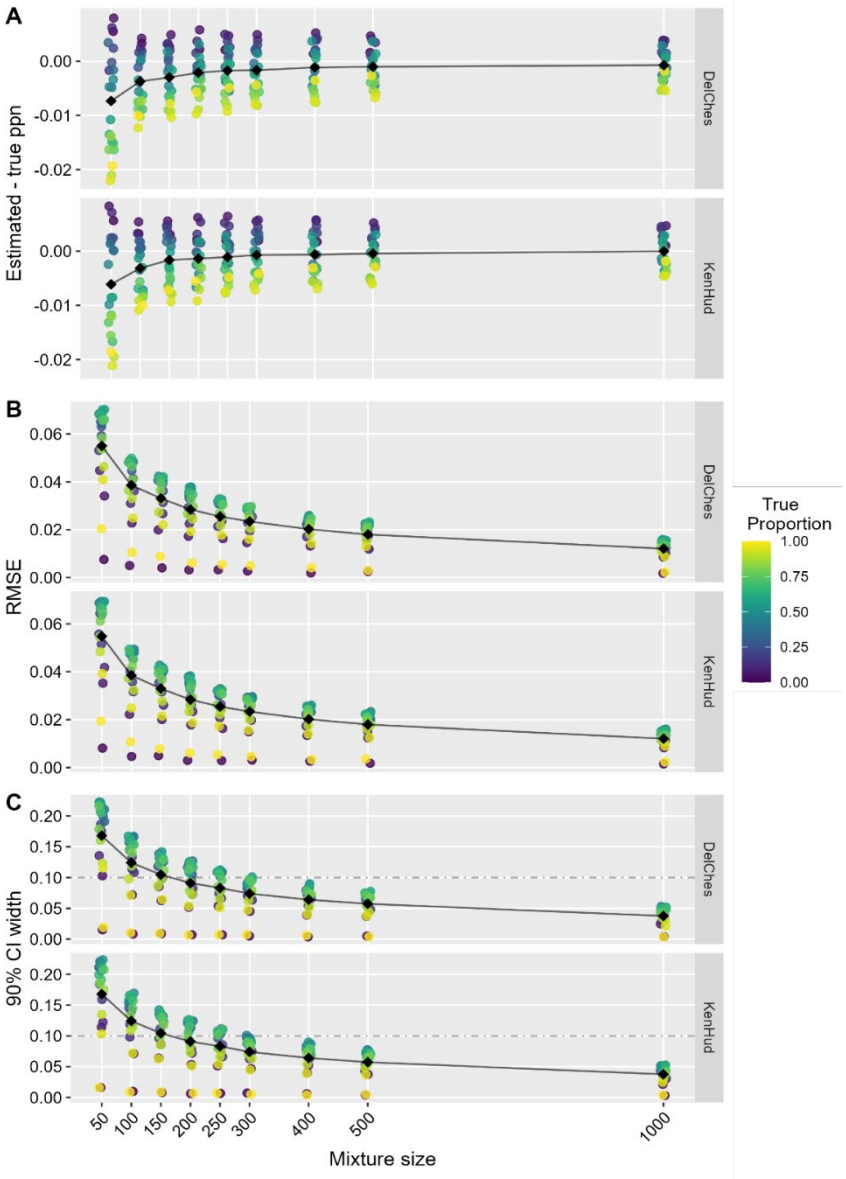

Figure 30. The mean estimated proportion minus the true proportion (A), root mean squared error (B), and 90% credible interval size (C) of the DelChes and KenHud reporting units across all combinations of sample sizes and proportions. Point color represents the mean value at each proportion estimated and the points are jittered horizontally for clarity. Solid black points connected by a black line represent the global mean across proportions at each sample size. In panel C, the horizontal dashed gray line represents a 10% threshold for interval size.

Coastwide Tagging Study

DMF has participated in the Striped Bass Cooperative State-Federal Coastwide Tagging Study since 1991. The study's primary objective has been to develop an integrated database of tag releases and recoveries that will provide current information related to Striped Bass mortality and migration rates. In 2024, ten charter trips were made and 463 Striped Bass were tagged. These fish ranged in size from 24 inches to 42 inches total length and were collected during September–October southeast of Cape Cod off Monomoy and Nantucket Shoals.

Market Sampling

Monitoring of the age, size, and sex composition of the commercial harvest of Striped Bass is indispensable for identifying effective management and for substantiating estimates of mortality derived from fishery-independent sources. The objective of this project is to generate a time series database of biological characteristics of Massachusetts's commercial Striped Bass landings. Length, weight, and age structures (scales and otoliths) are collected during market sampling trips, in accordance with ASMFC target sampling levels. During 2024, staff conducted 14 market sampling trips and collected length, weight, and age structures from 339 Striped Bass.

Volunteer Recreational Angler Data Collection Program

The Sportfish Angler Data Collection Team (SADCT) program was implemented in 2002 to generate a time series database of biological characteristics of Massachusetts' striped bass recreational catch. In 2013, black sea bass, summer flounder, and scup were added to the program. During 2024, 30 participating anglers returned 977 paired length/age samples from striped bass. The size composition of striped bass reported by participating anglers is shown in Figure 31. Participating anglers also collected 198 black sea bass samples, 47 summer flounder samples, 54 scup samples, and 380 bluefish samples. The Striped Bass Carcass Collection Program also continued in 2024, with volunteer anglers donating 108 carcasses.

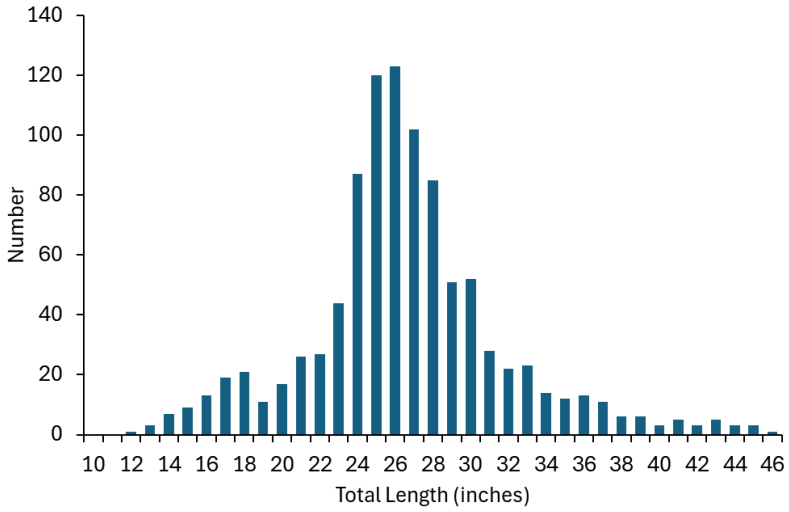

Figure 31. Size composition of striped bass measured by SADCT anglers in 2024.

Striped Bass Stock Assessment

Staff conducted simulation analyses for the ASMFC Striped Bass Technical Committee exploring the impacts of regulation changes on the recreational and commercial fisheries.

Other Activities

Assessment and Management Support: Program staff provided technical expertise to other governmental organizations, private groups, and individuals with concerns about marine fisheries via on-line meetings and served on technical and advisory committees to support management efforts of important marine species. Several presentations were given by staff to other governmental organizations, private groups and science-related conferences.

Invertebrate Fisheries Program

Personnel

Dr. Tracy Pugh, Program Manager
Derek Perry, Senior Marine Fisheries Biologist
Jillian Swinford, Marine Fisheries Biologist (started in May)
Jacob Dorothy, Assistant Marine Fisheries Biologist
Laura Tomlinson, Assistant Marine Fisheries Biologist
Giovanni Aulizio, Seasonal Fisheries Technician (May – November)

Overview

The Invertebrate Fisheries Program is responsible for conducting fishery-dependent and fishery-independent surveys and applied research projects to characterize the populations of, and the fisheries for, American lobster, horseshoe crab, Jonah crab, northern shrimp, and whelk. Program staff also regularly engage with managers to provide science-based advice to inform management of these valuable marine species.

American Lobster Research and Monitoring

American lobster is the most commercially valuable single-species fishery conducted within Massachusetts state waters. DMF has a comprehensive monitoring program that tracks various life history stages, along with an at-sea sampling program to characterize the commercial catch. Applied research focused on this species aims to understand important vital rates, reproductive capacity, and environmental impacts.

Commercial Lobster Trap Sampling

DMF has worked cooperatively with Massachusetts commercial lobster trap fishermen to sample their catch since 1981. In 2024, the 44th year of operation, a total of 59 trips were conducted by staff members of the Invertebrate Fisheries Program (16 trips), the Protected Species Program (16 trips), and the Fisheries Research and Monitoring Project (27 trips), during which 31,765 lobsters were sampled from 13,100 trap hauls. Data from the commercial trap sampling program are used to characterize the sex ratio and size distribution of the commercial catch, as well as to track conservation discards (including sublegal-sized lobsters, egg-bearing females, and v-notched females). This effort also includes shell disease monitoring, which tracks the prevalence of shell disease symptoms on lobsters in Massachusetts coastal waters.

Staff continued to conduct bycatch sampling during the commercial lobster trap sampling program to better characterize the incidental catch of several commercially important finfish species in lobster gear. For each sampled species (e.g., black sea bass, tautog, scup, cod, haddock, various flounders), samplers collect size and disposition information (including presence/absence of barotrauma wounds).

Staff continued to refine a new reporting initiative to provide each captain with summarizations of their sampled catch data. We hope that captains who participate in the sea sampling program will be interested in receiving these summaries of the lobster data collected by DMF biologists aboard their boats. Progress was made towards automating the data summarization and reporting format. We plan to provide these reports annually to each captain who participated in the sea sampling program.

Ventless Lobster Trap Survey

This survey is a cooperative effort between DMF and the Massachusetts lobster fishing industry to monitor the abundance of lobster and several bycatch species and is funded primarily by commercial and recreational lobster permit fees. Data from the Ventless Trap Survey are used to generate indices of lobster relative abundance, to monitor various population characteristics (such as sex ratio, abundance of egg-bearing females, and disease), and to examine spatial patterns in abundance (Figure 32). The ASMFC Lobster Technical Committee continually monitors the results of the various states' ventless trap surveys as indicators of stock status in both the GOM/GB and SNE stocks, and data are provided to the ASMFC Lobster Stock Assessment.

The 2024 Ventless Trap Survey took place from June through September in the GOM survey area, and from June through August in SNE, with a total of six contracted vessels. Project staff completed a total of 40 sea days in 2024. A total of 8,935 lobsters were sampled from 2,808 trap hauls in the northern survey area (MA territorial waters from Cape Cod Bay to the NH border). In the southern survey area (MA territorial waters including Buzzards Bay and south of the Elizabeth Islands), a total of 451 lobsters were sampled from 209 trap hauls.

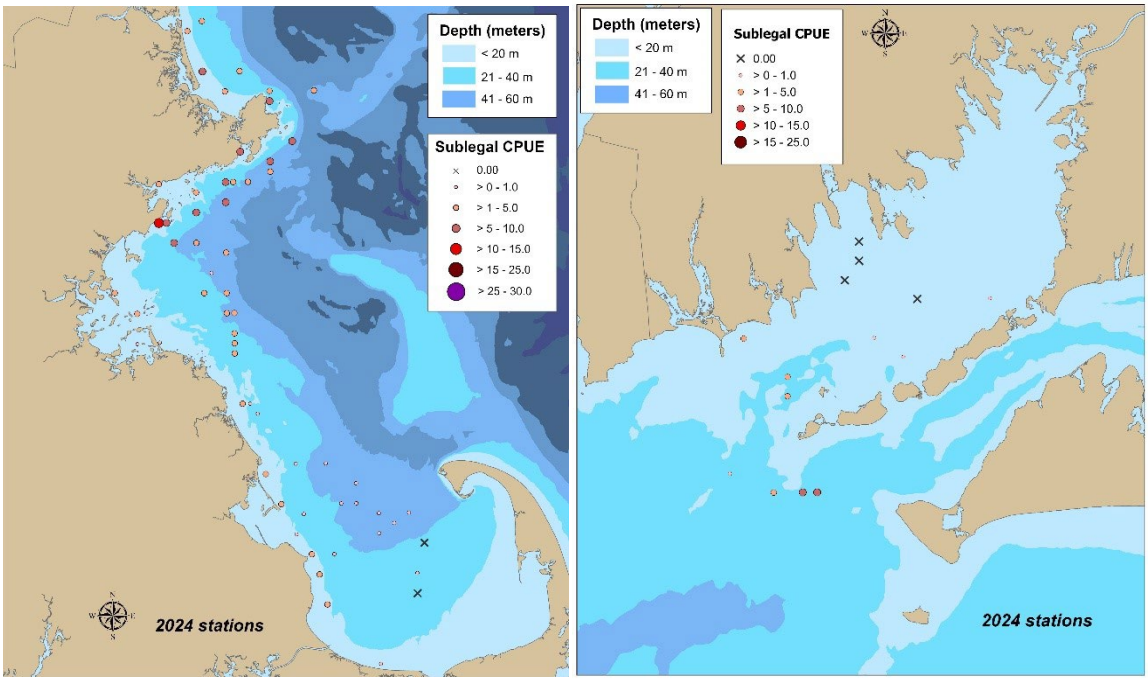

Figure 32. Average catch per trap haul (CPUE) of sublegal-sized lobsters at the 2024 ventless trap survey stations in the northern (left) and southern (right) survey areas.

Additional biological sampling of bycatch species was continued in 2024, which increases the available data on commercially important crab and finfish species. In both survey areas, samplers collected size and sex for *Cancer* crabs (Jonah and rock crabs), and size information for various finfish species. Additionally in the southern survey area, staff collected size information for whelk, and size information and age structures for black sea bass and tautog, which were analyzed by the DMF Age and Growth Project.

Annually, significant time is dedicated to maintenance of the DMF-owned gear needed to conduct the survey. Over 600 traps and 6+ miles of groundline must be checked, repaired, and standardized each year. Trap maintenance includes twine repair, wire mesh repair, runner replacement, bungee replacement, and minor wire mesh patches. Each ground line is checked for wear and damage and repaired as needed, while also assuring proper

spacing between gangions (to maintain the survey's standardized trap spacing). To minimize data loss, spare traps and groundlines must be ready to replace any survey gear that is lost or damaged throughout the season. In addition to the gear maintenance, a total of 12 days each year are dedicated to trap delivery and retrieval to and from participating captains. Finally, all gear needs to comply with current vertical line configuration and marking standards which reduce entanglement risk for protected species. DMF continues to provide the necessary vertical lines and marking materials for the survey gear to participating captains, to ensure compliance.

Annual Early-Benthic-Phase Lobster Suction Sampling

Project staff completed the 30th year of this sampling program in 2024. The survey tracks year-class strength of newly settled post-larval American lobsters (young-of-the-year or YOY) and delineates coastal habitat important to the settlement of these juveniles. Project staff conducted the SCUBA-based survey (Figure 33) over nine field days in August, September, and October, sampling 16 coastal sites spanning Cape Ann to Buzzards Bay. Two new sites added to the Cape Ann region in 2021, Hodgkins Cove and Brace Cove, have not yet been incorporated into the time series due to the limited years (four) they've been sampled. The two new Cape Ann sites had an average density of 0.58 YOY/m^2 in 2024, which is greater than the 2024 mean of the two historical Cape Ann sites (0.33/m^2). Average density of YOY lobster was at or below time series averages for each region (Table 21). No YOY lobster were observed in Boston Harbor or Buzzards Bay. Data from this survey are contributed annually to the American Lobster Settlement Index, an international research collaborative that compiles data and tracks changes in the recruitment of American lobsters in U.S. and Canadian waters.

Figure 33. DMF biologists conducting the annual early benthic-phase lobster suction sampling survey.

Table 21. Comparison of 2024 YOY lobster densities to time series averages, by region.

Region	# years sampled	2024 YOY Average (#/m2)	Time Series Average (#/m2)
Cape Ann	15	0.33	0.39
Beverly/Salem	29	0.17	0.53
Boston Harbor	28	0.00	0.20
South Shore	13	0.17	0.08
Buzzards Bay	30	0.00	0.07

Assessment and Management Support

Staff served as Chair for the ASMFC American Lobster Technical Committee, and the ongoing 2025 ASMFC American Lobster Benchmark Stock Assessment. Significant work was performed compiling, analyzing, and reviewing various data sources for use in the assessment, and staff coordinated and participated in multiple virtual meetings as well as two multi-day assessment workshops. Additional work supported: actions related to Addendum XXVII, characterization of the lobster resource around the northern edge of George's Bank relative to potential scallop fishery access, and attendance at Lobster Conservation Management Team Area 2 and Area 3 meetings.

Applied Research

Staff continued work with the Lobster Foundation of Massachusetts' Cape Cod Bay Study Fleet to monitor temperature and dissolved oxygen (DO) conditions in Cape Cod Bay. DMF covered the costs of annual maintenance on the Fleet's monitoring equipment, and the Fleet participants deployed 25 sensors to monitor conditions during July–November 2024. Staff monitored the Fleet's incoming data, and continued work with the DFG GIS team to improve GIS tools for monitoring, summarizing, and sharing data. The data from the Study Fleet are publicly accessible at mass.gov/capecodbaydo, which displays a map of existing and recent DO and temperature conditions, and now includes downloadable annual .csv files of the data.

