UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northeast Fisheries Science Center
166 Water Street
Woods Hole, MA 02543-1026

20 March, 2026

New England Fishery Management Council
50 Water St No. 2
Newburyport, MA 01950

To the SSC,

In this memo we list comments and requests received on the 2019-2025 State of the Ecosystem (SOE) reports, and how we responded to those requests. We include comments from both Councils because adjustments to the report were made in response to both. We welcome feedback on whether this memo is useful and how to improve it for future SOE reporting.

This year, the memo is reorganized into three tables. Table 1 shows all completed requests, Table 2 shows all pending requests, and Table 3 shows all request removed from tracking. Request priorities and the decision that items were out of scope for the SOE were discussed with both Councils' SSCs during a July 2025 prioritization meeting.

The SOE team is also requesting that the Council and SSC consider some of the following items relating to recent changes to the SOE

1. **Performance metrics**: For each management objective category are the performance metrics clearly articulated and are the metrics used appropriate?
2. **Specific objectives and indicators**:
   - The framework of the *Stability objective* has been revised for both ecosystem and fishery indicators to focus on *Changes From Baseline*, *Adaptive Capacity*, and *Volatility*.
   - Does this reframing of stability better address the Council needs? Comment on how they could be refined
3. The SOE team has integrated **ocean model forecasts** from MOM6 into an SOE graphic summary
   - Are presenting forecast information as probabilities of deviating from historical average a useful format for the Council? Are there other reference points or "events" that could be used instead of historical averages?
   - How should uncertainty be discussed alongside observations?
   - Are there any research questions or Council decisions that forecast information could assist?

We welcome comments on the entire SOE report as well as information included in this memo, and look forward to feedback from the SSC and Council.

Sincerely,

Joseph Caracappa, PhD
Research Fishery Biologist
Ecosystem Dynamics and Assessment
Branch
Northeast Fisheries Science Center

encl: State of the Ecosystem 2024: Request Tracking Memo

cc: Jon Hare

State of the Ecosystem 2026: Request Tracking Memo

Introduction

In this document, we summarize a running list of comments and requests from the Mid Atlantic Fishery Management council (MAFMC), New England Fishery Management Council (NEFMC), and both Science and Statistical Committees (SSCs). The memo is organized by task based on its current status and topic category. The Priority column (formerly called Rank) has been updated based on quantitative scoring guidelines that were developed following the publication of 2025 State of the Ecosystem (SOE) reports. Priority determination methods and scores were discussed with Council staff and SSC members at the July 2025 State of the Ecosystem Prioritization meeting. We first show requests that have been completed as of the 2026 SOE reports (Table 1), research requests that are in progress or not yet started (Table 2), and requests that have been removed from tracking due to being out of scope or not well-defined (Table 3).

Table 1: Requests that have been completed as of the 2026 State of the Ecosytem reports.

Request	Year	Priority
SOE admin		
Include estimates of inclusion years in request memo	2022	Lowest
System level thresholds/ ref pts		
Trend Analysis	2019 - 2024	Highest
Multiple system drivers		
Profits vs Revenue: net revenue indicator incomplete and different trend from gross	2023-2024	Highest
Clarify objectives, terminology and presentation for fishing community engagement/reliance/social indicators	2022, 2024	Highest
Time series of social indicators	2023-2024	Highest
Consider appropriate scale for social and economic indicators	2024	Highest
Add social and economic considerations in the Climate and Ecosystem risks section	2024	Highest
Clarify community definitions and consider indicators beyond landings to employment, subsistence	2024	Highest
Include community affordability in port level vulnerability	2024	High
Report changes in small fish and large fish biomass along with production anomalies	2024	Moderate
Relate OA to nutrient input; are there "dead zones" (hypoxia)?	2021	Low
Estuarine Water Quality	2020	Low
What determines a "risk"? Include aquaculture as a risk?	2022	Unranked

Table 2: Remaining research requests for the State of the Ecosystem reports.