Staff also spent significant time finalizing work on a large project funded by National Sea Grant American Lobster Initiative that was conducted in collaboration with researchers from Woods Hole Oceanographic Institution and the Center for Coastal Studies titled "Understanding the Cause of Low Dissolved Oxygen in Cape Cod Bay and Initiating a Hypoxia Warning System for the Lobster Fishery." This project resulted in a peer-reviewed manuscript describing the environmental changes that lead up to the 2019 hypoxia event, supported the development of the DMF-hosted website for the Study Fleet's data, and supported several years of enhanced monitoring in the region which improved understanding of summer and fall DO and temperature dynamics in Cape Cod Bay. Additionally, analyses of lobster and crab catch in survey gear were conducted to examine potential relationships between environmental variables and catch characteristics. Results documented seasonal patterns in catch, but no clear relationships with environmental conditions that occurred during this portion of the study (2022–2023). The comprehensive final report was submitted to NOAA in December.

DO/temperature sensors were deployed again in 2024 at four "sentinel stations" in Cape Cod Bay to fill in spatial gaps in the Study Fleet monitoring locations. Staff monitored the temperature and DO data from these stations throughout the summer into October, and data were displayed along with the Study Fleet's data on the website.

Program staff maintain several external collaborative relationships and currently are either actively involved with or acting as an advisor to projects with Bigelow Laboratory for Ocean Sciences (shell disease), Center for Coastal Studies (lobster settlement), Gloucester Marine Genomics Institute (regional connectivity), and Maine Department of Marine Resources (molting and growth).

Outreach and Other Activities

Program staff attended the annual Massachusetts Lobstermen's Association Trade Show in Hyannis, presenting information during seminars and interacting with industry members at the DMF booth and on the trade show floor. Staff participated in the 2024 U.S.-Canada Lobster Town Meeting (Moncton, New Brunswick, CA), an annual event that brings industry, researchers, and managers from the US and Canada together to discuss topics of mutual interest and concern. Staff also served on the planning committee for the 2024 event and the 2025 event. This event is hosted by the Lobster Institute, based at the University of Maine. Staff also served on the Advisory Board for the Lobster Institute. Staff contributed an article to the international "Lobster Newsletter" describing the U.S. Lobster Stock Assessment process and challenges to be addressed with the 2025 assessment.

Horseshoe Crab Monitoring

Commercial Fishery Sampling

DMF monitors the commercial bait and biomedical harvests of horseshoe crab in accordance with the ASMFC Fisheries Management Plan (FMP). At the request of the public and participants in the biomedical fishery, DMF has greatly increased sampling of the biomedical fishery. The public was concerned about increased pressure on

the resource due to a second biomedical facility that opened in Massachusetts in 2022, and the biomedical industry expressed a desire for increased sampling effort due to their frustration over what they felt was misinformation being spread about their operations.

DMF has collected prosomal width measurements from horseshoe crabs during market sampling trips at bait and biomedical facilities since 2000. However, source data (harvest location, harvest method, sampling location, and whether it was harvested for bait or biomedical) weren't collected until 2008, so data prior to 2008 are rarely used. There are known differences in crab size by area within the state, so harvest location is a critical data component for understanding the resource. While DMF has conducted market sampling trips since 2000, DMF increased sampling in 2023 to include at-sea biomedical collection trips, in-water holding systems (e.g., pens), and biomedical release trips (crabs collected under the authority of a biomedical horseshoe crab permit must be returned to the area they were collected).

Table 22. The number of fisheries dependent sampling trips for horseshoe crabs conducted by DMF staff in 2024 and the number of crabs sampled by sampling trip type.

	# of 2024 Trips	# of Crabs Observed
Bait market sampling	13	1,714
Collection sampling trips	7	3,117
Pen Samples	7	1,409
Biomedical market sampling	11	2,433
Release trips	10	2,242
Total	48	10,915

Forty-eight horseshoe crab sampling trips were conducted in 2024 (Table 22), which is more sampling effort than for any other fishery sampled by DMF besides groundfish and lobster. Thirty-five of the horseshoe crab sampling events were biomedical sampling trips. For all biomedical sampling trips, the number of live and dead crabs were recorded by sex. For bait market sampling, biomedical market sampling, and biomedical collection trips, data collected also included sex, prosomal width, maturity stage (males only), molt stage, and injuries. Pre-bleeding mortality (from collection until arrival at the biomedical labs) observed in our biomedical sampling was 0.0% and 1.0% for males and females, respectively. The mortality rate of bled crabs during DMF-observed biomedical release trips was 0.6% and 1.7% for males and females, respectively.

Fisheries-Independent Surveys

DMF and numerous volunteer organizations conducted spawning beach surveys at 16 beaches along the South Coast, Cape Cod, and the islands in 2024 (Figure 34). Surveys were conducted at high tide two days prior, the day of, and two days after the new and full moons from May to the end of June. DMF staff conducted 22 surveys at Swift's Beach in Wareham, and compiled and analyzed data from all survey beaches. The numbers of female crabs observed in the survey were above time series medians for 74% of beaches in 2024 (Table 23). Ninety percent of survey indices have an increasing trend over the last 10 years, and 75% are increasing over the last 15 years.

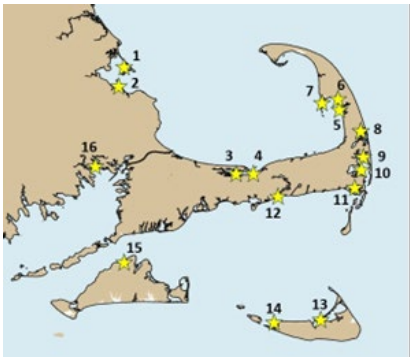

Figure 34. Map of 16 sites monitored for the 2024 Massachusetts Horseshoe Crab Spawning Beach Survey.

Table 23. Summary of the 2024 Massachusetts Horseshoe Crab Spawning Beach Survey. Survey beaches are grouped by region with day and night surveys treated independently for beaches that conduct surveys at both time periods. A Mann-Kendall test was used to determine whether each survey had a positive or negative trend and whether those trends were statistically significant. Those with a positive trend are shaded green, those with a negative trend are shaded red. Significant trends are in bold with cells outlined in yellow. N/A is shown for surveys with insufficient data (e.g., not surveyed long enough for trend analysis or missing data).

Region	Beach	Time of Day	15-year trend	10-year trend
Cape Cod Bay	Duxbury	Day	decreasing	decreasing
	Duxbury	Night	decreasing	increasing
	Long Beach	Day	NA	NA
	Long Beach	Night	NA	NA
	Millway	Day	**increasing**	**increasing**
	Millway	Night	increasing	**increasing**
	Long Pasture	Day	increasing	**increasing**
	Sanctuary Beach	Day	increasing	increasing
	Indian Neck	Day	increasing	increasing
	Indian Neck	Night	increasing	increasing
	Great Island	Day	NA	increasing
Outer Cape Cod	Priscillas Landing	Day	NA	**increasing**
	Marsh 2-3	Day	**increasing**	**increasing**
	Erica's Beach	Day	increasing	increasing
Nantucket Sound	Stage Harbor	Day	NA	NA
	Stage Harbor	Night	NA	NA
	Bass River	Day	NA	NA
	Bass River	Night	NA	NA
	Monomoy	Day	increasing	increasing
	Monomoy	Night	increasing	increasing
	Warrens Landing	Day	NA	**increasing**
	Warrens Landing	Night	NA	**increasing**
	Tashmoo	Day	**increasing**	increasing
	Tashmoo	Night	increasing	increasing
Buzzards Bay	Swifts Beach	Day	**decreasing**	increasing
	Swifts Beach	Night	**decreasing**	decreasing

Applied Research

Staff spent considerable time developing a research proposal focused on quantifying unintended mortalities in the otter trawl fishery, which is subject to numerous regulatory measures resulting in discarded catch, and the hand harvest segment of the biomedical fishery in which post-bled crabs are released alive. The proposal was submitted to the NOAA Saltonstall-Kennedy grant program in November.

Assessment, Management Support, and Outreach

In 2024, staff served on the ASMFC Horseshoe Crab Technical Committee, and the ASMFC Horseshoe Crab Stock Assessment Committee. Staff also submitted the annual Massachusetts Horseshoe Crab Compliance Report to ASMFC.

Staff gave presentations on DMF's horseshoe crab biomedical monitoring program and changes in the timing of spawning in Massachusetts at the annual Northeast Association of Fish and Wildlife Agencies Conference, a stock assessment overview to the Massachusetts Marine Fisheries Advisory Commission, a summary of horseshoe crab regulations to the Buzzards Bay Action Committee, and an overview of the DMF biomedical sampling program to the DMF lunchtime seminar series. Staff hosted a hybrid symposium for the 2024 Massachusetts Horseshoe Crab Science Meeting, which is held annually to review horseshoe crab survey trends and other relevant information. Speakers at the symposium were from DMF, Plymouth State University, Rhode Island Division of Marine Fisheries, and the International Union for the Conservation of Nature (IUCN).

Jonah Crab Research and Monitoring

Commercial Fishery Sampling

Figure 35. DMF staff measuring Jonah crab during a port sampling trip.

Monitoring the commercial Jonah crab catch has been required by the interstate FMP since 2015. Most crabs landed in Massachusetts are harvested in waters south of Martha's Vineyard and east to Georges Bank (NMFS statistical areas 537, 525, and 526). Project biologists conducted 11 port sampling trips with six individual boats to collect length frequency and sex ratio data from the commercial fishery in 2024 (Figure 35). These trips sampled a total of 7,817 crabs from NMFS statistical areas 537, 526, 525, and 562. A decline in the Jonah crab market made it more challenging to conduct port sampling trips because the commercial fleet was making fewer trips than in past years. The median carapace width in these areas was larger than previous years, likely due to fishers being more size selective due to current market conditions.

Assessment and Management Support

Staff represented Massachusetts on the AMSFC Jonah Crab Plan Review Team and ASMFC Jonah Crab Technical Committee. Staff also submitted the annual Massachusetts Jonah Crab Compliance Report to ASMFC.

Whelk Research and Monitoring

Commercial Fishery Sampling

Staff conducted six sampling trips aboard commercial vessels fishing whelk pots for channeled whelk. One trip each in spring and fall took place in the Buzzards Bay region and two trips each season took place in Nantucket Sound. A total of 12,468 whelk were sampled, 97% of which were channeled whelk (3% knobbed whelk). Staff

spent time re-organizing historical data into a master file format that would be compatible with data extracted from the new database under development.

Northern Shrimp Research and Monitoring

Assessment and Management Support

Staff served on the ASMFC Northern Shrimp Technical Committee. The fishery remains closed in 2024 due to depleted stock conditions and lack of recruitment. The Technical Committee provided an update on stock conditions using a simple "traffic light" approach based solely on survey data. Additional work focused on reviewing a winter sampling proposal for implementation in January of 2025, and preliminary discussions occurred around development of an industry-based survey.

Other Program Activities

In addition to the ongoing DO monitoring work, Program staff worked with the DFG GIS team to develop and host a website for our Program's *in situ* bottom temperature monitoring data. These temperature loggers (nine active locations) are swapped annually by DMF divers, and data are QC'd and maintained by Program staff as well as contributed to the larger DMF temperature database overseen by the Habitat Program. These data represent the longest fixed station bottom temperature time series in coastal New England, with some locations dating back to the mid-1980s, and are frequently sought by external researchers. The time series of daily mean temperatures at each monitoring location are now publicly available: https://hub.arcgis.com/maps/c9a6405efba44915810fa4e894102d35/about.

Staff continued to work on the development of a comprehensive new database to house data collected from multiple Invertebrate Fisheries sampling programs. This entailed meetings with developers and DMF Statistics Program staff, and extensive testing at multiple stages of development to ensure functionality and performance. Invertebrate Fisheries Program Staff also acted as reviewers for peer-reviewed journals.

Protected Species Program

Personnel

Erin Burke, Program Manager
Manali Rege-Colt, Protected Species Acoustician (started in December)
Emma Fowler, Protected Species Specialist (started in November)
David Chosid, Protected Species Gear Specialist
Brendan Reilly, Protected Species Gear Specialist

Overview

The Protected Species Program has substantially expanded the scale and scope of work conducted in recent years. This included the expansion of monitoring of North Atlantic right whales through increased aerial surveillance and the implementation of a passive acoustic monitoring network, along with the initiation of an on-demand gear research initiative and outreach regarding whale-related regulations. The overall Program is focused on research, management, applied conservation projects and policy development to minimize and mitigate entanglement risk of protected species in fixed fishing gear. Additional tasks include policy development, research grant writing and administration, and participation in Take Reduction Teams and committees related to offshore wind energy development.

Activities

Right Whale Aerial Surveillance

In 2024, DMF partnered with the Center for Coastal Studies (CCS) and NOAA Fisheries to carry out the 26th year of the Right Whale Aerial Surveillance Program. The program conducts aerial surveillance of right whales in Cape Cod Bay, Massachusetts Bay and adjacent areas during the winter and spring (Figure 36). Our understanding of the real-time distribution and abundance of right whales in Massachusetts waters informs critical management decisions, including the dynamic management of fixed gear closures and speed restrictions. Surveillance primarily occurs in the Massachusetts Restricted Area (MRA) – a seasonal trap gear closure to protect aggregations of right whales from the risk of entanglement. The team documented 47% (n=168 individuals) of the known right whale population in Cape Cod Bay and adjacent waters, including Massachusetts Bay (Figure 37). Cape Cod Bay and adjacent Massachusetts coastal waters continue to be an important seasonal habitat for right whales, which is especially significant given that the population currently numbers

Figure 36. Right whale mother and calf (CCS image: permit # 25740-02).

around 370 individuals.

In 2024, 20 right whale calves were identified in the Southeast US calving grounds, of which 5 mother/calf pairs were eventually documented in Cape Cod Bay. Based on the lingering presence of right whales, DMF extended the MRA closure and small vessel speed restriction in state waters through May 8. The high abundance of right whales visiting Cape Cod Bay and adjacent areas demonstrates how critical Massachusetts waters are to the North Atlantic population and the importance of protecting them.

In 2024, Project Staff administered the grant from NMFS that supports aerial surveillance and habitat monitoring and assisted in coordination of all large whale conservation activities.

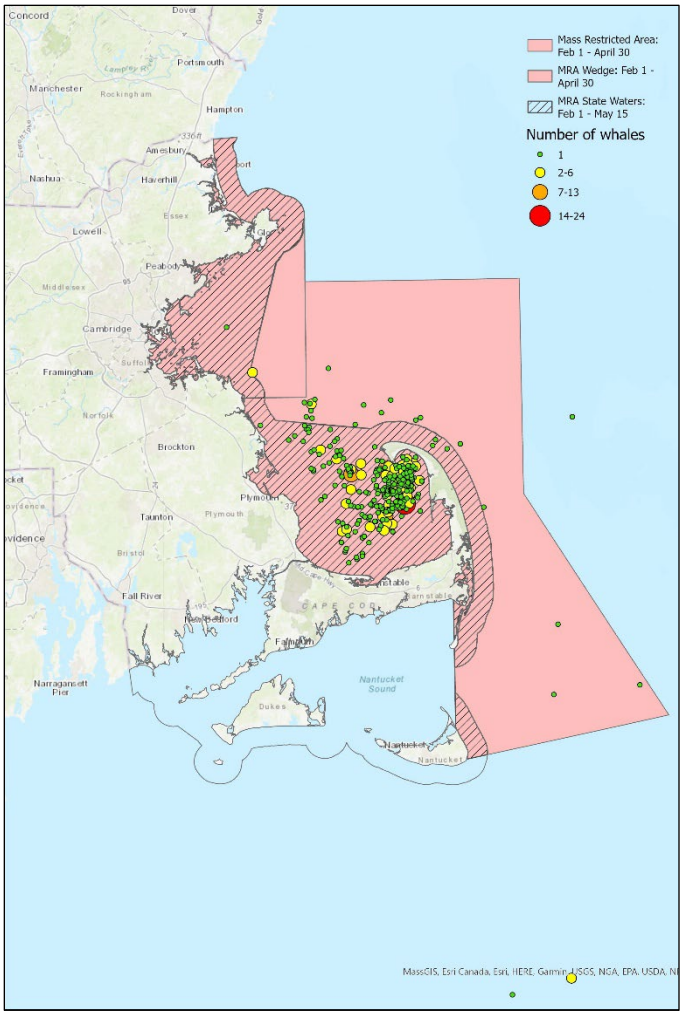

Figure 37. Map of 2024 right whale sightings during CCS aerial survey.

Right Whale Acoustic Surveillance

In 2024, DMF initiated a new effort to implement a passive acoustic monitoring network for right whales in MA state waters and adjacent federal waters. This program is part of the Massachusetts Right Whale and Lobster Fishery Research Program, funded by the Congressional Appropriations Act FY23. This additional monitoring will include both real-time and archival detection methods and will enhance our understanding of the presence of right whales in Massachusetts coastal waters year-round. This acoustic monitoring will complement the aerial surveillance conducted by the Center for Coastal Studies and DMF during winter and spring, providing information about right whale presence outside those survey times and areas. Staff contracted Woods Hole Oceanographic Institution to build, deploy and operate two real-time passive acoustic monitoring buoys (one in Cape Cod Bay and one off Gloucester) which will relay right whale call detections via satellite to a publicly accessible website (https://robots4whales.whoi.edu/). These buoys were expected to be deployed in early 2025.

In addition, DMF will be deploying bottom-mounted moorings equipped with hydrophones, or underwater recording devices, across Massachusetts state waters and adjacent areas in early 2025 (Figure 38). The hydrophones will be archival, collecting data over a four-month period before being called to the surface using an acoustic release. The data will then be accessed, and the hydrophones and moorings redeployed to continue recording right whale vocalizations. This array of recorders will be part of a regional acoustic monitoring network for right whales in the Northeast in collaboration with NOAA's Northeast Fisheries Science Center and other New England states.

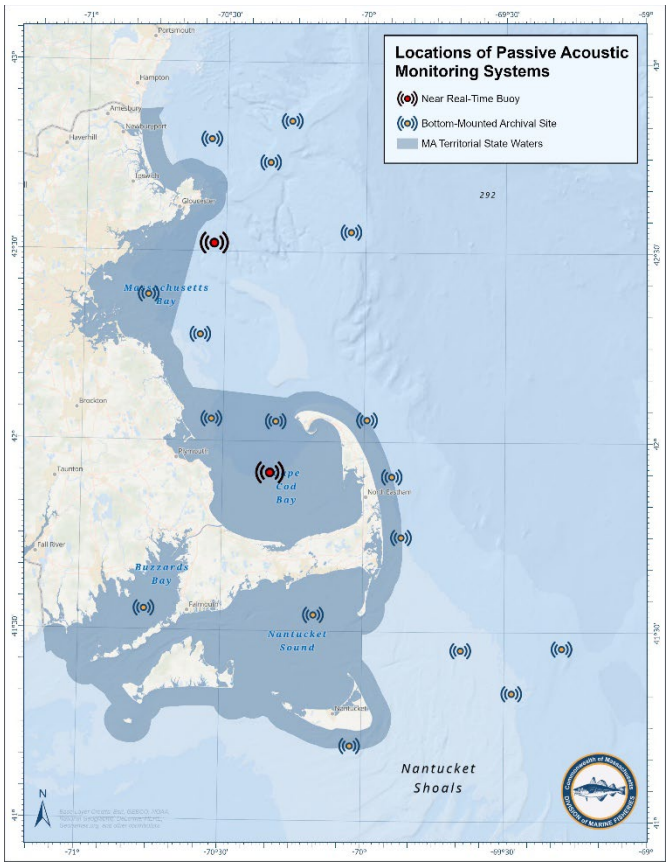

Figure 38. Proposed acoustic monitoring sites.

The data collected through this acoustic monitoring network will enhance our understanding of the spatial and temporal presence of North Atlantic right whales, aid in the development of occupancy estimates, and increase the efficiency of dynamic management of fixed gear closures meant to protect right whales from entanglement. Real-time detections will improve our confidence in the decision to extend or open the closure of the Massachusetts Restricted Area due to right whale presence or absence, as well as assist in guiding aerial survey efforts. Archival data will be analyzed for seasonal and temporal patterns in detections, aiding in the estimates of right whale density and occupancy in New England waters.

Large Whale and Sea Turtle Disentanglement

DMF and CCS cooperatively administer large whale and sea turtle disentanglement efforts around Massachusetts through grants from NMFS and the Massachusetts Environmental Trust. The 24-hour hotline and rapid response program is critical to reducing the potential for injury and mortality caused by entanglements, while also collecting information on entangling gear for management purposes. Project staff assisted in disentanglement efforts, gear analysis, and performed all grant management activities. A confirmed 22 whales were reported as entangled within the CCS response area, including three right whales and 18 humpback whales. The team either partially or fully disentangled five humpback whales. Additionally, CCS confirmed 12 leatherback sea turtle entanglements, of which 11 were disentangled.

Incidental Take Permit Application

DMF is applying for a federal Endangered Species Act Section 10 Incidental Take Permit (ITP) for fixed gear fisheries in state waters that might interact with endangered species, specifically North Atlantic right whales, leatherback sea turtles, and loggerhead sea turtles. Project staff are part of DMF's ITP Task Force. In 2024, staff finished updating the draft Habitat Conservation Plan (HCP), a key component of the ITP application. The HCP encompasses the history of fishing activity for fixed gear fisheries in Massachusetts, the presence of endangered species in state waters, an analysis of their co-occurrence, and conservation and mitigation measures DMF has implemented to protect endangered species during the fishing season. An updated draft HCP was submitted to NMFS in July 2024 for internal comment and review. Feedback from NMFS on the updated draft HCP will be instrumental in DMF's development of a final HCP and completed ITP application, which we hope to submit to NMFS in summer 2025. It will likely take one year for NMFS to review and conduct environmental analyses of the final ITP application.

Protected Species Regulations

DMF adopted regulatory changes in May 2024 to allow for the use of rope with a labeled "MASS LOBSTER" ribbon tracer woven through reduced breaking strength rope in place of non-solid marking requirements. DMF staff and the NEFSC conducted testing in 2023 and confirmed the reduced breaking strength ropes from Rocky Mount with the labeled ribbon (red and candy cane ropes) and another reduced breaking strength rope from Everson with the ribbon met the weak contrivance conditions of a 1,700-lb breaking strength (Figure 39).

In addition, with DMF support, NMFS amended the Atlantic Large Whale Take Reduction Plan to expand the boundaries of the seasonal Massachusetts Restricted Area to include the "Wedge" area (Figure 40). The Wedge was closed via emergency action in 2022 and 2023 to prevent entanglement of North Atlantic right whales in persistent buoy lines. This area will now be a part of the federal waters portion of the Massachusetts Restricted Area seasonal closure during February 1–April 30 each year.

Figure 39. Everson whale-safe weak rope with "MASS LOBSTER" ribbon.

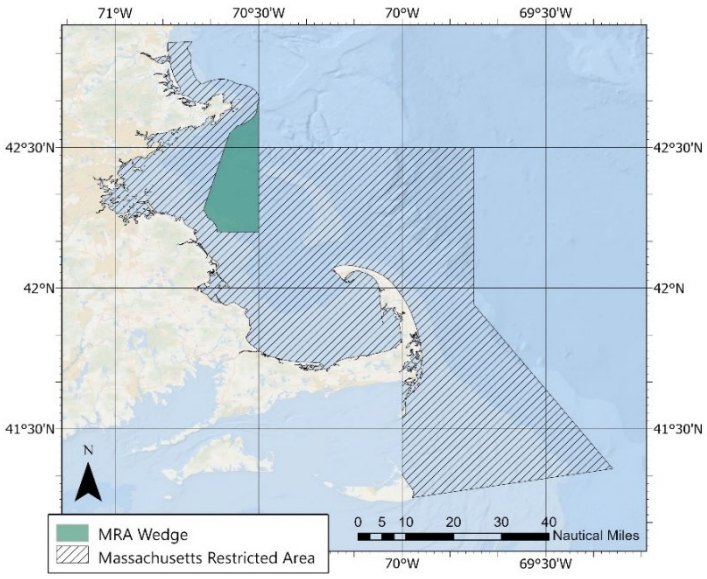

Figure 40. Map of seasonal Massachusetts Restricted Area including "Wedge".

Derelict Fishing Gear Removal

In 2024, DMF continued an on-going cooperative program to locate and remove abandoned, lost, and illegally fished gear (collectively referred to as derelict fishing gear) in the Massachusetts Restricted Area (MRA) prior to the arrival of right whales. DMF partners with MEP, commercial fishermen, and CCS to locate and remove all buoyed derelict trap gear within the Massachusetts state waters portions of the MRA that are closed for right whale protection from February 1–May 15 each year.

Six DMF staff members and MEP conducted 20 sea days of derelict gear removal efforts during February through April 2024 (Figure 41). In total, 373 traps and 193 buoy lines were successfully recovered; 80% of the traps and 54% of the buoy lines were associated with commercial trap/pot gear. The remaining traps and buoy lines were recreational trap gear. Three violations were cited by the MEP and DMF due to improper trap tagging. No violations were given due to marking and lack of weak contrivance during the gear removal season in 2024.

The derelict gear removal efforts not only ensured that the seasonal state waters closure was effective in eliminating entanglement risks for whales, but it also provided an opportunity to monitor compliance with the

closure and requirements for weak rope/contrivances, maximum rope diameter, and gear marking schemes.

DMF staff also participated in the Massachusetts Derelict Fishing Gear Task Force to study the issue of derelict gear in Massachusetts waters and to develop solutions for the removal of such gear. Recommendations for legislative changes were approved on November 20, 2024 and included an amendment to G.L. c. 130 § 31 to simplify the language and adopt a distinction between fishing gear and fishing gear debris, removal of the language in G.L. c. 130 § 32 which previously stipulated ownership of fishing gear swept ashore, and new and amended definitions for "intact" and "not intact" fishing gear, and "open season" and "closed season" in G.L. c. 130 § 1. The future work of this task force will focus on making regulatory changes to provide clear guidance on how the public may interact with intact fishing gear and fishing gear debris.

Figure 41. Lobster vessel returning to port after a successful gear removal mission.

On-Demand ("Ropeless") Gear Research

On-demand fishing gear replaces traditional, static buoy lines in the water column with stowed buoy lines which are released via an acoustic command triggered by fishermen. This eliminates the presence of buoy lines in the water column and reduces the risk of entanglement, which is a leading cause of human-induced injury and mortality for right whales. On-demand gear offers an innovative solution to the threat of entanglement and could provide fishermen access to seasonal gear closure areas meant to protect right whales.

Starting in 2019, the NEFSC has applied to DMF for yearly Letters of Authorization (LOAs) to conduct experimental fishing and research operations using on-demand gear (ODG) in Massachusetts waters, along with a NOAA issued experimental fishing permit (EFP). The goals of this ongoing work are to:

- Demonstrate successful retrievals of multi-trap trawls using proven acoustic releases on a variety of experimental on-demand components.
- Collect additional operational data on fishing without static vertical lines, gear location awareness, operational efficiency, cloud storage, and data sharing.
- Assess and improve the ease and accuracy of data collection itself.
- Improve virtual displays of fishing activity for managers and enforcement to inform future regulatory decisions. Demonstrate and develop the EarthRanger platform as an affordable and efficient interim solution to gear conflicts by integrating deployments from multiple manufacturers into a centralized cloud database and plot relevant data for the mobile and fixed gear fleet operating in the area.
- Provide additional feedback and recommendations to manufacturers of on-demand gear and related industries (i.e., database developers, geolocation technologies) on improvements that increase their performance under commercial fishing conditions.

Following work from the prior year, in 2024, the NEFSC was again approved for ODG fishing and research, with similar stipulations to prior state LOAs and under the NOAA EFP, for 23 vessels operating during the Massachusetts open season (valid to January 2025). In addition, and like in the prior year, the NEFSC applied to DMF for an LOA to conduct testing, using only ODG (no standard buoy lines) during the 2024 MA state closure and within specific areas of the Massachusetts Restricted Area (MRA) and South Island Restricted Area (SIRA) for seven vessels (Figure 42). These 2024 LOAs also stipulated that participating vessels must use vessel tracker systems.

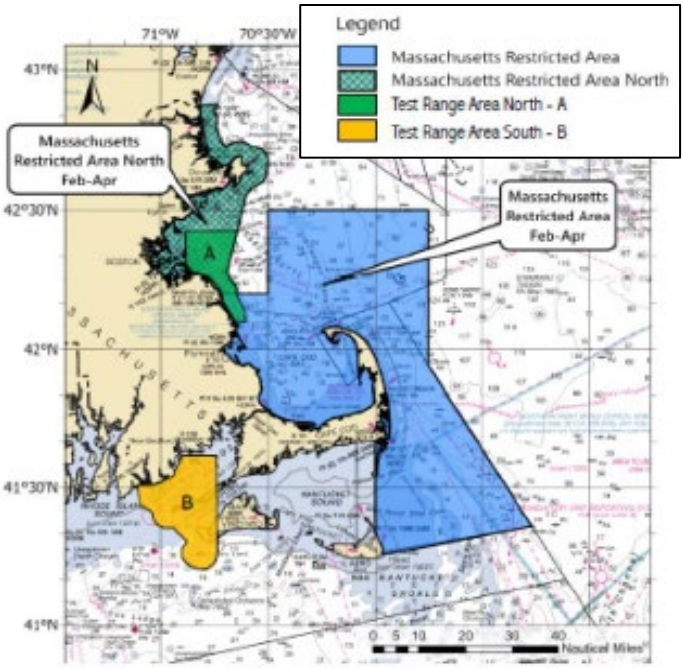

Figure 42. Proposed and accepted ODG research areas during the Massachusetts state closure.

DMF staff reviewed the LOA applications submitted by the NEFSC and worked closely with them so that operations could be conducted in MA state waters by state and dual federal/state fixed-gear permit holders. Progress reports of trips in state waters under ODG LOAs were submitted regularly for review and preliminary analyses were conducted by DMF staff. A 2024 final report was submitted detailing work coordinated under this program during the MA state closure. The 2024 NEFSC final report details the vessels that participated, successful rates of hauls, the numbers of lobsters retained and discarded, numbers of North Atlantic right whales sighted in the work areas, and reasons for unsuccessful hauls (Table 24).

Table 24. Results from the NEFSC 2023 and 2024 final reports.

	2023	2024	Total
#Vessels that set OD gear	5	6	11
# OD hauls completed in MRA	222	328	550
# OD hauls completed in SIRI	3	7	10
# Lobsters kept	2,446	4,262	6,708
# Lobsters discarded	1,632	2,962	4,594
# Right whales sighted	14	2	16
Successful recovery rates	94%	88%	

On-Demand Gear Fishing Economic Model

The implementation of ODG fishing could have significant impacts on the economics of the lobster industry such as the cost of the new gear, changes in hauling efficiency and catch rates, and the implications of gear conflict and gear loss. DMF partnered with contractor Noah Oppenheim of Homarus Strategies LLC, Dr. Rob Griffin of University of Massachusetts Dartmouth, and Dr. Andrew Goode of the University of Maine to develop a model to estimate operational costs of on-demand fishing under a range of implementation scenarios. The model is based on available fishery-dependent reporting and economic data and a series of stakeholder surveys and

interviews. The outputs from this modeling approach will allow DMF to provide economic and cost impact estimates for the state's lobster fishery under various on-call fishing gear management and implementation scenarios for the first time. The final report titled “Estimating the Costs of Using On-Demand Gear in Massachusetts Lobster Fisheries” is available online.

Staff were awarded funding in 2023 from the National Fish and Wildlife Foundation to continue developing the economic model using more sophisticated fishery-dependent data, more ODG testing data, and enhanced socioeconomic information from the Massachusetts lobster fishery. This updated model will be able to provide a more comprehensive assessment of the impacts of on-demand implementation across a wider range of fishing scenarios, such as fishing in seasonal restricted areas, hybrid fishing with traditional gear and on-demand gear, and potential future fishing closures.

In 2024, DMF and our contractors updated fishery-dependent data and cost estimates for the lobster fleet to ensure the economic data used in upcoming analyses are as accurate as possible. We also considerably enhanced our model by compiling data collected by DMF staff on hauling efficiency and throughput rates for both on-demand and standard fishing trawls (see next section). This integration of data sets has provided us with the empirical means to investigate how trawl length correlates with haul time for both standard and on-demand gear, thereby significantly improving the robustness and accuracy of our analysis. We expect to be able to continue refining these throughput metrics based on additional ODG testing data generated in 2025. We also will continue conversations with state and federal fishery managers about developing time-area management scenarios for socioeconomic modeling exercises.

On-Demand Gear Throughput Research

The transition to using ODG could result in revenue reductions due to additional operating time associated with the technological complexities of the gear. To examine the impact of the use of ODG on hauling efficiency and to collect data to incorporate into the economic model, DMF staff conducted fieldwork aboard vessels participating in the NEFSC LOA and EFP programs. The goal was to collect throughput (timing) data when using trawls with ODG and compare them to throughput data of fishing standard trawls. Results from this work inform economic analyses prepared by the consulting firm, Homarus Strategies, LLC.

Multiple meetings were held between DMF, the NEFSC, and Homarus Strategies to determine the needed data, field operations, project and data management, and progress. DMF also shared our throughput data collection methodology with the Maine Department of Marine Resources for use in their own program.

The NEFSC provided DMF staff with an Android tablet to identify the locations of set ODG gear. Additionally, special EarthRanger permissions were provided to DMF’s Protected Species staff by the NEFSC to identify all ODG gear in Massachusetts waters. While aboard participating vessels, DMF field staff collected location and throughput data of both ODG hauls and standard gear hauls. DMF staff completed 11 trips in 2024 on five vessels, operating under DMF issued LOAs or EFPs. Forty observed trawls were retrieved in the Massachusetts closed area and 105 trawls in open areas. A total of 65 ODG trawls and 80 standard trawls were retrieved. Average numbers of traps per trawl for vessels ranged from 10–26 for ODG and 10–20 for standard gear.