Request	Year	Status	Priority
Short term forecasts			
Short term forecasting from CEFI (water temp, productivity); Characterize current conditions in context of expected short term change	2022, 2024, 2025	In progress	Highest
Using phytoplankton trends to forecast fish stocks	2022	Not started	Moderate
Management			
Ensure that indicators are formatted in a way that is useable for risk work	2024	Not started	High
Management complexity	2019	In progress	Moderate
Recreational bycatch mortality as an indicator of regulatory waste	2021	Not started	Moderate
Functional group level status/ thresholds/ ref pts			
Biomass+landings trends by (aggregated) Council managed species, stock status, cold vs warm water spp	2024	In progress	High
VAST	2020	In progress	Moderate
Expand HMS and rec indicators to include tunas and commercially caught HMS species to explore further evidence of distribution shifts	2025	In progress	Moderate
Consider expanding species included in seabird productivity indicators–Roseate tern	2024	Not started	Low
Seal index, Apex predator index (pinnipeds, time series of marine mammal species abundance	2020, 2021, 2024	In progress	Low
Stock level indicators			
Include cross references to stock specific products (ECSA/ESP), ensure consistent approaches; Establish more links between events and consequences (e.g. temp ranges for more species)	2024	In progress	Highest
Shellfish growth/distribution linked to climate (system productivity)	2019	In progress	Moderate
Indicator of scallop pred pops poorly sampled by bottom trawls	2021	Not started	Moderate
Update text around NARW trend drivers, specifically recent stabilization (for PSD)	2024	Not started	Moderate
Evaluate if NARW hotspots changing over time	2024	Not started	Low
SOE admin			
Present relevant MA information in NE report	2025	In progress	Highest
Improve context and definitions of Management Objectives	2025	Not started	Highest
Include statement on reliance on contributors for evaluation of data quality	2024	Not started	High
Establish criteria for inclusion of events in the Year Highlights section	2024	In progress	High
Present the SOE highlights page to Advisory Panels for feedback	2025	Not started	Moderate
SOE usage tracking	2022-2023	In progress	Low
System level thresholds/ ref pts			
Ecosystem Overfishing Indicators: compare to empirical thresholds; assess informativeness of indicators using simulation analysis; assess impact of phytoplankton size composition on EOF thresholds; determine optimum yield	2021-2024	In progress	Highest
Develop regime shift analysis methods (e.g., inflection point analysis, influence statistics, break point analysis, early warning variance)	2019-2025	Not started	Highest
Conduct regime shift analysis of relevant indicators (e.g., zooplankton, forage fish, socioeconomic, etc). Use influence statistics to identify whether we are approaching tipping points.	2019-2025	Not started	Highest
Use community and port level information to inform fleet stability indicator	2025	In progress	Highest
Update CVA and explore trend changes when a new CVA is applied	2025	In progress	Highest
Include standardized language about uncertainty from e.g. IPCC or NCA applicable to each indicator or data input	2024	Not started	Highest
Create volatility indices to assess system stability	2025	Not started	High
Improve language around status and trends (e.g., assumed baselines, contextualize long v short trends, contextualize local influences)	2025	In progress	High

Table 2: Remaining research requests for the State of the Ecosystem reports.

Request	Year	Status	Priority
Sum of TAC/ Landings relative to TAC	2021, 2024	In progress	High
Present normalized indicators to more clearly show variability; incorporate into assessment of system stability	2025	Not started	Moderate
Explore stock assessment indices as measure of stability	2025	Not started	Moderate
Better evaluation of one-time observations (i.e. address persistence of observations)	2025	Not started	Low
Nutrient input, Benthic Flux and POC (particulate organic carbon) to inform benthic productivity by something other than surface indicators	2021, 2023	Not started	Low
Multiple system drivers			
Evaluate port level landings considering home port vs out of state vessel landings	2024	Not started	High
Consider including indicators of predator prey relationships / predator pressure	2024	In progress	High
Young of Year index from multiple surveys	2019	Not started	High
Tell Social stories like we try to tell biological stories	2022	Not started	High
Vessel-level diversity vs fleet level diversity. Recontextualize fishery stability as adaptive capacity/flexibility.	2023	In progress	High
Distribution shifts: percent of species shifting in similar directions and magnitude of the change, id cross jurisdictional shifts	2024	In progress	High
Relate declining commercial landings to interactions with Council and non-Council species. Especially focus on larger vessels with multiple permits that can shift fishing targets from year to year	2025	Not started	High
Assess if species distributions and processing capacity are drivers of profitibility	2025	Not started	High
Linking Condition	2020	In progress	Moderate
New diet indicators: average weight of diet components by feeding group, mean stomach weight across feeding guilds	2019	Not started	Moderate
Cumulative weather index	2020	In progress	Moderate
Modeling cold pool/warm core ring and wind development interactions	2022	Not started	Moderate
Impact of climate on data streams (changes in catchability of survey)	2022	In progress	Moderate
OA linked to scallop harvest in areas where aragonite saturation is highlighted.	2023	Not started	Moderate
Stability indicator - yield over time in NE	2023	Not started	Moderate
Inclusion of upcoming HMS climate vulnerability assessment	2023	Not started	Moderate
Aggregate surplus production and avg length of inds at recruitment age to productivity section	2024	Not started	Moderate
Consider HMS recreational effort in effort trends	2024	In progress	Moderate
Changing per capita seafood consumption as driver of revenue?	2021	Not started	Moderate
Decomposition of diversity drivers highlighting social components	2021	Not started	Moderate
Assess connection between community vulnerability indicators and recreational fleet diversity and shore-based fishing mode	2025	Not started	Moderate
Assess if there is generational shift in fishing activity; test if this is linked to shore-based fishing	2025	In progress	Moderate
Capture risks to climate for shore anglers in cultural objectives/risk metrics	2025	Not started	Moderate
Qualify the linkage between slope water and cold pool persistence	2025	Not started	Moderate
Investigate the role of spatial distribution of costs and consolidation of industry into fewer ports	2025	Not started	Moderate
Explore the impact of changed timing on reproductive success, climate change vulnerability and recruits	2025	Not started	Moderate
Links between species availability inshore/offshore (estuarine conditions) and trends in recreational fishing effort?	2021	In progress	Low
Track subsequent impacts of 2023 phytoplankton bloom in GOM. Track anomalous events from previous years.	2024	In progress	Low

Table 2: Remaining research requests for the State of the Ecosystem reports.

Request	Year	Status	Priority
Consider and account for the role of labor in cost calculations	2025	Not started	Low

Table 3: Requests that have been removed from tracking due to being out of scope or not well-defined.