Data collected by DMF were shared with the NEFSC and Homarus Strategies. DMF’s preliminary analyses revealed that there may be significant differences in timing of ODG retrievals by vessel and crew and that particular events that increase the time for retrieving or setting trawls (such as a gear conflict or a failed buoy release) will greatly inflate operation times. Technological improvements might reduce throughput times in the future. Timing of standard vs. ODG trawls requires a clearly established identification of the required timing data and not all timing data may be comparable between the ODG trawls and standard trawls. Additional trips and further analyses were planned for 2025.

On-Demand Gear Grant Program

The acquisition of on-demand fishing-related equipment can have significant economic impacts. To assist fishermen in off-setting those costs and encourage investment in on-demand equipment, DMF initiated a grant program to reimburse a portion of the costs associated with the purchase of ODG or related equipment. This program is part of the Massachusetts Right Whale and Lobster Fishery Research Program, funded by the Congressional Appropriations Act FY23. The grant program will provide reimbursement of costs, or a portion of costs, for equipment needed to conduct on-demand fishing activities by Massachusetts commercial fixed gear fishers. There will also be a component for mobile gear fishers to participate by purchasing equipment needed to visualize the location of ODG on the seafloor during the fixed gear closed season. All participants will be required to submit reports on the performance of the on-demand technology. DMF will reimburse costs to chosen on-demand research program participants up to $25,000 for fixed gear fishers and $6,000 for mobile gear fishers. DMF made available a total of $330,000 for distribution through this grant program in 2025.

Eligible reimbursements shall include, but will not be limited to, the purchase of on-demand gear; the purchase and/or installation of through-hull transducers for signaling on-demand fishing gear; the installation and/or maintenance of satellite communication systems capable of providing information of on-demand gear locations; monthly costs for satellite services used while on-demand fishing; a device to receive on-demand data; and on-demand software application downloads and/or subscriptions. In 2024, staff notified fixed and mobile gear permit holders about the grant opportunity and solicited applications for evaluations. In 2025, we will evaluate the applications and begin the process of reimbursing approved equipment.

On-Demand Gear Density Study

Gear conflicts are a major nuisance to fixed-gear fishers and can usually be avoided while using standard gear with buoys. Set ODG gear, which is detected through chart marks or with acoustic equipment, may require considerably greater distances between neighboring fixed-gear trawls than standard trawls in order to avoid gear conflicts. The purpose of this research is to identify the minimum effective distance possible to fish ODG trawls without gear conflicts, so that we can assess the impacts to the industry with regards to time, space, and cost needs. This program is part of the Massachusetts Right Whale and Lobster Fishery Research Program, funded by the Congressional Appropriations Act FY23.

In 2024, DMF posted a Request for Proposals to acquire 12 ODG release units (cages) and all associated equipment (including two transceivers, two command boxes, tablets, software subscriptions, and spare parts). A bid was accepted from Edgetech and the items were received. Other purchased items included various field equipment and office supplies, and replacement batteries and tools needed for maintaining the equipment.

Prior to conducting the density study, DMF familiarized themselves with the usage and operations of the purchased ODG and tested the equipment. This initial work was performed over three days in Buzzards Bay using two DMF vessels. Staff attempted to deploy and retrieve cages, testing all associated equipment. Troubleshooting of a failed cage retrieval utilized transceiver communications, trilateration of the gear's position, side-scan sonar imaging, grappling techniques, and SCUBA divers. The unit was retrieved and the experience informed future operations and modified gear rigging.

Two lobster vessels were contracted to conduct the density study trials in 2024 - the *F/V Bad Habit* and *F/V Helen Irene*. A third vessel was planned for 2025. Vessel crew and DMF staff completed fieldwork in Buzzards Bay as this area provided relatively good protection from high winds, flat and featureless bottom, had desirable project work depths, had low chances of gear conflicts from other fishing industry members, and was easy to

access for industry participants and researchers (Figure 43). A total of 73 gear density trials were completed during 12 trips. Each vessel completed at least 12 trials per nominal trawl spacing (100 ft, 50 ft, and 35 ft). Data were entered into a customized database. For both vessels, the most gear conflict events occurred during the 35-ft nominal spacing trials. Analyses were ongoing at year's end, along with qualitative assessments of gear and vessel performance.

DMF staff attended meetings specific to the density study. We compared research activities with Fisheries and Oceans Canada staff and separately with Blue Planet Strategies, who are both conducting ODG density research. Multiple meetings were also held between DMF and Edgetech to discuss usage of their ODG, to offer feedback towards improvements, and to troubleshoot problems. Other attended meetings of significance included the 2024 World Fisheries Congress, updates on the Assessments of Acoustic Interoperability Standards of On Demand Gear, and the 2024 Ropeless Consortium.

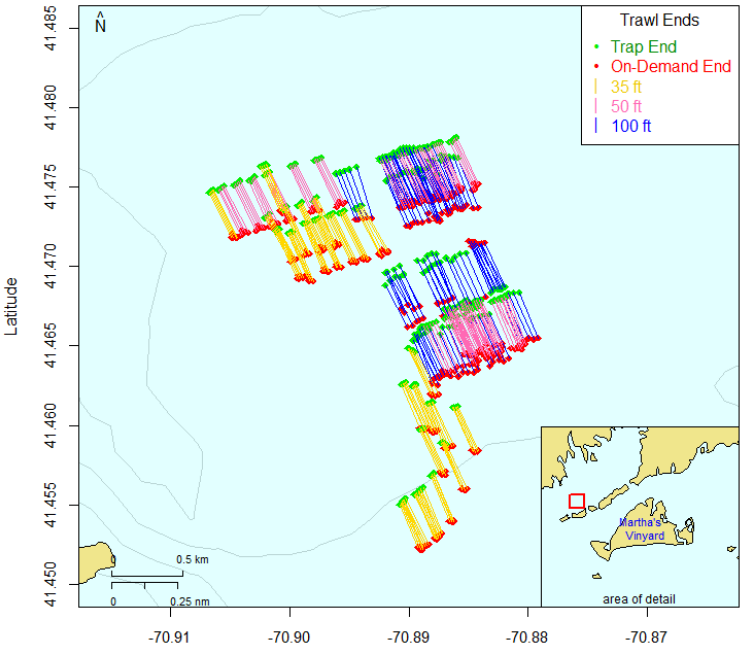

Figure 43. Map of set trawls, from all vessels, in Buzzards Bay. Trap ends and ODG ends are shown in green and red points respectively. Line colors show the nominal trawl spacings (yellow = 35 ft; purple = 50 ft; blue = 100 ft). The key in the bottom right shows the larger area of MA waters with the area of detail boxed in red.

Compliance Assistance

Entanglement in fishing is a major source of serious injury and mortality for right whales. The severity of injuries caused by entanglement can be reduced by using line that breaks at 1,700 lbs or less. DMF and NOAA Fisheries have implemented regulations requiring the use of reduced breaking strength ropes ("weak rope") or other weak contrivances that break at the same approximate 1,700 lbs pressure in the lobster fishery. DMF requires fishermen to use fully formed weak rope for their buoy lines or to use weak contrivances every 60 feet, as well as requiring color-coded marking of buoy lines to identify gear as originating from Massachusetts. To assist fishermen in complying with the required weak rope contrivances and buoy line marking regulations, DMF staff conducted outreach to distribute gear to fishers through directed gear give-away events, adjacent events such as the Massachusetts Lobstermen Association meeting, direct deliveries to organizations, or by meeting with individual permit holders. Items purchased for distribution included various types of weak ropes for the MA inshore fleet, plastic break-away links and other contrivances, and gear marking materials. Goods were purchased from regional suppliers. This program is part of the Massachusetts Right Whale and Lobster Fishery Research Program, funded by the Congressional Appropriations Act FY23.

In 2024, DMF purchased and added the following items to our inventory: 500 weak links, 2,496 Southshore Sleeves, 96 coils of red rope with the "MASS LOBSTER" ribbon, 96 coils of candy cane rope with the "MASS LOBSTER" ribbon, 62 coils of Everson rope without the "MASS LOBSTER" ribbon, and 111 coils of Everson rope with the "MASS LOBSTER" ribbon. In 2024, at least 214 permit holders were provided with weak contrivances and marking materials. Additional informational outreach was provided through electronic media, at events, and

at one-on-one meetings.

Staff assessed the weak contrivance and marking material preferences based on fishing industry constituents' feedback and personal use of the evolving available materials. Whereas prior compliance purchases were based on an initial web poll to state permit holders, new purchases also considered the new feedback. Constituents identified a preference for weak ropes with the "MASS LOBSTER" ribbon. As this ribbon became available for each rope, new purchases only included ropes with the ribbon.

Based on the increased amount of goods purchased for and provided to industry members, DMF began improvements towards our infrastructure. A forklift was purchased for large supply orders, and plans made to complete staff training, install a charging station for the forklift, and improve storage shelving in 2025.

Training was provided to DMF staff who engage in removing derelict trap and pot gear from the Massachusetts Restricted Area during the seasonal closed period in understanding rope compliance issues.

DMF continues to work with our constituents to clarify and simplify the compliance regulations, which can be confusing and occasionally change with new products and options. We have worked internally and with the NEFSC to advise, produce, and distribute outreach materials, in-person and through electronic media. We continue to work with industry organizations and individuals to help them rig their gear correctly and according to their preference. DMF staff also participated in relevant meetings in 2024. Meetings of particular significance included the International Whaling Commission, 2024 Ropeless Consortium, 2024 NARWC Consortium, and the Atlantic Large Whale Take Reduction Plan Informational Webinar: North Atlantic Right Whale Monitoring Update.

Other Activities

DMF participated as a member of the Massachusetts Habitat Working Group. This body assists EEOEA, the federal Bureau of Ocean Energy Management, and the Massachusetts Clean Energy Center with analysis of natural resource data as it relates to potential impacts in the Massachusetts Wind Energy Area (WEA). State and federal governments are assessing the potential impact of wind energy development on marine mammals that inhabit the area south of Martha's Vineyard and Nantucket. DMF is also a member of the Sea Turtle Subcommittee for the Regional Wildlife Science Collaborative for Offshore Wind which serves as a coordination hub for offshore wind research to increase collaboration and data sharing. Project staff also consult on review of subtidal aquaculture projects to minimize potential impacts to protected species.

Staff participated in two NOAA Gulf of Maine Marine Debris Action Plan working groups, "Fishing Gear" and "Research, Information, and Risk Assessment for Wildlife and Habitat", which re-evaluated and updated the action plan. The Gulf of Maine Marine Debris Action Plan, originally published in November 2019, establishes a comprehensive framework for strategic action to ensure the Gulf of Maine and its coasts, people, and wildlife are free from the impacts of marine debris. This Action Plan is one of several being implemented in coastal regions across the country.

Recreational Fisheries Program

Personnel

Ben Gahagan, Program Manager
John Boardman, Marine Fisheries Biologist
Matt Ayer, Marine Fisheries Biologist
Ross Kessler, Public Access Coordinator
David Martins, MRIP Coordinator
Kristen Thiebault, MRIP/FHTS Sampler
Neil McCoy, Information & Education Coordinator

Overview

The **Recreational Fisheries Program** works to preserve, enhance, and promote the Commonwealth's marine recreational fisheries. The goals of the Program are to conserve key recreational species through science-based monitoring and management; support the recreational fishing community, including local recreational fishing businesses; and educate the Commonwealth's citizens on the features and benefits of local recreational fisheries resources. Program personnel participate in Division-led research, measure abundance, length frequency, and age classes of key finfish populations; assess habitat and prey needs of key species; measure harvest and release of key species; facilitate purchase and maintenance of access sites, much of which is funded by recreational fishing permit sales; and disseminate information on all aspects of recreational species and fisheries to the public.

MRIP Sampling Project

Since 1983, recreational fisheries catch and effort data have been collected along the Atlantic Coast through NOAA Fisheries' Marine Recreational Information Program (MRIP). MRIP is vitally important to both fisheries scientists and managers who use the information to assess how catch levels affect fish population size and to develop measures for sustainable recreational fisheries. DMF has managed the at-sea sampling of head boats in Massachusetts since 2003 and the shore-side Access Point Angler Intercept Survey (APAIS) sampling of charter vessels, shore anglers, and private/rental vessel anglers since 2013. The benefits of doing so include the ability to increase sample sizes and improve the precision of catch estimates. In 2020, DMF began the administration of the For-Hire Telephone Survey (FHTS) in Massachusetts to estimate fishing effort by charter and head boat vessels operating in Massachusetts.

DMF continued its coordination of APAIS surveys in 2024, training 20 seasonal field interviewers, scheduling trips, logging data, maintaining equipment, attending data review meetings, and maintaining regular communication with the Atlantic Coastal Cooperative Statistics Program (ACCSP), which administers the program for NOAA Fisheries, regarding survey performance and sampling. In 2024, MRIP field interviewers completed 1,290 shore-side assignments out of 1,329 scheduled for a total of 4,855 angler intercepts (20% higher than the year prior): 3,188 from private vessels, 554 from charter vessels, and 1,113 from shore anglers. DMF also collected head boat harvest and discard data during 62 at-sea head boat trips in which 795 anglers were interviewed (a decrease from 2023). In 2024, there was an increase in the number of interviews collected in each month except July, as compared with 2023. Most notable was a program record set for the highest number of interviews collected in the month of September, with 1,004. The FHTS completed 1,795 calls to charter and head boat representatives from March through December to collect for-hire vessel effort

information. FHTS staff also worked to update and improve the federal charter and head boat vessel directory to ensure survey precision and accuracy as well as sampling efficiency each year.

Recreational Fishing Derby

Project staff administered the state's Saltwater Fishing Derby. Formally known as the Governor's Cup and hosted by the Division of Tourism, the derby was moved to DMF in 1983. In 2024, there were 50 entries in the derby, including 35 winners, two Anglers of the Year and a Skillful Skipper. The two Anglers of the Year were both back-to-back winners. No new state records were set in 2024. Administrative duties include creating, printing, and distributing derby rule pamphlets and entry forms; regular communications with weigh stations; preparation of press releases; and tracking derby standings. The Derby winners will receive their awards at the New England Boat Show in January 2025.

Planning began in 2024 to revitalize the derby for 2025, including a name change. The contest will transition to being called the Commissioner's Cup, providing a fresh start while honoring the long history of the Derby. To celebrate the Angler and Junior Angler of the Year, DMF commissioned Cape Cod artist Steve Swain to create a trophy to which winners names will be added annually (Figure 44). Announcements of these exciting changes were expected in early 2025.

Figure 44. The new logo and trophy for the Commissioner's Cup.

Public Access

The Public Access Coordinator position, which is funded by the Marine Recreational Fisheries Development Fund, manages DMF saltwater fishing access projects, working closely with the *Mass*DFG Office of Fishing and Boating Access (OFBA), NGOs, towns, and other state and federal agencies to identify, plan, and implement projects that will enhance fishing access. The coordinator also serves as a liaison to the fishing public for all matters of saltwater fishing access, including advocating for beach and shore access. To fulfill these duties, staff worked throughout 2024 to develop proposals for the development and enhancement of public access sites; responded to inquiries regarding shoreside fishing sites, public access rights, and future access projects; and represented the agency remotely at multiple meetings of various sportsmen's gatherings.

In the fall of 2023, planning and permitting were completed for the new Salem Willows Fishing Pier. The construction contract was awarded, and construction began in January of 2024 and was completed in October (Figure 45). The old pier had been a mainstay in Salem and had served the fishing public for well over one hundred years. Like the old pier, the new pier extends about 330 feet into Salem Sound. However, the end of the new pier has a 60 x 16 ft 'T' section, capable of accommodating far more anglers than its predecessor. A major improvement over the old pier is improved accessibility in the form of wheelchair accessible railings covering 25 percent of the fishable frontage.

Figure 45. The completed Salem Willows Pier.

DMF's annual small grants public access program provides up to $50,000 to assist municipalities with projects that promote or support local recreational fishing activities and access. During 2024, two projects were approved to receive funding for 2025 projects: (1) Chatham was granted $12,000 in order to install life rings in housings at multiple shore fishing locations supported by the town; and (2) Edgartown was granted $13,000 in order to provide lighting, bait cutting/filleting stations, and washdown capabilities at Memorial Wharf and North Wharf, both of which have provided pier fishing access for decades.

At the agency's Craven's Landing access site on Scorton Creek in Sandwich, periodic site monitoring and maintenance were required. Seasonal contractors were hired for site patrol and coordinated for weekly summer assignments. Every year, staff work closely with official plover monitors to comply with USFWS regulations. Access is limited at Craven's Landing after plover chicks are born and re-opens after young plovers fledge or migrate out of a federally established buffer zone. Staff also continued to collaborate with the Massachusetts Natural Heritage Program and many other organizations to implement a Habitat Conservation Plan (HCP) for alternative management options in piping plover habitat.

The agency also owns Leland Beach on Cape Poge in Edgartown, Martha's Vineyard. The Trustees of Reservations (TTOR) provides management of that parcel through a Memorandum of Understanding. The Division participated in the drafting of a new Beach Management Plan with TTOR and other user groups. Going forward, the Division will work with TTOR to aid in public access management decisions on an ongoing basis. DMF participated and commented in meetings with the Edgartown Conservation Commission and *Mass*DEP. Our focus is to protect and enhance public access for anglers wherever legal and reasonable.

Outreach

The Recreational Fisheries Program's outreach efforts are focused on engaging and informing the Massachusetts saltwater fishing community and the public. Activities are supported in large part by the sale of recreational saltwater fishing permits. The Information & Education Project focuses specifically on communicating information and establishing and maintaining meaningful connections with Massachusetts recreational saltwater anglers. Staff achieve this in the following ways:

Communications: Staff routinely answered public inquiries regarding recreational fisheries and attended meetings of the recreational fishing community, including several regional fishing and boating trade shows. Staff also continued to create and maintain online content and resources on the Mass.gov website. Existing Recreational Fishing web content was reviewed and updated, new webpages for events, information, and projects were built, and website analytics were tracked. Staff used GovDelivery email bulletins to regularly communicate with an audience of almost 90,000 subscribers. Bulletins were used to communicate information that impacted recreational anglers, including advisories, updated regulations, upcoming events, public hearings, surveys, and citizen science.

Social Media: Social media was an important communication tool to connect with our audiences in 2024. We actively shared content through our social media platforms on Facebook, Instagram, and Twitter/X. Followers and engagement continued to increase across all platforms, but especially on Instagram where we increased our followers from about 6,200 to almost 7,000. Content across platforms included regulatory advisories, recreational fishing topics, saltwater derby activity, highlights from field research, angler education events, and more. The Striped Bass Citizen Science project was often featured on our social media, where we recruited participants and posted highlights and celebrated raffle winners. In 2024, social media analytics, including followers, engagement, impressions, and top posts, were tracked monthly.

Video and Podcasts: We identified multimedia as a priority in 2024 and purchased GoPros, microphones, and other media equipment in anticipation of creating in-house videos for instruction and social media in the coming year. We also pursued several opportunities to partner with established content creators to produce striped bass video and podcast episodes. Our staff were featured in "Striped Bass Science" on the SeaBros Fishing Podcast, "Stripah!" on MeatEater's Cal of the Wild Podcast, and "How You Can Help Stripers Survive" with On The Water Media.

Publications and Design: In 2024, we continued an information campaign to increase awareness and understanding about the status of the striped bass recreational fishery. We updated and distributed a Striped Bass Management Status handout and a *How Old is My Striper?* handout. To raise awareness of striped bass conservation, we produced an over-sized striped bass conservation license plate to display at events. Recruitment materials were designed, printed, and distributed for our public science initiatives, including the Sportfish Angler Data Collection Team, the River Herring Viewing Guide, and the Striped Bass Citizen Science Project (Figure 46). The 2024 Massachusetts Saltwater Recreational Fishing Guide was prepared and distributed to over 140 bait and tackle shops and to requesting anglers by mail and website downloads. Featured content included the Striped Bass Citizen Science Project, a Striped Bass Management Status Update, and a *How Old is My Striper?*. Routine reorders of existing program materials, including shark and saltwater fish activity books, were completed to fulfill distribution needs at events. Additional educational materials and promotional items for the Take Me Saltwater Fishing initiative were designed and produced, including a series of saltwater species stickers. To make our materials more accessible and inclusive, we produced a set of angler education handouts in Spanish and had our popular Saltwater Fishing Youth Field Guide translated into Spanish (with an initial printing of 2,000 copies).

Figure 46. Striped Bass Citizen Science Information and Recruitment poster.

Events: Our staff kicked off 2024 by hosting the annual Saltwater Derby Awards Ceremony (for 2023 winners) during the New England Boat Show. Staff also attended and provided outreach materials for several events throughout the year, including the New England Saltwater Fishing Show, the Salem Willows Park Pier ribbon-cutting, StriperFest, and the Topsfield Fair, which has an annual attendance of roughly 500,000 people. Event materials included marine activity books, posters, recreational fishing guides, youth fishing field guides, citizen science project materials, *How Old is My Striper?* handouts, and promotional striper license plate instructions. In 2024, we altered our annual Free Saltwater Fishing Days to include both Mother's Day (Figure 47) and Father's Day. We promoted them both on outdoor billboards, social media, and in the Saltwater Recreational Fishing Guide. We also had the opportunity to host Beverly Public School District 4th graders at our Cat Cove facility, where 54 students gained hands-on experience to learn about marine animal structures.

Figure 47. Mother's Day was included as a free saltwater fishing day in 2024.

Saltwater Angler Education Program

The Saltwater Angler Education Program's mission is to teach responsible fishing in an enthusiastic environment, recruit new anglers, and make saltwater fishing accessible to everyone. Our program engages the public in the following ways: fishing clinics, fishing festivals, and training seminars.

Fishing Clinics: The DMF Saltwater Angler Education Program promotes responsible recreational saltwater fishing in coastal Massachusetts waters and provides learning opportunities and educational materials for new anglers. Our program includes free fishing clinics, informational booths at festivals and events, training seminars, video tutorials, a fishing field guide, and other educational handouts (Figure 48). In 2024, Saltwater Angler Education hosted, participated in, or supported 16 events open to all ages, one multi-day summer camp, and four training seminars. The 2024 events (Table 25) occurred from May through October and were free to the public. At these events, DMF

Figure 48. Fishing clinic visitors enjoy learning how to fish through hands-on practice and talking with DMF staff, and participate in other fun activities

staff taught basic angling skills, how to responsibly handle fish, and other fun activities such as knot tying and fish identification. Educational handouts were distributed to the public in both English and Spanish.

The goal of our fishing clinics is to give participants the skills and confidence to go saltwater fishing on their own. Providing them with gear and tackle to do so greatly increases those odds. In 2024, we applied for and received $7,800 from the Massachusetts Office of Outdoor Recreation's Inclusive and Accessible Outdoor Recreation Grant. With these funds DMF was able to purchase 200 rods and starter tackle kits to distribute at free, public saltwater angler education fishing clinics. Registered participants were able to take home the gear and tackle they used for the day in hopes that they would continue fishing on their own or with friends and family.

Table 25. 2024 Saltwater Angler Education Fishing Events

Event	Partnering Organization(s)	Participants
Boston Harbor Island Summer Series	National Park Service, Boston Harbor Now, MWRA, Fish and Wildlife-Deer Island	150
Fort Taber Take Me Saltwater Fishing Clinic-New Bedford	Journey Christian Youth Group	30
Water Safety Day	Cape Cod Canal Visitor Center, Sandwich	126
Evening Family Fishing Clinic	Cape Cod Canal Visitor Center, Sandwich	70
Hill to Harbor Discovery Camp Peddocks Island	National Parks of Boston, YMCA groups from the greater Boston Area (week-long event)	207
Let's Go Saltwater Fishing!	City of New Bedford	55
Cops and Bobbers: Bicentennial Park, Fall River	Fall River Police Department	60
Boston Harbor Island Summer Series	National Park Service, Boston Harbor Now, MWRA, Fish and Wildlife, Trustees-Nut Island	200+
Cops and Bobbers: Village Waterfront Park, Somerset	Somerset Police Department	57
Family Fishing Clinic	Gloucester Harbormaster, Harbor Loop-Gloucester	24
Surfcasting Clinic	Mashpee, MA	20
Take Me Saltwater Fishing	Cape Cod Salties-Bass River, South Yarmouth	42
Accessible Adventures	Friends of Winthrop, MWRA-Deer Island	120
Fairhaven Fishing Derby	Fairhaven Parks and Rec Dept - Educational material and DMF Staff available	40
Province Town Fishing Festival	Mass Beach Buggy Assoc. & Nat. Park Service - Educational material and DMF Staff available	29
Nickerson Park Youth Fishing Day	Flax pond, Nickerson Park	130 (kids and parents)
Cops and Kids	City of Gloucester Police Dept. (ongoing summer event) - Provide Educational Material	80

Large Pelagics and Diadromous Fisheries Program

Personnel

Dr. Gregory Skomal, Program Manager
Brad Chase, Diadromous Fisheries Project Leader
John Sheppard, Diadromous Fisheries Biologist
Stephanie Berkman, Diadromous Fisheries Biologist
Joseph Holbeche, Diadromous Fisheries Biologist
Micheal Burgess, Diadromous Fisheries Biologist (beginning in March)
Edward Clark, Fishway Crew
James Rossignol, Fishway Crew

Overview

The **Large Pelagics Fisheries Project** conducts research to enhance our understanding of the ecology, life history, and relative abundance of sharks, tunas, and billfish off the coast of Massachusetts, where extensive recreational fisheries for these species occur. In addition to this research, the project's goals are to foster cooperative research; participate in the state, regional, federal, and international management processes; and provide public education and technical information on the biology, management, and utilization of highly migratory species.

The **Diadromous Fisheries Project** works to sustain and improve sea-run fish passage, habitat, and populations. The project also conducts fish biology monitoring and research that contributes to fisheries management. Fish passage and habitat restoration are accomplished through coordinated efforts of DMF staff, state and federal agencies, municipalities, and private groups to facilitate, design, and execute projects to enhance diadromous fish populations. Technical assistance is provided as needed for individual restoration projects and coastal watersheds. Project efforts cover 10 species of diadromous fish stocks in Massachusetts, with a focus on river herring, American shad, rainbow smelt, and American eel. These species are monitored for run counts, indices of population abundance, size and age composition, harvest, and restoration potential. The information generated by this project is necessary for the sustainable management of diadromous fish populations as required by state and federal laws.

Large Pelagics Fisheries Project

Shark Research

DMF began shark research in 1987 to better understand the ecology, distribution, and relative abundance of sharks that are subject to fisheries off the coast of Massachusetts. Staff conduct field research and opportunistically collect data from recreational and commercial fishermen's catch. Biological parameters are examined through the dissection and tagging of sharks. The goals are to foster cooperative shark research; participate in state, regional, federal, and international management processes; and provide public education and technical information on the biology, management, and utilization of sharks.

White Sharks: The aggregation of white sharks off the coast of Massachusetts is one of only a handful of hotspots in the world and unique along the east coast of the US (Figure 49). Consequently, the state of Massachusetts, and in particular, the towns on Cape Cod are faced with a growing potential for negative

interactions between this species and people utilizing our coastal waters. As a result, DMF has intensified its research on the fine-scale predatory behavior of white sharks off the coast of Massachusetts using a variety of high-tech tags, including acoustic telemetry, satellite-linked tags, and acceleration data loggers.

Our acoustic receiver array has been expanded to fill gaps around Cape Cod and to include most towns along the Massachusetts coastline. In collaboration with the Center for Coastal Studies, five gridded acoustic arrays were deployed off beaches of the Outer Cape to examine fine-scale movements of sharks as they relate to habitat. To notify public safety officials of the presence of tagged white sharks, four real-time acoustic receivers were deployed off popular Outer Cape swimming beaches including Newcomb Hollow and Lecounts (Wellfleet), Nauset Beach (Orleans), and North Beach (Chatham). These receivers provided beach managers and lifeguards with immediate notifications when acoustically tagged white sharks were detected close to these beaches. Acceleration data logging camera tags were deployed on white sharks to record very fine-scale movements at sub-second intervals, including tailbeat frequency, amplitude, body posture, and swimming depth. These data are being used to examine predatory patterns (e.g., traveling, resting, hunting, foraging, mating), bioenergetics, and, ultimately, provide estimates of the intensity of white shark predation on gray seals. Lastly, drone camera systems were utilized off the Outer Cape to observe nearshore white shark behavior in response to vessel traffic.

Figure 49. A white shark swims along the coast of the Outer Cape.

As a result, 28 and 11 white sharks were tagged with acoustic transmitters and/or acceleration data logging camera tags, respectively, off the Outer Cape in 2024. When combined with collaborative tagging efforts off Canada (1), New York (1), New Jersey (1), North Carolina (3), South Carolina (37), and Florida (1), this brings the total to 386 individuals tagged since 2009. These efforts were conducted with funding and logistical support from local non-profits, primarily the Atlantic White Shark Conservancy. Data collected in 2024 will be used to enhance our understanding of white shark predatory behavior in these areas of high shark-human overlap to better inform public safety practices.

Shark Management: Staff participated in state, interstate, federal, and international shark management processes. During 2024, staff served on the ASMFC Coastal Sharks and Spiny Dogfish Technical Committees; the International Commission for the Conservation of Atlantic Tunas Advisory Committee, Swordfish and Shark Working Group; and NMFS Highly Migratory Species Advisory Panel.

Outreach and Media: To meet the public demand for information on sharks, especially white sharks, numerous presentations were delivered. Technical information on sharks was also provided to several media outlets.

As adjunct faculty to SMAST, the UMass Biology Department, and the Woods Hole Oceanographic Institution, staff co-advised and served on the committees of 13 graduate students who are working with DMF to study the relative abundance, life history, movements, and physiology of sharks.

Publications: Staff co-authored seven articles published in scholarly journals in 2024. Topics included: tarpon depredation by hammerhead sharks, striped bass reaction to angling stress, pre-copulatory behavior of basking sharks, a review of white shark parturition, the development of a single-pin pole tagging technique, the occurrence of white sharks in the Bahamas, and the global redistribution of whale sharks in response to climate change.

Diadromous Fisheries Project

Diadromous fishes migrate between fresh and marine waters to complete their life history. They are valued for the forage they provide for a wide range of wildlife and were formerly important for traditional small-scale fisheries in coastal towns. DMF is not only responsible for the management of diadromous fish populations in the coastal rivers of Massachusetts, but also the restoration, improvement, and maintenance of their migratory pathways.

Biological Assessments for River Herring

The alewife is the most abundant and well-known anadromous fish in Massachusetts. Along with the closely related blueback herring, both species are known commonly as river herring. River herring have had high cultural and economic importance historically, but present populations are well below former levels and harvest has been banned since 2006. As a result, DMF has increased monitoring efforts over the past decade to meet management goals of restoring populations and harvest in coastal towns.

Current monitoring comprises at least one station collecting river herring spawning run counts and biological data in each of the major coastal drainage areas. Project staff provide technical assistance to towns and watershed groups for electronic and video counting systems as well as the design and data processing for volunteer visual counts of river herring. DMF staff have designed, fabricated, and installed over 20 electronic and video counting systems in river herring runs (Table 26). In addition, DMF annually collects biological samples of river herring at eight of the rivers with counting stations.

Table 26. River herring monitoring stations managed or supported by DMF.

River	Biological	Counts
Merrimack River, Lawrence	Yes	Fish Lift/Video
Concord River, North Billerica	No	Video
Parker River, Newbury	Yes	Video
Essex River, Essex	No	Electronic
Mystic River, Medford	Yes	Video
Back River, Weymouth	Yes	Electronic
Herring Brook, Pembroke	No	Electronic
Town Brook, Plymouth	Yes	Video/Visual (*Volunteer*)
Nemasket River, Middleboro	Yes	Visual *(Volunteer)*
Sippican River, Rochester	No	Electronic
Mattapoisett River, Mattapoisett	No	Electronic
Acushnet River, Acushnet	No	Electronic
Agawam River, Wareham	No	Electronic
Wankinco River, Wareham	No	Electronic
Monument River, Bournedale	Yes	Electronic
Cedar Lake, Falmouth	No	Electronic
Stony Brook, Brewster	No	Electronic
Herring River, Harwich	Yes	Electronic
Pilgrim Lake, Orleans	No	Video/Visual (*Volunteer*)
Herring Creek, Aquinnah	No	Video
Mill River, Taunton	No	Video

In 2024, river herring counts ranged from 0 fish (Concord River, North Billerica) to 649,688 fish (Mystic River, Medford) at 43 rivers in 36 towns where counts occurred. Some locations posted time-series highs, including the Jones River (Forge Pond) in Kingston, and the Trunk River in Falmouth. The Mystic River count in Medford was the top count in 2024, and the only site in Massachusetts to exceed a half million river herring.

River Herring Stocking

DMF collects and transports river herring to assist efforts to re-establish and enhance river herring runs, subject to the guidance of our Stocking Protocol Policy (available online). In 2024, 15 stocking trips transferred approximately 8,758 adult river herring as follows: 1,200 herring from the Monument River to Tom Matthews Pond, Yarmouth; 1,000 herring from Herring Brook, Pembroke to Island Creek, Duxbury; 1,000 herring from the Monument River to Mill Pond, Barnstable; 300 herring from the Herring River, Harwich to Little Sandy Pond, Yarmouth; 1,000 herring from the Coonamessett and Santuit Rivers to Bourne Pond, Falmouth; and 338 herring from the Parker River in Byfield to Hood Pond, Topsfield. Additionally, 3,926 herring were moved upstream within the Jones River, Kingston.

Technical Assistance

Project staff provided technical assistance to local authorities, private organizations, the DMF Habitat Program (environmental permit review), and other agencies on topics related to diadromous fish resources. Numerous requests are received each year, especially during the spring, requiring a wide range of responses. Technical assistance associated with larger efforts in 2024 are described below.

Environmental Review: Staff biologists routinely provide technical assistance to the Habitat Program's review of environmental permit applications in diadromous fish runs. This activity includes field site visits and can involve extensive reviews of project designs and permit applications.