Request	Year
System level thresholds/ ref pts	
Reduce indicator dimensionality with multivariate statistics	2020
Management	
Re-evaluate EPUs	2020
conduct a tradeoff analysis to determine which management objectives have the largest impact and should be prioritized for monitoring, similar to the summer flounder MSE.	2025
Identify technical interactions within fisheries so management does not cause underfishing	2025
Multiple system drivers	
Inclusion of additional environmental justice indicators from National Academies	2024
Consider state managed fishery production instead of recreational shark harvest	2024
Consider HMS predation pressure	2024
Indicators of chemical pollution in offshore waters	2021
Estuarine condition relative to power plants and temp	2019
Functional group level status/ thresholds/ ref pts	
Uncertainty	2020
Biomass of spp not included in BTS	2020
Stock level indicators	
Sturgeon Bycatch	2021
SOE admin	
Include estimates of inclusion years in request memo	2022
More frequent indicator updates in web based product	2024

Quantitative priority rating criteria

In order to use time more effectively, we developed criteria to guide and speed up the prioritization of requests. These criteria are framed around the impact of the request on the scientific content of the SOE, combined with the impact on fisheries management decision making, regardless of currently available resources. Improvements to the scientific content of the SOE were considered on the ecosystem scale, not on the scale of how that information would affect a single species. Impact on management decision making was characterized as how well the information would fit into a well-defined on-ramp into the management process, such as a risk assessment. Requests that had been previously ranked as "lowest priority" were re-assessed according to the new criteria, and were removed from the tracking list if the request was out of scope or not well-defined.

The new priority definitions are:

- Highest: Significant scientific improvement to the SOE **and** maximum impact on management decision making
- High: Significant scientific improvement to SOE **or** maximum impact on management decision making
- Moderate: The impact on management decision making is unclear, but potentially impactful
- Low: Negligible scientific improvement to SOE and minimal impact on management decision making

Please note that some requests are currently marked as "low priority" due to the imprecise or vague wording, which could be updated in the future if the request is made more specific. All rankings can continue to be discussed and refined in the next SOE Prioritization meeting.

Overview of requests

Request categories

This memo is organized into categories by topic. The former category called "Regime shifts" has been absorbed into the "System level thresholds/reference points" category. The ability to work on requests subject to resource limitations and staffing. The request categories are:

Short term forecasts Includes requests for biological and environmental forecasts, including MOM6 oceanographic model products.

Management Includes analyses related to management performance.

Stock level indicators Includes requests for information on the scale of a single species or stock. Requests for this information may be more appropriately directed to stock specific ecosystem products such as Ecosystem and Socioeconomic Profiles (ESPs).

Functional group level status/thresholds/reference points Includes requests for information on the scale of functional groups or guilds.

SOE admin Includes requests relating to the structure and methods of the creation of the SOE reports.

System level thresholds/reference points Includes requests to develop analytical methods that can be applied across all indicator types and operationalized for management advice.

Multiple system drivers Includes requests for information about oceanographic, ecological, social, and economic processes that impact fisheries.

We welcome further feedback on planned and continuing work.

Adjustments to general SOE report structure

Based on feedback and requests for information surrounding our Stability section, we revised both the ecosystem and fishery stability sections to focus on Changes From Baseline, Adaptive Capacity, and Volatility. This reframing is intended to better communicate how the system has changed from historic observations, how well-prepared the system is for future change, and how variable the system is.

We have retained and updated the online indicator catalog that provides a "deep dive" into each indicator, with multiple visualizations of the data and clearer links to the datasets in the ecodata R package for increased transparency and ease of use by investigators throughout the region. We are also updating the online technical documentation.

Summary of completed requests by category

SOE admin

We have reformatted the memo to identify which requests have been completed in the last year, as well as which requests have been dropped from future tracking.

System level thresholds/reference points

A refined trend analysis is now systematically incorporated into the SOE and the ecodata R package. Both long-term and short-term trends are assessed and plotted if statistically significant at the $p < 0.05$ level. To minimize bias introduced by small sample size, time series with less than 30 years are assessed using the short-term trend methodology applied over the extent of the time period.

OA and hypoxia indicators have been developed through collaboration with the FishBot team. Estuarine water quality is described in the Chesapeake Bay Water Quality Standards Attainment catalog page.

Multiple system drivers

The profitability indicator developed by Geret dePiper has been incorporated into the report for the second year in a row, and this request has been removed from tracking.

Experts from the Social Sciences Branch contributed edits, information, and updated methods to the fishing community social indicators. Part of this effort included the development of time series of fishing activity by port. We have also begun including Committees at Sea indicators for both regions to address alternative community definitions. Although methods will continue to be updated, we consider the basic requirements of the social indicator requests to have been met and remove them from tracking.

Aquaculture has been added to the Other Ocean Uses section of the reports. We will continue to expand this section in future reports.

Productivity anomaly indicators have been included for small fish to large fish biomass and recruitment anomalies from stock assessments.

Requests in Progress

Of the 90 requests we are actively tracking, 28 of them are currently *in progress*. Instead of providing a detailed summary of the status of each request, below is a high level summary of the ongoing activities that we are aware of. The following activities represent active work that relates to specific requests, but is not comprehensive of all research being done elsewhere.

SOE admin

The SOE Team has been expanding the reach of their SOE Highlights section and is planning on revising the inclusion criteria following a workshop during the 2026 Cooperative Research Summit.