River Herring Habitat Assessment: DMF river herring habitat assessments are conducted over two years during May–September to assess the suitability of habitats for river herring life history and restoration potential, and to contribute to habitat and water quality remediation efforts. Two habitat assessments concluded in 2024 at Billington Sea, Plymouth and Pilgrim Lake, Orleans. Three new assessments began at the Cole River watershed in Swansea, Stony Brook watershed in Brewster, and the Ipswich River Watershed in Ipswich. Data processing continued with the goal of preparing assessment summary reports. The Back River assessment report was submitted to the DMF Technical Report series in September 2024.

Diadromous Fish Restoration Priority List/*Mass*DOT Diadromous Fish GIS Data Layer: Efforts continued to maintain and update the diadromous species GIS data layer, which documents the status of fish passageways and prioritizes restoration projects. Although the list focuses on passageways for river herring, other diadromous fish species and watershed connectivity are also taken into consideration. The data layer contains over 490 fishways, impediments, and potential restoration sites, ranked by restoration potential within the major coastal regions of Massachusetts. The GIS data layer was designed to support transportation infrastructure planning and environmental review activities conducted by *Mass*DOT/DMF and supports DMF and *Mass*DEP restoration planning. The data layer originated from the DMF fish passage survey of 2001/2002 that resulted in the first restoration priority list in 2005. After years of preparation, the data layer was published by MassGIS in 2023 (MassGIS Data: Diadromous Fish | Mass.gov).

Diadromous Fish Research Studies

Diadromous Fish Monitoring, Mill River: Project staff monitored migrations of multiple diadromous species at Taunton's Lake Sabbatia dam and fishway as part of a continuing cooperative restoration effort in the Mill River watershed. An underwater video camera at the fishway exit recorded fish passage and a collection tank at an eel ramp was checked daily from spring through summer. As part of the ongoing diadromous fish restoration-response in the Mill River, a lamprey redd survey was conducted in the Mill River and a mark/recapture study

was conducted in Lake Sabbatia in 2024 to estimate the eel population size using eel pot sampling and Passive Integrated Transponder tags.

American Shad Monitoring

Merrimack River Monitoring: American shad are monitored in cooperation with *Mass*Wildlife each spring/ summer at the Essex Dam fish lift on the Merrimack River in Lawrence, per ASMFC's Fishery Management Plan requirements. The count of American shad in 2024 decreased in comparison to 2023. This monitoring also includes other diadromous fish species. Project staff led an acoustic tagging project of American shad examining the passage efficiency of the fish ladder at the hydroelectric dam in Lowell.

Taunton River Monitoring: A cooperative American shad stocking project was initiated in the Taunton River with USFWS and *MassWildlife* in 2022. Over five million juvenile American shad were stocked again by USFWS in 2024 from May to June in five locations in the Taunton River. Taunton River monitoring for American shad continued in 2024 as part of the shad stocking project and included a continuation of pre-stocking beach seine and boat electrofishing. The beach seine survey targeting juvenile American shad was conducted monthly at five fixed locations along the Taunton River from June through October (Figure 50). Juvenile American shad were not caught during the 2024 seine survey. Shad were not caught during five years of pre-stocking seining; however, juvenile shad were caught in the first season of post-stocking seining in 2022 during three of the five seining trips.

Figure 50. Shad monitoring with a beach seine in the Taunton River.

American Shad Electrofishing Survey: In the spring of 2024, project staff completed the eighth season of monitoring the presence and abundance of American shad in the South River, Marshfield and Indian Head River, Pembroke. Monitoring was conducted in each river from the head of tide to the first obstruction using stream electroshocking surveys to detect the presence of spawning adult shad. During 2024, 16 sampling trips in the South River and 16 sampling trips in the Indian Head River were conducted between April and June; 12 and 117 shad were captured, respectively, for size, age, and genetic sampling. Scale-based aging indicated that these shad ranged from 4–8 years with some fish having spawned up to four times previously. Catch-per-unit-effort indices of abundance were calculated for each river. Monitoring is expected to continue in 2025 with the intent to develop biological and catch-per-unit-effort indices of population abundance.

American Eel Young-of-Year Monitoring

All U.S. east coast states conduct standardized monitoring of young of year (YOY) American eels under mandatory ASMFC protocols. DMF has monitored the spring migration of YOY eels in the Jones River (Kingston) using a Sheldon trap since 2001 and in the Essex River (Essex) with a fyke net since 2014 to contribute to a coast-wide index of eel population relative abundance. The Jones River trap YOY catch in 2024 was 6,843 eels with a catch-per-haul of 149, which is below the 24-year time series of 266 eels per haul. The Essex River fyke net catch continued its upward trend, setting record highs in both eels per haul (3,030) and a total number of eels

(81,821), which is the highest total captured at this site for the second year. High flows prevented setting the fyke for two weeks at the start of the run, which may have reduced the total catch while increasing the catch per haul. High glass eel catches continued at the Wankinco River and Pilgrim Lake eel ramps in 2024, following a trend of time-series high catches in the last few years at these sites. The Jones River YOY dataset was accepted as an index of abundance for the ASMFC eel stock assessment in 2012 and had been the only eel population index in Massachusetts until 2022. Data for the Saugus River eel ramp, the first eel ramp in coastal Massachusetts, were accepted by ASMFC as an age-1+ index of abundance for the 2022 eel stock assessment.

Project staff have fabricated and installed 13 eel ramps in coastal rivers since 2007 to provide eel passage over barriers. Most ramps are managed cooperatively with local groups and include a collection tank to evaluate the performance of the eel ramp and to monitor counts of YOY or older eels. Collectively, between the deployment of eel ramps and an increase in coastal river dam removals, juvenile eel passage has improved in some watersheds in the last 15 years.

Rainbow Smelt Population and Habitat Monitoring

Rainbow smelt population declines since the 1980s prompted DMF to initiate spawning run monitoring using in-stream fyke nets in 2004. This monitoring continues as an annual data series to provide a relative index of abundance and size and age data (Figure 51). The project currently maintains four stations at the Parker River in Newbury, the Fore River in Braintree, the Jones River in Kingston, and the Weweantic River in Wareham. The smelt catches in the Fore River continued to be the highest among stations in 2024 with 4,425 smelt, which is the second highest total catch observed and more than double the time-series average for catch-per-haul. Smelt catches at the other stations continue to show a significant decline with Jones River catching 82 smelt (3rd lowest in time-series) and the Parker River and Weweantic catching 2 and 0 smelt, respectively. Collectively, the fyke nets have caught over 40 species of fish in total, including 10 diadromous species, with potential indices of abundance for eel, white perch, Atlantic tomcod, and lamprey. The American eel bycatch data from the Fore River fyke net were accepted by ASMFC as a yellow eel index of abundance for the 2022 eel stock assessment.

Figure 51. A large rainbow smelt is measured during fyke net monitoring of the Jones River, Kingston.

Fish Passage and Habitat Restoration Projects

Numerous projects to improve and maintain diadromous fish passage, habitats, and populations are underway each year. In 2024, project staff devoted time to over 15 individual projects in various stages of development and implementation. It was a busy year for project development of several larger projects with technical assistance provided to 15 contracted, cooperative fish passage improvements. Additionally, six DMF Fishway Crew jobs were completed in 2024: four small, one-day projects and two larger fishway repairs.

DMF Fishway Crew

Diadromous Fish Restoration Funding: DMF received a budget allocation in 2024 to specifically support the efforts of the DMF Fishway Crew to advance diadromous fish habitat restoration. A Municipal Request for Responses was prepared to allow the transfer of these funds to towns in support of larger restoration projects.

Funds were provided to support five projects in 2024 and to buy materials for the following projects conducted during the fishway construction season (summer/fall). The Westport and Brewster projects listed below received DMF funding from this source. This funding also paid for the design and permitting of the Wings Pond, Falmouth, project listed below, design contracts for the War Memorial Park fishway reconstruction in West Bridgewater, and the design and permitting contract for the new fishway at Forge Pond Dam on the Jones River in Kingston.

Snuff Mill Dam, Parker River, Newbury: A vintage concrete weir-pool fishway at the Snuff Mill Dam on the Parker River needed a tune-up in 2024. The DMF Fishway Crew spent a day travelling to Newbury, removing debris from the fishway, and repairing concrete cracks. Large root balls were removed that had grown to such a large size that water depth in some pools was reduced, and weir notches were obscured to limit passage.

Pine Hill Farm Culvert, Acushnet River: A wood dam at Pine Hill Farm on the Acushnet River functions to back water up for a farm irrigation pump. The culvert board creates an elevation drop that can fully impede fish passage at lower stream flows. Working with the property owner, DMF designed a notch cut in the control board that would improve fish passage while keeping the pump intake submerged. Continuous depth loggers were deployed for the prior spring and summer migration seasons to aid in the design of the notch cut and to forecast pond level changes. The data analysis and project proposal were the largest component of the project, with only a few hours in the field to cut the board notch (Figure 52).

Figure 52. A notch is cut to improve fish passage at the Acushnet River dam in Acushnet.

Herring Creek, Aquinnah. The Aquinnah Wampanoag Tribe requested assistance with the relocation of their video counting station at Herring Creek. DMF designed and installed the initial in-stream video enclosure. The new location was at a culvert downstream of their Aquinnah Laboratory, recently installed to improve passage, counting, and aid harvest. DMF designed and fabricated the aluminum video closure frame to allow upstream and downstream passage at this tidal location. After several weeks of shop fabrication and welding, the installation took less than a day in March 2024.

Depot Pond, Eastham: The channel connection from Deborah's Pond to the 29-acre Depot Pond in the Herring Brook/Great Pond herring run has long been limited for fish passage due to low outflow, sediment shoaling, and vegetation growth. DMF worked with the Town of Eastham's Department of Natural Resources starting in 2009 to prepare grant applications to improve this passageway. In 2024, the DMF Fishway Crew conducted the needed improvements by grooming the downstream channel, removing a large root ball from the culvert, removing a sand berm from the Depot Pond outlet, and installing stop log board slots at the culvert to regulate outflow. The work was conducted by the DMF Fishway Crew under a Request for Determination at minimal cost with one day in the shop and one day in the field.

Monument River Fishway, Bourne: The DMF Fishway Crew teamed up with the Army Corps of Engineers to rehabilitate their fishway in the Monument River running along the Cape Cod Canal. The concrete weirs in this fishway were built in 1938 with several showing significant degradation. One was replaced in 2022, followed by high flows in the summer of 2023 that prevented in-water work. DMF returned in 2024 to replace the second degraded weir (Figure 53). The Corps provided funds for materials ($1,200) and much-needed crane and labor assistance. With tidal and river flows, water control at this site was difficult, with two pumps required along with upstream flow management for the 5-day job (3 field days and 2 shop preparation).

Figure 53. Replacing a weir in the Canal fishway in the Monument River, Bourne.

Wings Pond, Herring Brook, Falmouth: The signature restoration project of the DMF Fishway Crew in 2024 was the rehabilitation of the Wings Pond fishway in Falmouth. This in-stream fishway is located along a 400 ft stretch of Herring Brook connecting migrating herring from tidal waters to Wings Pond. The DMF Fishway Crew built the 10 concrete weirs in 1974 under a cooperative agreement with Handy Cranberry Farm family and the Town of Falmouth. Over time, stream flow, rising sea level, and foot traffic caused erosion of the brook channel and bank to bypass several weirs, resulting in low water depth for fish passage between weirs. Fifty years later, DMF entered into an agreement again with the Handy Cranberry Farm and Town of Falmouth to repair the fishway. One concrete weir was reformed, four were demolished and replaced with rock weirs, and three others had fiber rolls installed to repair the bank erosion (Figure 54). The project was conducted over three weeks in the fall and highlighted the DMF Fishway Crew's mini-excavator use, in-water experience, and fabrication skill. The Town of Falmouth provided valuable staff time to assist with manual labor. DMF restoration funds paid for all costs ($34,000 for design and permitting, and $3,500 for materials).

Figure 54. Fishway repairs at Wings Pond, Herring Brook, Falmouth.

Cooperative Restoration

Large Fish Passage Collaborations: There was much activity in 2024, in part due to large federal funding sources, on large fish passage collaborations, several of which involved significant dam removals in coastal rivers. DMF staff held a range of roles in these projects, from minor technical assistance related to fish passage requirements to active participation as project partners. For the Cape Cod region, the Natural Resources Conservation Service (NRCS) Cape Cod Watershed Restoration Plan had several projects under design in 2024. Large dam removal projects were ongoing in the Ipswich River, at the Talbot Mills Dam, Concord River, North Billerica, and Larkin Mill Dam, Parker River, Byfield. A large fishway project was in the advanced stages of design at Horn Pond in Woburn.

Fore River Watershed, Braintree: The last step in the multi-decade effort to restore diadromous fish to the Fore River Watershed was completed in 2024. Four locations prevented passage of river herring and other migratory fish from reaching native spawning and nursery habitat in Great Pond Reservoir and the upper watershed. The Armstrong and Ames Pond dams were removed in 2023 and a fishway was installed at the reservoir in 2017. A fishway was installed at Rock Falls in 2024 to complete the passageway (Figure 55). The project was led by the Town of Braintree, with long-term funding and technical assistance from DMF and *Mass*DER and funding assistance from several state and federal partners. As the construction site was active in the spring of 2024, thousands of river herring aggregated at the Rock Falls, unable to pass further. Much anticipation is focused on these fish moving upstream in 2025 for the first time in over 200 years.

Figure 55. The new fishway at Rock Falls, Fore River watershed, Braintree.

Sesuit Creek, Dennis: Two culverts on Route 6A were replaced under a *Mass*DOT project in 2024. These two culverts had long been a source of river herring passage impediments and fish kills as riprap stone and debris clogged the undersized culverts, trapping both adult herring in the spring and juvenile herring during emigration in the fall. Extensive coordination took place between DMF, *Mass*DOT, and the Town of Dennis to advance this challenging culvert replacement. Much of the site work was completed in 2024, with ongoing work needed to complete the project with associated staff monitoring and stream maintenance. This project was one of the highest-ranked restoration priorities for the Cape Cod region in the DMF Diadromous Fish Restoration Priority List and a good example of cooperative restoration related to *Mass*DOT infrastructure.

Stony Brook, Brewster: DMF allocated $40,000 to fund the Notice of Intent for the Stony Brook fishway construction project at the iconic Stony Brook Mill. This regionally important restoration project commenced late in 2024 with completion expected in the fall of 2025. The lower mill fishway weirs were last constructed by the DMF Fishway Crew nearly 40 years ago, and the upper mill fishway weirs were reconstructed by the Crew in 2011. DMF also provided technical assistance with the design of the lower mill weirs.

Forge Pond Dam, Westport River, Westport: The migration of diadromous fish to the 165-acre Lake Nochoquoke in Westport has been blocked by two dams for decades. DMF conducted diadromous fish monitoring and a river herring habitat assessment in Lake Nochoquoke to confirm species status and habitat conditions. DMF contracted the USFWS Fish Passage Engineering Team in 2021 to prepare a scoping design for a fishway at Forge Pond Dam. DMF then funded a Phase I engineering and fish passage improvement study in 2022 that was completed by GZA GeoEnvironmental, Inc., which was contracted again in 2023 to conduct the Phase II engineering study while advancing the fishway design at Forge Pond Dam. The Phase II study was completed by GZA GeoEnvironmental, Inc. in 2024. A scope was drafted in 2024 to start the design process for a fishway at the upstream impassable dam at Lake Nochoquoke. A public meeting was hosted by DMF at the Westport Grange Hall in November 2024 to inform the public and gather comments on Westport River fish passage improvements for diadromous fish.

Diadromous Fish Coast-Wide Survey

DMF began a survey of diadromous fish passage in Massachusetts coastal rivers in 2021 with a report in progress in 2024. The survey is an update of sea-run fish surveys first conducted by DMF's precursor, the Division of Fisheries and Game, and reported in Dr. David L. Belding's seminal report "Alewife Fisheries of Massachusetts" in 1921. The survey was next conducted in 1967 by DMF and repeated in 2001–2002. These surveys focused on fishways and dams in river herring runs. The surveys have been invaluable for documenting the status of sea-run fish in coastal rivers and making recommendations on improvements. The present survey update will broaden the focus to include additional types of fishways and more information on migratory habitats and other species. Further, the survey will be directly integrated into DMF's Diadromous Fish Restoration Priority List and the Diadromous Fish GIS data layer that was developed by DMF and *Mass*DOT and published in 2023 by *Mass*GIS. The integrated survey, priority list, and GIS Data Layer should become valuable tools for aquatic restoration, resiliency, and transportation planning at local, state, and federal levels.

River Herring Stream Channel Maintenance

Project staff routinely encounter stream channel blockages during field investigations and receive requests from towns to assist maintaining passageways for river herring. The work can involve developing cooperative plans for removing debris jams and excessive plant growth in channels or responding quickly during the migration season to remove blockages that threaten sea-run fish survival. Our Stream Maintenance Protocol for Diadromous Fish Passage provides coastwide guidance for these practices. A large cooperative effort was made with *Mass*DEP to develop a policy to connect the Wetland Protection Act to stream maintenance for diadromous fish runs; this policy was issued in 2022. New plans were prepared for Sesuit Creek in Dennis, Stump Brook in Halifax, and Alewife Brook in Essex in 2024. These plans and the Palmer River plan for Rehoboth were presented to the Conservation Commissions in those towns in 2024, finalized, and implemented with cooperative field work. Project staff worked in nine rivers with local partners in 2024, with a major effort in the Fore River in Braintree, to ensure fish passage was ready for the spring 2025 migration following the completion of restoration efforts.