System level thresholds/reference points

The revision of the Ecosystem and Fishery Stability section has led to discussions about how to add or modify existing indicators to better suit this definition. Research on ecosystem overfishing is also being conducted with ecosystem models that may lead to revisions to prior ecosystem overfishing indicators and the establishment of ecosystem thresholds in the SOE. As work concludes on the Climate Vulnerability Assessment (CVA) 2.0, the SOE Team is considering how to develop related indicators.

Multiple system drivers

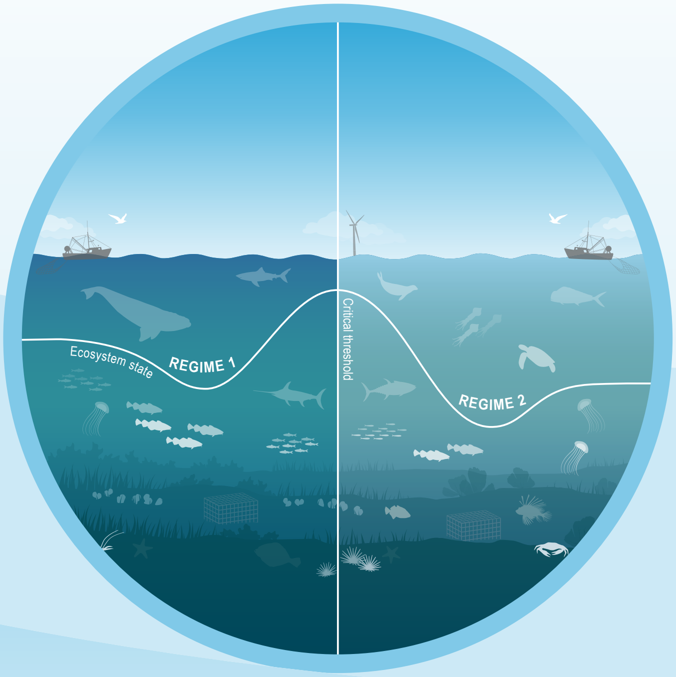
There is ongoing research at the NEFSC on fishery adaptation strategies, demographic shifts, and shifts in fishing behavior that may lead to future indicators. Species distribution models from the CVA2.0 may address requests to quantify species distribution shifts. Work continues to evaluate changes in social and ecosystem changes relating to highly migratory and protected species.

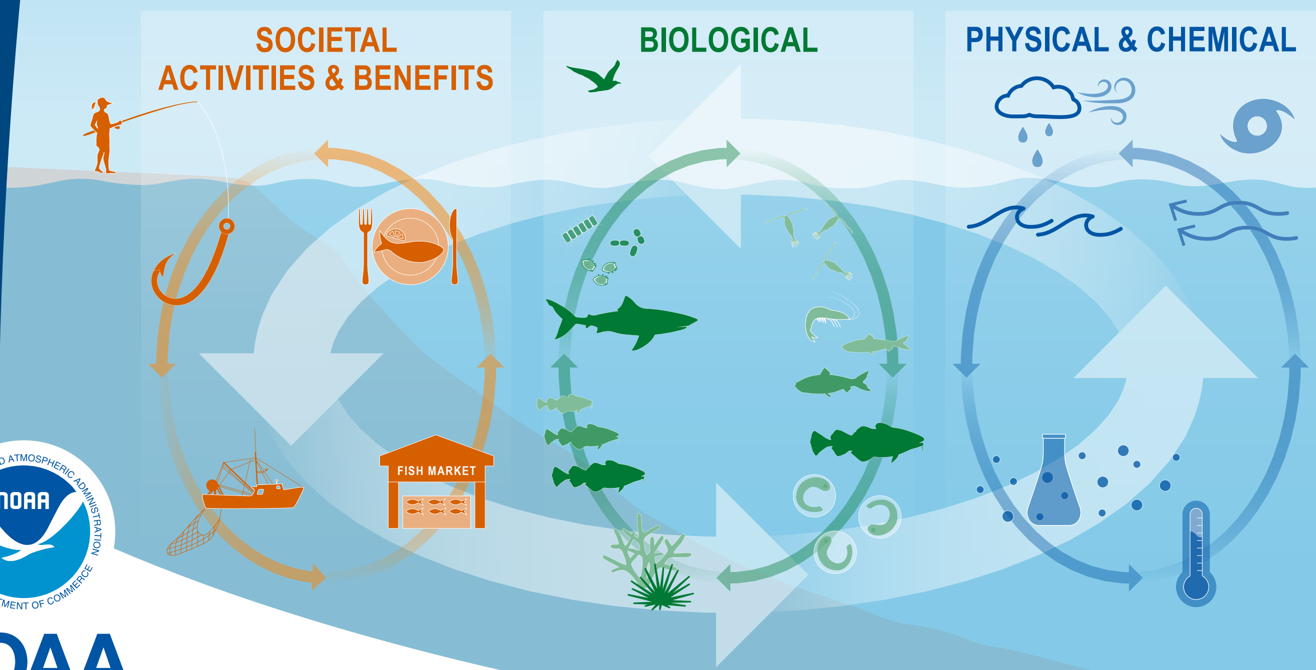
Short term forecasts

An operational Northwest Atlantic MOM6 forecast model has been developed which provides quarterly 12-month forecasts of temperature and other oceanographic variables for the entire Northeast U.S. A high-level infographic has been included into the SOE summary page presenting the 2026 bottom temperature forecasts and the 10 year projection. We plan to continue integrating forecast results into the SOE when appropriate.

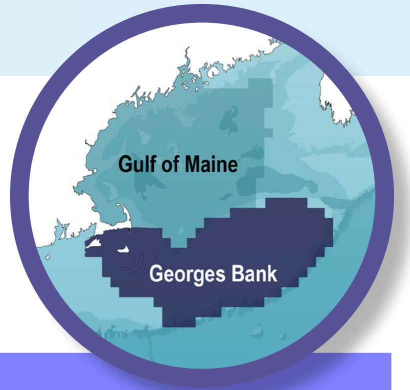
2026 State of the Ecosystem

New England





NOAA
FISHERIES



Performance Relative to Fishery Management Objectives

Trends and status of indicators related to broad ecosystem-level fishery management objectives, with implications for the New England Fishery Management Council (NEFMC)

GEORGES BANK (GB)

OBJECTIVE (indicator)		TREND	CURRENT STATUS	DRIVERS & IMPLICATIONS
Seafood production (Total and NEFMC managed landings)	TOTAL	Declining trend	Below long-term average	GB seafood production is decreasing, driven by piscivore and benthivore landings. Stable biomass indices indicate a shift in species composition. Recreational landings declines are driven by increased catch-and-release angling and stricter large sport fish regulations. These trends reflect management actions to rebuild depleted stocks. New England communities face moderate risk of environmental shifts impacting landings and threatening the viability of ports.
	MANAGED	Declining trend	Below long-term average	
	RECREATIONAL	Declining trend	Below long-term average	
Commercial profits (Total revenue and NEFMC managed revenue/profitability)	TOTAL REVENUE	No trend	Below long-term average	Revenue declines since 2021 are primarily driven by scallop landings decreases. New England fishing communities face moderate risk of environmental shifts impacting economic instability because their revenue depends on species sensitive to environmental change. The 2024 profit index was lower than the historic average, but increased from 2023 due to decreasing costs.
	MANAGED REVENUE	No trend	Below long-term average	
	PROFITABILITY	No trend	Below long-term average	
Recreational opportunities (Effort and fleet and catch diversity)	EFFORT	No trend	Below long-term average	Recreational activity remains below average, with consistent angling methods. Recreational fleet diversity remains near average. Increased catch diversity, however, suggests shifts in species targeting or availability.
	DIVERSITY	Mixed trend	Near long-term average	
Stability (Change from baseline, adaptive capacity, and volatility)	FISHERY		Not meeting objective	**Fishery:** Less predictable earnings are driven by scallop rotational management. Declining landings, aging crew, and fewer people entering the fishery suggest a shift from historical fishing participation. The decreasing number of fleets and reliance on fewer species reduce capacity to adapt to future change. **Ecosystem:** Managed species productivity declines are occurring despite increases in zooplankton and fish guild biomass, resulting in an increasingly productive system dominated by non-target species.
	ECOSYSTEM		Not meeting objective	
Social and cultural (Port activity, total community environmental variability risk indicators)	Total Community Environmental Variability	Increasing trend	Varies by community	Most ports show steady commercial fishing activity since 2007, except New Bedford and Gloucester, MA decline and Friendship, ME increases. The Crew Survey shows aging of the fleet and varying degrees of job satisfaction. The proportion of communities reliant on climate vulnerable species increased, suggesting reduced capacity to adapt to changing environmental conditions.
Protected species (Coastwide bycatch, population numbers, mortalities)	BYCATCH	Mixed trend	Harbor Porpoise: Meeting objective; Gray Seal: Meeting objective	Bycatch objectives are being met for harbor porpoise and gray seals. Mixed bycatch trends are related to fishery management, shifts in porpoise distribution, changing fishing locations, and the increasing presence of gray seals. North Atlantic Right Whales (NARW) are impacted by combined fishery interactions/vessel strikes and changes in their distribution, prey abundance and prey quality. Management measures to reduce adult mortality are reflected in more stable population numbers. Unusual mortality events continue for 3 large whale species.
	POPULATIONS	Mixed trend	NARW: Below long-term average; Gray Seal: Above long-term average	

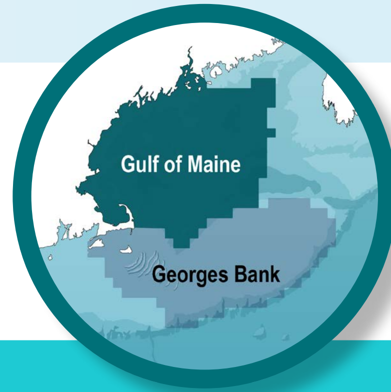
TABLE KEY

TREND: Declining Trend; Increasing Trend; No Trend; Mixed Trend

CURRENT STATUS: Meeting objective; Not meeting objective; Below long-term average; Above long-term average; Near long-term average

Performance Relative to Fishery Management Objectives

Trends and status of indicators related to broad ecosystem-level fishery management objectives, with implications for the New England Fishery Management Council (NEFMC)



GULF OF MAINE (GOM)