Fishway Operation and Maintenance Plans, Permits and Memorandum of Understanding

The DMF Director issues Fishway Operation and Maintenance (O&M) Plans for all new and reconstructed fishways per the authority granted under Chapter 130, Section 19 of Massachusetts General Laws. The following O&M plans were issued in 2024: Great Pond Reservoir, Fore River watershed, Braintree (2nd draft); Acushnet Reservoir, Acushnet River, Acushnet; and Wequaquet Lake, Centerville River, Barnstable (2nd draft). DMF issues

Fishway Construction Permits following the review of engineering plans to construct, rebuild, or alter fishways. During 2024, Fishway Construction Permits were issued for Stony Brook, Brewster; Wings Pond, Falmouth; Larkin Mill Dam, Newbury; and the South River, Marshfield.

Other Activities

Technical Committee Participation: Staff actively participated on management and technical committees related to diadromous fish including the ASMFC technical committees for river herring, American shad, American eel, sturgeon, and fish passage. Annual ASMFC compliance reports were prepared for American eel, river herring, American shad, and Atlantic sturgeon. Staff also served on the NMFS River Herring Technical Expert Working Group, technical committees for the Connecticut River Atlantic Salmon Commission, Anadromous Fishery Management of the Merrimack River Basin, and ASFMC River Herring and Shad Stock Assessment Sub-Committee.

Presentations & Publications: Project staff are routinely requested to provide presentations related to diadromous fish to education, outreach, and constituency groups. Approximately 20 formal presentations were given by project staff in 2024, with participation in several other education/outreach events.

ADMINISTRATION

Kevin Creighton, Chief Fiscal Operator, Section Leader

Personnel

Finance
Darlene Pari, Accounts Payable Coordinator
Kim Trotto, Accountant III
Jeanne Hayes, Accounts Receivable Coordinator
Shannon Davis, Program Coordinator
Whitney Sargent, Procurement Coordinator

Administrative Support
Lynne Besse, Administrative Support
Vicki Oliveira, Administrative Support

Grants Management
Stephanie Cunningham, Fiscal Administration and Operations Manager (retired in September)
Cecil French, Project Leader – Clean Vessel Act and Boating Infrastructure Grant
Maren Budrow, Assistant Federal Aid and Grants Coordinator
Melanie Griffin, Project Leader – Revolving Loan Fund and State Fishery Management & Technical Assistance
Amanda Meli, Program Coordinator – Grants Specialist

Seafood Marketing
Wendy Mainardi, Marketing Coordinator

Scientific Diving
Vincent Malkoski, Diving Safety Officer

Capital Assets and Facilities Management
Brian Castonguay, Gloucester Office, Head of Facilities and Capital Assets
Lucas Cunningham, Gloucester Office, Facilities Support
Vincent Malkoski, New Bedford Office, Facilities and Capital Assets
Conor Byrne, Shellfish Purification Plant, Facilities and Capital Assets (through February)

Overview

DMF Administration is responsible for the Division's fiscal functions, grants management, capital assets, scientific diver management, and seafood marketing. Staff develops, analyzes, and manages the Division's financial planning and resource allocation activities, including budget submission to the Legislature. The program is responsible for collecting fees and reconciling revenue. Staff also provide all fiscal oversight and reporting on grants, contracts, and mitigation projects. Facilities and capital assets are procured, inventoried, managed, and maintained with the intent to provide a healthy and productive working environment. Seafood Marketing efforts support and promote Massachusetts seafood and the commercial fishing industry.

Budget

Overall, state-appropriated funds saw an increase of 7.91% from Fiscal Year (FY) 2023 to FY2024 (Table 27). The increase can be attributed primarily to personnel costs, an approved $150,000 expansion to the diadromous

fisheries program, and spending on the Salem Willows public access fishing pier.

The Legislature has created three retained revenue accounts for DMF, whereby funds from a particular source may be retained by the agency to expend for a particular purpose. The Sportfish Restoration account allows for the deposit of federal Wallop-Breaux reimbursements (a sportfish restoration program), which may then be spent on other Wallop-Breaux reimbursable projects. The Shellfish Purification Plant account allows for the deposit of funds collected from shellfish depuration and de-sanding at the Division's Newburyport facility, which may then be spent on the maintenance and operation of the plant. The Ventless Trap account allows for the deposit of funds generated from the sale of lobster permits, which are then used to fund research on commercially important invertebrate species. Funding from retained revenue accounts decreased by 1.58% in FY24, resulting from the continued decline of revenue generated by the Shellfish Purification Plant.

Appropriations from special fund accounts increased by 12.46%. The Legislature increased the appropriation for the Saltwater Sport Fish Licensing account to adjust for increased personnel costs and for the public access project to rebuild the Salem Willows Fishing Pier. This account is funded by recreational saltwater fishing permit sales and supports recreational fishery improvements. The Seafood Marketing Program, funded by revenue collected from the issuance of commercial fisherman and seafood dealer permits, remained level-funded.

Table 27. Fiscal Year 2023 and 2024 appropriations (available funds for operations).

Title	Acct. Number	FY2023	FY2024	Change
General Fund Accounts				
General Operating	2330-0100	[1]$7,835,313	[2]$8,411,345	+7.35%
Sportfish Program	2330-0120	$901,879	[3]$966,565	+7.17%
General Fund Total		$8,737,192	$9,377,910	+7.33%
Retained Revenue Accounts				
Sportfish Retained Revenue	2330-0121	$217,989	$217,989	0.00%
Purification Retained Revenue	2330-0150	$11,509	$3,934	-65.82%
Ventless Trap Retained Revenue	2330-0199	$250,000	$250,000	0.00%
Retained Revenue Total		$479,498	$471,923	-1.58%
Special Fund Accounts				
Saltwater Sport Fish Licensing	2330-0300	$1,854,417	$2,116,721	+14.14%
Seafood Marketing	2330-0104	$250,000	$250,000	0.00%
Special Fund Total		$2,104,417	$2,366,721	+12.46%
Appropriations Grand Total		**$11,321,107**	**$12,216,554**	**+7.91%**

[1] The final budget FY2023 in Chapter 126 of the Acts of 2022 for appropriation 2330-0100 was $9,523,813. DMF's general operating budget was affected by earmarks totaling $1,688,500 including $500,000 to SMAST; $175,000 for the Great Marsh Green Crab Trapping and Coastal Marsh Restoration Program; $150,000 for shellfish propagation in Barnstable, Dukes, and Nantucket counties; $80,000 to the Center for Coastal Studies for study of great white shark presence in nearshore areas of Cape Cod; $195,000 for the Gloucester Marine Genomics Institute for the study of harmful algal blooms; $75,000 for the Cape Cod Commercial Fishermen's Alliance to study winter flounder in partnership with DMF; $30,000 for sediment removal in the upper Nemasket River; and $500,000 for a program to assist commercial lobster fishery participants with the costs of equipment associated with the protection of right whales.

[2] The final budget FY2024 in Chapter 28 of the Acts of 2023 for appropriation 2330-0100 was $10,041,345. DMF's general operating budget was affected by: 1) earmarks totaling $1,625,000 ($550,000 to SMAST; $200,000 for the Great Marsh Green Crab Trapping and Coastal Marsh Restoration Program; $150,000 for shellfish propagation in Barnstable, Dukes, and Nantucket counties; $100,000 to the Center for Coastal Studies for a shark ecology program; $200,000 for the Gloucester Marine Genomics Institute to characterize the impact of offshore wind on economically important species using acoustic telemetry and eDNA; $50,000 for the Town of Saugus's Harbor Masters office to purchase a vessel; $375,000 for a grant program to assist commercial fishers for the purchase and maintenance of safety gear; 2) $381,114 made available from a reserve draw account to cover union raises; 3) $5,000 that was moved by ANF for the purpose of debt reduction; and 4) $150,000 supplemental funding approved for the diadromous fisheries program.

[3] The final budget FY2024 in Chapter 28 of the Acts of 2023 for appropriation 2330-0120 was affected by $58,739 made available from a reserve draw account to cover union raises.

Table 28 provides the breakdown of costs by primary spending category for the DMF operating accounts.

Table 28. FY2024 expenditures (including earmarks) by account type and primary spending category.

	General Fund	Retained Revenue	Special Fund	Total
Salaries	$7,671,282	$46,473	$454,627	$8,172,382
Employee Expenses	$25,738	$844	$7,127	$33,708
Contracted Employees	$76,790	$66,059	$327,618	$470,468
Contracts	$324,193	$238,243	$126,870	$689,306
Facility Maintenance	$70,041	$12,913	$408,919	$491,873
Field & Lab Supplies	$132,222	$51,166	$153,009	$336,397
Fringe Costs	$172,864	$2,226	$15,654	$190,744
Fuel	$48,006	$0	$0	$48,006
Utilities	$96,975	$0	$0	$96,975
Lease/Rent	$238,189	$0	$0	$238,189
Maintenance/Repair	$152,128	$17,249	$48	$169,426
Office & Administrative	$251,664	$32,241	$69,205	$353,109
Outside Agencies	$129,435	$2,233	$979	$132,646
Grants	$1,462,950	$0	$60,507	$1,523,457
TOTAL	**$10,852,478**	**$469,646**	**$1,624,562**	**$12,946,686**

Staffing

Staffing levels were static over the past year when comparing all account types (Table 29).

Table 29. Calendar Year 2023 and 2024 Authorized Personnel Levels.

Title	Acct. Number	CY2023	CY2024
DMF General Operating	2330-0100	75	71
Sport Fish Program	2330-0120	9	10
Saltwater Sport Fish Licensing	2330-0300	7	9
Federal Grants and Trust Account	2330-XXXX*	14	16
Total Employees in All Appropriations		**105**	**106**

*Multiple account numbers

Revenue

General Fund Revenue

DMF collects fees primarily from permit issuance. A total of 33,994 permits and endorsements were issued by the Permitting Project for the categories of commercial fishing, seafood dealers, and special permit types, producing General Fund revenue of $2,164,490 in 2024 (Table 30). Overall, there was a decrease in permit revenue collected by approximately 3% as compared to 2023.

Table 30. Calendar Year 2023 and 2024 General Fund Permitting Revenue.

Permit Categories	CY2023	CY2024	Change
Commercial Fishing	$1,254,325	$1,229,065	-2.01%
Seafood Dealer	$179,530	$177,840	-0.94%
Special	$799,120	$757,585	-5.2%
Total General Fund Permit Revenue	**$2,232,975**	**$2,164,490**	**-3.07%**

Dedicated Fund Revenue

In addition to General Fund revenue, DMF generated $1,822,655 in revenue for the Marine Recreational Fisheries Development Fund in 2024 (Table 31). Revenue is primarily from the issuance of recreational saltwater fishing permits but also includes direct donations to the fund and miscellaneous funds for programs such as MRIP. By law, all fees collected from the sale of recreational saltwater fishing permits, including permits issued to the for-hire fleet, are dedicated to the improvement of recreational saltwater fishing in Massachusetts. In 2024, the count of recreational permits issued was slightly up as compared to 2023 resulting in a modest gain of about 1% in revenue. A change to the online permitting system in 2024 made it easier for constituents to make donations to the Fund, and donation revenue increased 2.5 times as compared to 2023.

Table 31. CY2023 and CY2024 Marine Recreational Fisheries Development Fund Revenue.

Revenue Category	CY2023	CY2024	Change
Recreational Saltwater	$1,222,485	$1,234,770	+1.00%
For-Hire (charter & head boat)	$65,065	$64,675	-0.60%
Recreational Fund Donations	$16,723	$41,822	+150%
Other Sources (MRIP, Misc.)	$501,025	$481,388	-3.92%
Total Recreational Fisheries Fund Revenue	**$1,805,298**	**$1,822,655**	**+0.96%**

Grants

In FY2024, DMF spent approximately $6.75 million on mitigation projects operating out of the DMF Trust Account and federal grants. Although spending was up in most grant programs, overall expenditure in FY2024 was down by about 3% as compared to FY2023 (Table 32). The overall decrease in grant spending can be attributed to the completion of two grants in 2023: The Seafood Safety Program and an ACCSP grant.

Table 32. Fiscal Year 2023 and 2024 Expenditures.

Title of Federal Grant or Trust	Account No.	FY2023	FY2024
Clean Vessel Act	2330-9222	$902,000	$1,102,000
Fisheries Statistics	2330-9712	$212,000	$150,000
Interstate Fisheries	2330-9730	$219,000	$528,000
ACCSP	2330-9732	$15,000	$4,000
Turtle Disentanglement/Protected Species	2330-9739	$735,000	$822,000
Fish Age & Growth	2330-9742	$244,000	$298,000
Sport Fish Coordination	2330-9743	$72,000	$138,000
Sea Grant Lobster	2330-9745	$69,000	$17,000
Seafood Safety Program	2330-9746	$1,105,000	$0
Marine Fisheries Research Trust	2330-0101	$3,405,000	$3,698,000
Total		**$6,978,000**	**$6,756,000**

Massachusetts Shellfish Depuration Relief Program

On November 24, 2023, DMF suspended operations at its Newburyport Depuration Plant due to the destruction of its saltwater wells from severe coastal erosion. Subsequently, another storm in December inundated the

plant itself. Following a series of stakeholder meetings, DMF developed a multi-tiered approach to provide economic relief to the participants in the depuration fishery and evaluate options to potentially re-open the fishery. First, to determine the cost and feasibility of reopening the Depuration Plant, DMF initiated a study that included possible relocation of the saltwater wells and upgrades that would be required to make the plant more resilient to coastal storms. The results of the study determined that the plant could be reopened, but that necessary upgrades could cost more than $700,000. However, the longevity of the Plant was uncertain as continuing coastal erosion put a useful life expectancy of the Plant at that location of 20-25 years. Second, DMF developed a program to re-open the fishery by providing financial assistance to the diggers for the added cost of transporting their product to a nearby depuration facility in Eliot, Maine during the Newburyport Plant closure. And in the final phase, DMF secured funding to provide a temporary relief program to shellfishers who lost income due to the closure.

To qualify for the relief program, fishers must have held a 2022 or 2023 master or subordinate digger permit, have documented digging activity, had an average income from the depurated fishery during the qualifying period, and had to be in good standing with all state and federal regulatory agencies. The qualifying period included the years of 2020 to 2023 for the months of December through April in each of those years (which corresponds to the months the Plant was closed). DMF sent notice to all active permit holders informing them of the relief program and eligibility requirements for the program on May 8, 2024. There were 49 shellfish diggers active during the qualifying period, but only 23 were eligible for the relief program. DMF established an appeals process for any permit holder that did not agree with the information DMF had on file. In total, 20 payments were distributed to shellfish diggers ranging from $63 to $34,500. All payments were issued on July 15, 2024.

Massachusetts Commercial Safety Grant Program

The Massachusetts Commercial Fishing Safety Equipment Grant was created to help assist with the cost of purchasing commercial fishing safety equipment. The Massachusetts Legislature allocated $375,000 for a program to provide those engaged in commercial fisheries with grants for the purchase and maintenance of safety gear. To be eligible for the program, fishers must have held a state commercial fishing permit in 2023 and renewed for 2024, incurred safety-related expenses that were paid for on or after July 1, 2023, and must have documentation of the expenses. Eligible items for such grants included, but were not limited to, the purchase or servicing of life rafts, survival and exposure suits, personal flotation devices, man overboard recovery devices, and electronic signaling and tracking devices. Individual grant awards were capped at $3,000 and there was a requirement that grants be equitably distributed across various fisheries and the region. The applications included a brief description of the program, applicant-specific eligibility parameters, information on appeals, and details on steps to submit a complete application. In total, 709 fishers applied to the program, 12 were ineligible to receive funds, 10 qualified for partial funding, and 687 qualified for the total amount of funding requested. Once the application period closed, DMF conducted an audit on 42 randomly selected applicants to confirm submittal of eligible expenses. Payments were mailed out by DMF on the week of June 16, 2024. DMF worked in consultation with the Massachusetts Fishermen's Partnership and Fishing Partnership Support Services to efficiently distribute these funds to eligible fishers.

State Fishery Management & Technical Assistance

Staff provide technical assistance and support to the New England Fishery Management Council in the development, implementation, and monitoring of FMPs and Amendments. These cooperative activities enhance the management of fisheries occurring in the Territorial Sea and Exclusive Economic Zone. Since 2018, the Council has provided the Commonwealth with $80,000 biennially, split evenly between the two years. Beginning in 2022, the Council increased the biennial allocation to $90,000. The $45,000 allocated to state fiscal year 2024 (July 2023–June 2024) supported the Commonwealth’s participation in Council meetings and other Committee

meetings as well as in working groups, technical groups, and plan development teams. Some of this work is summarized in this annual report's Fisheries Policy and Management section. DMF also submitted to the Council a summary report of the State's technical assistance activities during the year.

The Revolving Loan Fund – Closeout

The Massachusetts Commercial Fisheries Revolving Loan Fund (RLF) Program was administered by DMF from 2013–2019 and has ceased operation due to limited utility. It was a federally funded program carried out under the joint oversight of DMF and NMFS. Both agencies, having an interest in promoting the effective implementation of catch-share programs in New England, intended the RLF to minimize potential adverse socio-economic impacts, especially on small-scale fishing businesses. Therefore, the RLF offered low-interest loans and ACE leasing opportunities to preserve fishing opportunities for small-scale fishermen.

To be considered small-scale and eligible for RLF assistance, a limited access multispecies permit holder had to meet the following eligibility criteria:

- A Massachusetts resident and/or the eligible fishing vessel is homeported in Massachusetts.
- No record of substantial federal or state permit sanctions or violations of any federal or state fishing regulations for at least the most recent three (3) year period.
- Ownership or majority ownership interest in three or fewer active fishing vessels.
- Enrolled as active in a groundfish sector for the current fishing year.
- Reported non-zero commercial groundfish landings for the most recent fishing year with finalized NMFS reporting.
- Has, for at least the previous fishing year, fishing trip duration of no more than 3 days (72 hours), but greater than zero, on average for all groundfish trips, as reported on the fishing vessel's Vessel Trip Reports.

These criteria must also have been met to qualify for a payment from the close-out of the RLF program. DMF sent notice to all eligible permit holders informing them of the upcoming payments on March 8, 2024. In total, 44 permit holders were eligible for close-out payments. Payments were determined by dividing the total amount of funds available for the project by the number of eligible permit holders. If an eligible permit holder had an outstanding loan through the program, that loan amount was deducted from their close out payment. All payments were issued on June 15, 2024.

The Clean Vessel Act Program

DMF administers the Clean Vessel Act Program (*Mass*CVA) to ensure that adequate, convenient pumpout facilities are provided to meet the needs of recreational boaters in Massachusetts coastal waters. This is achieved by monitoring the need for new or replacement coastal pumpout equipment and providing operation and maintenance funds to pumpout facilities offering free pumpout service to recreational boaters. Responsibilities include the identification of appropriate sites for needed pumpout equipment, providing technical assistance and information to boaters and others in need of *Mass*CVA information, and agency coordination with public and private parties.

In 2024, the 30th year of our participation, *Mass*CVA continued to support Massachusetts' status as a No Discharge Zone (NDZ). With the Massachusetts coastline's hundreds of bays, coves, and inlets, it is challenging to provide adequate shore-side pumpout support, especially with our short, intense New England boating season. Consequently, we have been a leader in the implementation of pumpout vessel use. Our matrix of pumpout vessels and shore-side pumpouts, along with dump stations, has created much wider boater access along the coast than twice the number of conventional shore-side facilities could have provided, and has been

instrumental in Massachusetts' establishment of a statewide NDZ. To date, the *Mass*CVA Program has kept over 10 million gallons of effluent from state coastal waters.

Our capital reinvestment program has enabled *Mass*CVA to expand with minimal cost to new pumpout operators that lack the capital for investment in new infrastructure. Through this program, when an operator replaces an existing *Mass*CVA pumpout boat or fixed-location station, the replaced equipment can be provided to another new or existing operator who can pay to have it refurbished at a fraction of the cost of new equipment.

In 2024, our CVA-funded pumpout facilities included 46 private marinas, one non-profit organization, and 49 cities and towns. *Mass*CVA staff stayed in close contact with all our pumpout operators, assessing programmatic needs. We addressed existing equipment concerns and facility growth requests as allowed by available federal funds (Table 33, Figure 56). Total reimbursement for all new and replacement equipment was $393,321.94. An additional $511,392.52 was spent on facility operation and maintenance costs in support of 65 pumpout boats, 83 fixed-location pumpout stations, and 13 mobile pumpout carts available to the recreational boating public along the Massachusetts coastline. Recreational boater outreach remained a critical component of *Mass*CVA. Over 8,000 pumpout location guides were distributed to the public at marinas and other boating or fishing-related outreach events.

Table 33. New and Replacement *Mass*CVA Infrastructure, 2024.

Recipient	Equipment
Barnstable	Replacement pumpout station
Beverly	Replacement pumpout boat
Dartmouth	Replacement pumpout boat engine
Duxbury	Replacement pumpout boat
Harwich	Replacement pumpout station
Ipswich	Replacement pumpout boat engine
Manchester Marine	Replacement pumpout cart
Marion	Replacement pumpout cart
Marshfield	Replacement pumpout station
Oak Bluffs	Replacement pumpout station
Plymouth	Replacement pumpout boat
Scituate	Replacement pumpout station
SHM Vineyard Haven	Replacement pumpout station
Tisbury	Replacement pumpout station/pump
Watertown Yacht Club	Replacement pumpout station
Yarmouth	Replacement pumpout boat engine

Figure 56. Beverly Pumpout boat at work keeping Massachusetts waters clean, funded by DMF's Clean Vessel Act.

Boating Infrastructure Grant Program

The Massachusetts Boating Infrastructure Grant Program (*Mass*BIG) is a two-tiered federal grant program, directed through the USFWS and administered by DMF. *Mass*BIG is funded by the Sport Fish Restoration Fund which in turn is funded by a small percentage of the Federal Gasoline Tax (an amount representing fuel purchased by boaters across the nation). *Mass*BIG is designed to provide grants to upgrade or install facilities for transient recreational boats 26 feet or more in length at public or partnered private facilities.

Under Tier I, *Mass*BIG may receive funding for eligible projects up to $300,000 annually. Proposed projects filed under Tier II can be much larger in scope, but unlike Tier I, Tier II proposals are judged in a nationally

competitive process based on a strict point system. Both grant tiers are reimbursement grants, meaning that payments are made upon the submission of invoices for work accomplished. Selected applicants provide at least a 25% match for Federal funds received. All payments are based on 75% reimbursement of invoices from work completed.

During 2024, one Tier II BIG grant was under construction for the town of Manchester by the Sea. The Tier II project extends the existing *Mass*BIG-funded dock to accommodate additional transient boaters (Figure 57). The $600,000, three-year grant proposal project includes the construction of an additional 500 feet of transient boater dock, including electrical service and water service (to both old and new tie ups), and an additional fixed pump-out station at the facility. This project helps address the ongoing significant lack of transient docking opportunities available in Manchester Harbor, and the greater Cape Ann region.

The City of Fall River applied for a Tier I BIG grant in 2024 to construct 15 transient boater moorings and a 475-foot dinghy dock at the Senator Thomas Norton City Pier on the Taunton River. If awarded, the project will improve transient boater access to the City of Fall River.

Figure 57. Barge installs Manchester by the Sea transient boater floats and piles funded by DMF's *Mass*BIG.

Seafood Marketing

DMF's Seafood Marketing Program seeks to increase consumer awareness and preference for local seafood products. The program supports the state's commercial fishing and seafood industries and communities. Its programming is supported in large part by revenue collected from the issuance of commercial fisherman and seafood dealer permits.

Marketing and Outreach

New England Restaurant and Bar Show: For the third year in a row, the Seafood Marketing Program led the Massachusetts Seafood Pavilion at the New England Restaurant and Bar Show (previously the New England Food Show) in February. More than a half dozen seafood businesses were featured.

Seafood Expo North America: The Seafood Marketing Program organized and promoted "Mass Ave." at Boston's Seafood Expo of North America in March. Mass Ave. is made up of local businesses that have received 50% cost-share for the show through the MDAR and the USDA. The Seafood Marketing Program promoted its work and local businesses while providing educational materials to visitors at its own table at Mass Ave.

Mixed Media Advertising: In response to the People for the Ethical Treatment of Animals (PETA) purchasing advertising on a Martha's Vineyard/Woods Hole ferry that read, "Did your lobster kill a whale?", the Seafood Marketing Program purchased counter-advertising on the same boat with the message, "Our Massachusetts fishing families thank you" (Figure 58). The Seafood Marketing Program also created a new children's pamphlet in 2024. This includes a word search, a crossword puzzle, a word scramble, a maze, and a name that fish game (Figure 59). Feedback has been overwhelmingly positive to both these initiatives. Following the Monterey Bay

Aquarium red-listing of Jonah crabs, DMF wrote a letter of support to be used by companies selling Jonah crabs to large food retailers to increase sales and support the fishery.

Figure 58. DMF's response advertisement following a PETA campaign against the lobster industry.

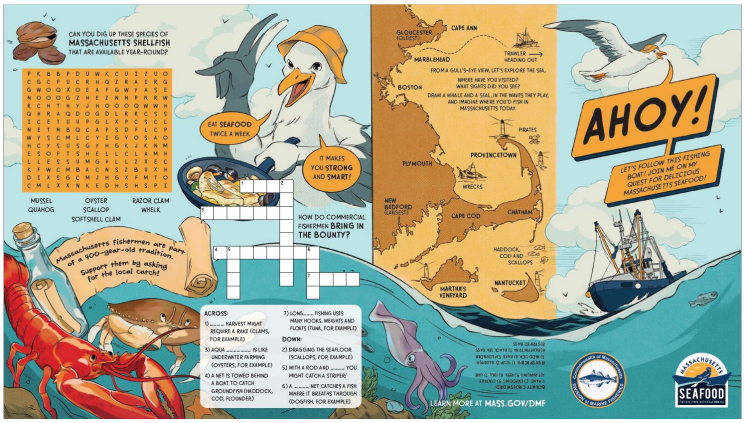

Figure 59. Seafood Marketing program's new children's pamphlet.

The School Nutrition Association's Annual National Conference: The Seafood Marketing Program worked in partnership with the Gulf of Maine Research Institute and MA Farm-to-School on two sold-out preconference workshops "Dive into Sea-to-School" at the School Nutrition Association's Annual National Conference in July. DMF moderated the panel at the workshop and took the group on a tour of the Boston Fish Pier.

Topsfield Fair: The Seafood Marketing Program has been focusing on flatfish, Jonah crab, and bluefin tuna. A consumer survey was conducted at the Topsfield Fair, held in October 2024, as part of this work. DMF received survey responses from 100 individuals. Some key results for flatfish are in Figure 60.

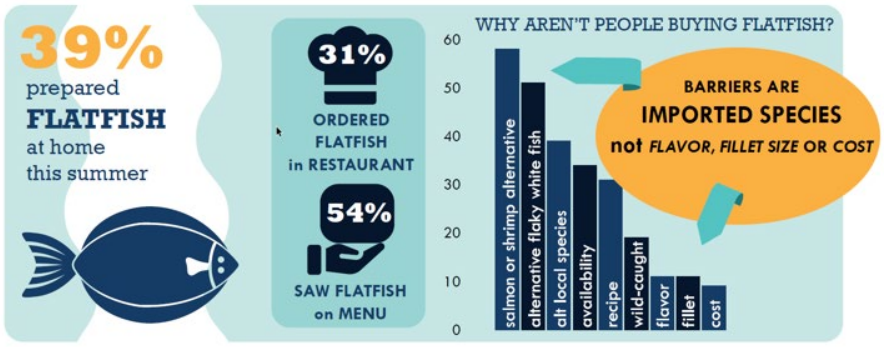

Figure 60. Results relevant to flatfish from the consumer survey given to visitors at the Topsfield Fair in October 2024

Seafood Day at the Statehouse: In the fall, the Seafood Marketing Program attended Seafood Day at the Statehouse.

Steering Committee: A Seafood Marketing Program Steering Committee meeting was held virtually on October 30. Seth Rolbein, Senior Outreach and Policy Advisor for the Cape Cod Commercial Fishermen's Alliance, was a guest speaker, and the meeting was well attended. The meeting began by honoring State Representative Susan Williams Gifford who had recently passed. The Committee also reviewed staff's analysis of the Food Security Infrastructure Grant program (see below).

Grant Program

The Seafood Marketing Program has been involved with the Food Security Infrastructure Grant (FSIG) program since the beginning of the program in 2020. More specifically, staff reviews FSIG grants, advocates for funding to go towards seafood industry projects, and acts as liaison to the grant administrators at MDAR. During 2024, staff also conducted analysis of the impact of FSIG on the seafood industry and presented data to the steering committee. The results document the commercial fishing and seafood industry's interest in the FSIG and success of the program in benefiting fisheries. While fisheries-related applications have generally decreased since 2020, the number that have been funded has increased, and the proportion of submitted applications that get funded for fisheries-related projects exceeds the proportion across all categories of projects combined. In 2024, of $11-million requested by fisheries, $8-million was funded. This compares to $41-million requested across all categories, of which $25 was funded. The amount and percentage of funds awarded to fisheries has increased across the years (Figure 61).

Figure 61. Percent of fisheries funding received compared to all other possible categories through 2024 (categorized as 2025).

Scientific Diving

Figure 62. DMF diver surveying eel grass on an exceptionally clear day.

Scientific Diving is responsible for managing all scientific diving activities conducted by DMF. First organized in 1972, the program has evolved to meet the standards of the Occupational Safety and Health Administration's Scientific Diving exemption. This structure sets high standards for DMF's training and dive operations, affording Division divers greater protection from accidental injury and helping to ensure the success of research performed by diving.

DMF's scientific divers conducted over 492 research dives to support on-going research and monitoring programs, including artificial reef site surveys, benthic temperature monitoring, early-benthic-phase lobster suction surveys, eelgrass monitoring and restoration, shellfish abundance and habitat surveys, maintenance of acoustic telemetry receivers, polychlorinated biphenyl monitoring sample collection, and dive program training (Figure 62). In 2024, the agency introduced scientific skin diver training and dives for eel grass habitat work done by two seasonal employees who logged 19 dive days with a total of 102 dives. In addition to DMF divers, staff manages the activities of scientific divers from *Mass*Wildlife, *Mass*CZM, the Massachusetts Board of Underwater Archeology, and UMass Dartmouth. DMF Scientific Diving Program also maintains reciprocity agreements with the U.S. EPA, Boston University, the Marine Biological Laboratory, NOAA, Northeastern University, and Woods Hole Oceanographic Institution, permitting cooperative diving research.

Routine maintenance and replacement of DMF diving equipment continued in 2024 at a cost of nearly $10,000. Sixty air cylinders were inspected in-house, saving $1,500. Additionally, in-house first responder training was provided for 36 DMF & SMAST divers, dive tenders, and boat operators, as well as nine *Mass*DFG staff. This

amounts to savings of $9,000.

The Diving Safety Officer contributed to DMF educational and outreach efforts and continued to serve on the boards of the American Academy of Underwater Sciences Foundation, Bay State Council of Divers, the Foundation for Underwater Research and Education, and the Our World Underwater Scholarship Society.

Work continued on a multi-year effort to collect marine life in and around New Bedford Harbor in partnership with *Mass*DEP to support EPA's Superfund monitoring efforts; collection includes SCUBA, deployment of fish pots, and use of other common gear for collection of both finfish and invertebrate species. In addition, the DSO served on the EEA Health and Safety Team, the Pilgrim Nuclear Power Station Decommissioning Committee, and as a DFG representative to EEA's MA Ingestion Pathway Team for responses to potential releases from Seabrook Station in New Hampshire.

Capital Assets and Facilities Management

Facilities

DMF maintains facilities at several locations throughout the state. The two primary field stations are in Gloucester and New Bedford, with smaller facilities that include the Shellfish Purification Plant in Newburyport, the Cat Cove Marine Laboratory in Salem, a storage and field support facility in New Bedford, and a subsidiary field office and storage facility in Sandwich.

In FY2024, DMF continued outdoor renovations of the 50-year-old Cat Cove Marine Laboratory, which included new exterior lighting, demolition of dilapidated buildings, installation of a new shed, repaving and relining of the parking lot, and installation of an EV charging station. Other major projects at the Gloucester facility included the installation of high efficiency boilers, asbestos remediation and new flooring, an upgraded walk-in freezer, and general upgrades to electrical and plumbing systems. DMF also purchased a new SCUBA air fill station for the Gloucester office, was able to replace aging safety equipment on several vessels and acquire several pieces of state-of-the-art scientific equipment. In total, DMF spent over $750,000 on facility planning, infrastructure maintenance, emergency repairs, vessel maintenance, and upgrading scientific instruments.

Vehicles and Boats

DMF maintains a fleet of 35 vehicles and 16 boats. In 2024, $153,000 was paid to the Office of Vehicle Management (OVM) for lease vehicles, and an additional $50,000 was spent on maintenance and repairing all stock. OVM is working to both reduce and "green" the overall size and composition of the fleet of vehicles operated by the Commonwealth in compliance with Executive Order 594. To meet those goals, benchmarks have been established that require 5% of the Commonwealth fleet of vehicles to be EV by the end of FY2025 and 20% by the end of FY2030. To meet those goals DMF has been switching from combustion engines to EV wherever practical and possible. Through 2024, 22% of the DMF fleet are EV.

DMF continued the vessel maintenance program that began in 2019. The total cost of upgrades, replacements and general maintenance was more than $80,000 for 2024.

Appendix A. 2024 Publications

DMF Technical Reports

TR-84: **Nelson, G. A**. 2024. Massachusetts Striped Bass Monitoring Report for 2023.

TR-82: **Sheppard, J.J.,** and **B.C. Chase**. 2024. Massachusetts American Shad and River Herring Monitoring Report: 2019.

Contributions

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