OBJECTIVE (indicator)		TREND	CURRENT STATUS	DRIVERS & IMPLICATIONS
Seafood production (Total and NEFMC managed landings)	TOTAL	Declining Trend	Below long-term average	GOM seafood production declines with piscivore, planktivore, and benthivore landings. Stable or increasing biomass indices indicate a shift in species composition. State-managed benthivore landings, including lobster, remain near average. Recreational landings declines are driven by increased catch-and-release angling and stricter large sport fish regulations. These trends reflect management actions to rebuild depleted stocks. New England communities face moderate risk of environmental shifts impacting landings and threatening the viability of ports.
	MANAGED	Declining Trend	Below long-term average	
	RECREATIONAL	Declining Trend	Below long-term average	
Commercial profits (Total revenue and NEFMC managed revenue/profitability)	TOTAL REVENUE	Increasing Trend	Near long-term average	Lobster price and landings drive increasing total revenue, but have shown declines in the last decade. Council-managed species revenue (excluding lobster) is at an all-time low. New England communities face moderate risk of environmental shifts affecting economic instability because their revenue depends on species sensitive to environmental change. An average profitability in 2024 was due to a decline in costs.
	MANAGED REVENUE	Declining Trend	Below long-term average	
	PROFITABILITY	No Trend	Near long-term average	
Recreational opportunities (Effort and fleet and catch diversity)	EFFORT	No Trend	Below long-term average	Recreational activity remains below average, with no change in angling methods. Recreational fleet diversity remains near average. Increased catch diversity, however, suggests shifts in species targeting or availability.
	DIVERSITY	Mixed Trend	Near long-term average	
Stability (Change from baseline, adaptive capacity, and volatility)	FISHERY		Not meeting objective	**Fishery:** Revenue is driven by lobster, with decreasing contribution of Council-managed species. Recent lobster declines pose a risk to regional stability. Declining landings, aging crew, and a lack of new entrants into the fishery show a shift from historical fishing participation. Declining fleet count and reliance on fewer species suggests a reduced capacity to adapt to future change. **Ecosystem:** Council-managed species productivity is low. Increased planktivores and krill suggest shifts in ecosystem dynamics. Zooplankton community composition oscillations result in unpredictable ecosystem conditions.
	ECOSYSTEM		Not meeting objective	
Social and cultural (Port activity, total community environmental variability risk indicators)	Total Community Environmental Variability	Increasing Trend	Varies by community	Most ports show steady commercial fishing activity since 2007, except New Bedford and Gloucester, MA decline and Friendship, ME increases. The Crew Survey shows aging of the fleet and varying degrees of job satisfaction. The proportion of communities reliant on climate vulnerable species increased, suggesting reduced capacity to adapt to changing environmental conditions.
Protected species (Coastwide bycatch, population numbers, mortalities)	BYCATCH	Mixed Trend	Harbor Porpoise: Meeting objective; Gray Seal: Meeting objective	Bycatch objectives are being met for harbor porpoise and gray seals. Mixed bycatch trends are related to fishery management, shifts in porpoise distribution, changing fishing locations, and the increasing presence of gray seals. North Atlantic Right Whales (NARW) are impacted by combined fishery interactions/vessel strikes and changes in their distribution, prey abundance and prey quality. Management measures to reduce adult mortality are reflected in more stable population numbers. Unusual mortality events continue for 3 large whale species.
	POPULATIONS	Mixed Trend	NARW: Below long-term average; Gray Seal: Above long-term average	

TABLE KEY

TREND		CURRENT STATUS	
↘	Declining Trend	✓	Meeting objective
↗	Increasing Trend	✕	Not meeting objective
↔	No Trend	−	Below long-term average
⤮	Mixed Trend	+	Above long-term average
		≈	Near long-term average

Risks to Meeting Fishery Management Objectives

Environmental Change and Ecosystem Risks

Climate and ecosystem change can pose risks to meeting fisheries management objectives by affecting the distribution, seasonal timing, productivity, and physiology of marine species. Marine development can impact marine species, surveys, and fisheries operations, which will affect fisheries management.

Risks to Managing Spatially

- **Observations:** Species distributions are trending to the northeast and into deeper water.
- **Potential Impacts:** Spatial mis-allocation of quotas may lead to unmet quotas, increased discards, and/or miscalculated fishing targets.

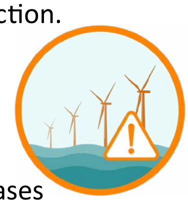
Risks to Setting Catch Limits

- **Observations:** Productivity and fish condition have changed across the ecosystem because of ecological and environmental changes.
- **Potential Impacts:** Unaccounted for and unknown productivity changes may lead to misspecified quotas and rebuilding plans, especially if they are not considered in stock reference points and short-term stock projections.

Risks to Managing Seasonally

- **Observations**: Seasonal spawning and migration timing has changed for some Council-managed species and whales.
- **Potential Impacts:** Spawning closures, seasonal openings, and seasonal quota allocations may be less effective if mis-timed with biological events, resulting in decreased seafood production.

Risks of Marine Development

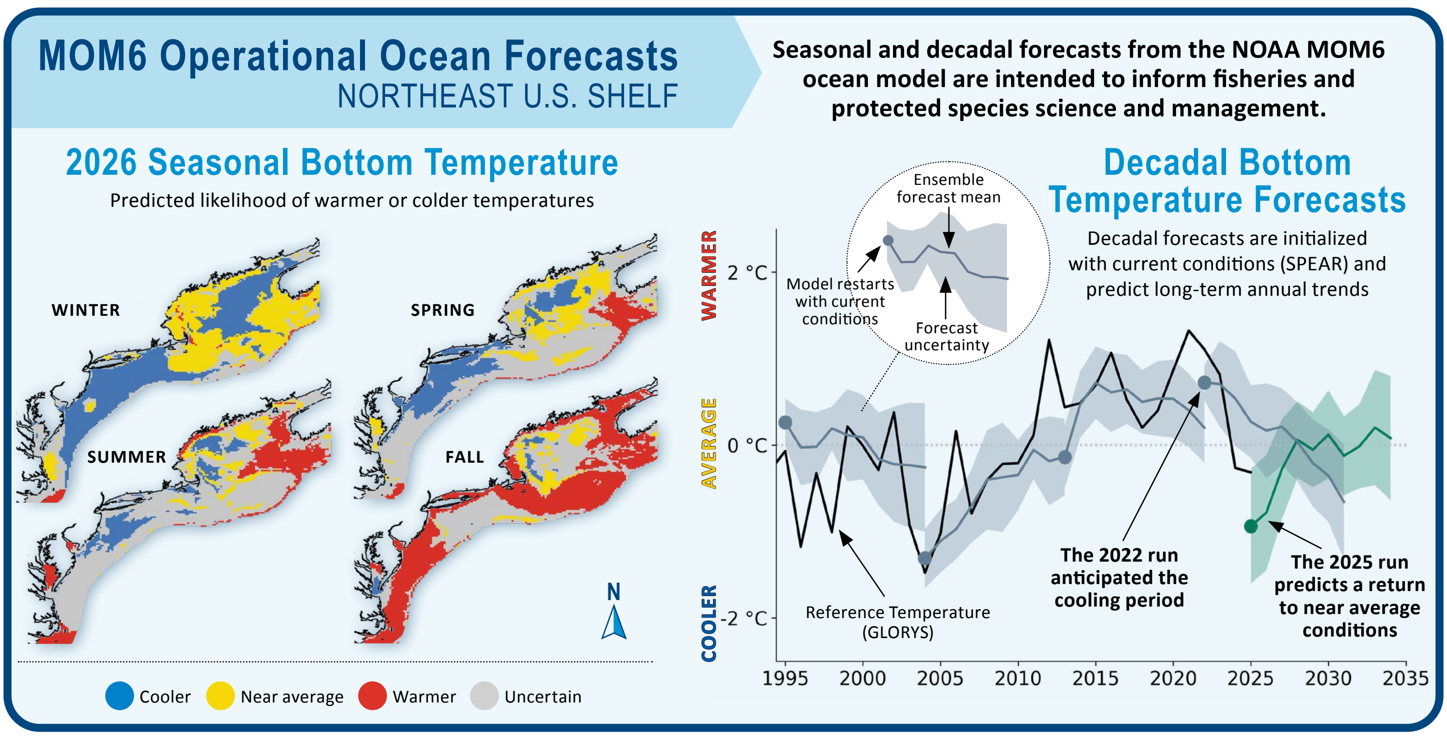


- **Observations:** Wind lease areas have historically been used for fishing and as habitat for North Atlantic right whales. Only 6 of 38 offshore wind leases in the Northeast are operational and/or under construction.
- **Potential Impacts:** Average annual revenue in active project areas is <5% for most ports and for most Council-managed species. Project areas overlap with North Atlantic right whale habitat.

Ocean Forecasts

2026 Seasonal and Decadal Bottom Temperature Forecasts

The 2026 seasonal forecast predicts normal to below average temperatures throughout most of the Northeast Shelf, but uncertainty is higher in the spring and summer. Fall temperatures are predicted to be above average in shallower regions. The latest decadal forecasts (2025 - 2034) predict a return towards average annual bottom temperatures.



2025 Highlights

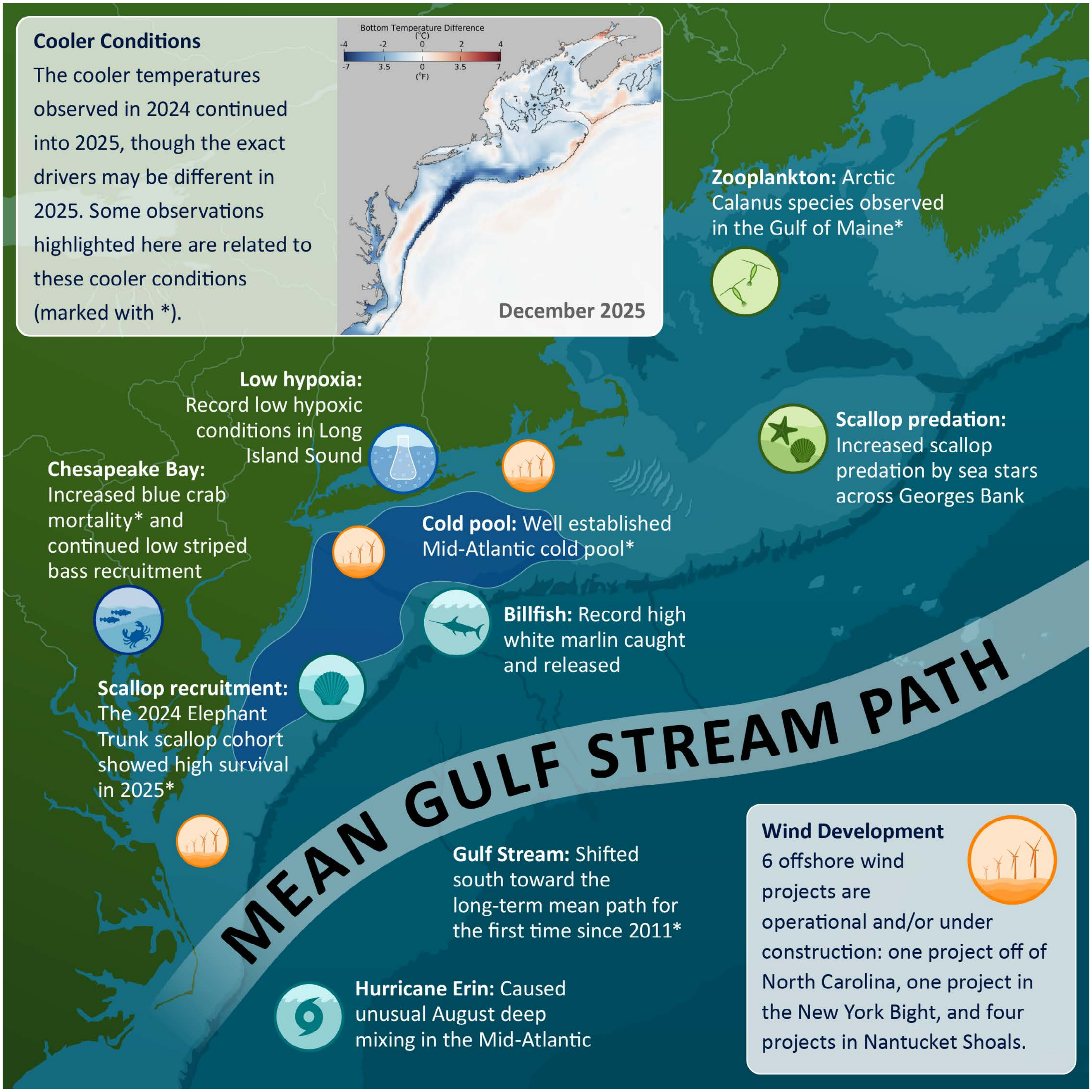
The Northeast U.S. region experienced colder than average ocean temperatures, despite record warm global ocean and air temperatures. Similar to 2024, oceanographic and ecological conditions reflected cooler water and changing species abundance, distribution, and timing.

We welcome readers to report notable or unusual conditions for next year's highlights section to **northeast.ecosystem.highlights@noaa.gov**.

Fishing Observations

Members of the fishing community reported cooler water temperatures and shared observations from the 2025 fishing season including:

- Reports of record levels of white marlin, and higher abundance of billfish, sandlance, Illex squid and Atlantic mackerel than in recent years.
- Observations of some species (Atlantic mackerel, striped bass, red drum, bluefish, and other gamefish) showed shifting distributions and unpredictable timing.
- Good hook and line fishing near the wind turbines.



Introduction

About This Report

This report is for the New England Fishery Management Council (NEFMC). The purpose of this report is to synthesize ecosystem information to allow the NEFMC to better meet fishery management objectives. The major messages of the report are synthesized on pages 1-3, with highlights of 2025 ecosystem events on page 4.

The information in this report is organized into two main sections; performance measured against ecosystem-level management objectives (Table 1), and potential risks to meeting fishery management objectives (Table 2: climate change and other ocean uses). A final section highlights notable 2025 ecosystem observations.

Report structure

A glossary of terms[1], detailed technical methods documentation[2], indicator data[3], and detailed indicator descriptions[4] are available online. We recommend new readers first review the details of standard figure formatting (Fig. 1a), categorization of fish and invertebrate species into feeding guilds (Table 3), and definitions of ecological production units (EPUs, including the Gulf of Maine (GOM) and Georges Bank (GB); Fig. 1b) provided at the end of the document.

The two main sections contain subsections for each management objective or potential risk. Within each subsection, we first review observed trends for indicators representing each objective or risk, including the status of the most recent data year relative to a threshold (if available) or relative to the long-term average. Second, we identify potential drivers of observed trends, and synthesize results of indicators related to those drivers to outline potential implications for management. For example, if there are multiple drivers related to an indicator trend, do indicators associated with the drivers have similar trends, and can any drivers be affected by management action(s)? We emphasize that these implications are intended to represent testable hypotheses at present, rather than "answers," because the science behind these indicators and syntheses continues to develop.

All indicators are updated with the most recent data available as of January 2026, and all indicators are updated with the same data years across both reports. In some cases, indicators are only updated through 2024 due to data availability. In these cases, we still include the indicator in the report to provide context for the most recent data year and to allow for future updates.

Because this report is intended to provide a high-level overview of marine ecosystem information in the Northeast United States, we do not include complete methods or detailed results for all of the indicators that we present. More information can be found hyperlinked in blue text.

[1] https://noaa-edab.github.io/tech-doc/glossary.html
[2] https://noaa-edab.github.io/tech-doc/
[3] https://noaa-edab.github.io/ecodata/
[4] https://noaa-edab.github.io/catalog/index.html

Table 1: Ecosystem-scale fishery management objectives in New England

Objective categories	Indicators reported
Objectives: Provisioning and Cultural Services	
Seafood Production	Landings; commercial total and by feeding guild; recreational harvest
Commercial Profits	Revenue decomposed to price and volume
Recreational Opportunities	Angler trips; recreational fleet diversity
Stability	Fishery and ecosystem volatility, adaptive capacity, and shifts from baseline
Social & Cultural	Community commercial fishing activity and risk factors
Protected Species	Bycatch; population (adult and juvenile) numbers; mortalities
Potential Drivers: Supporting and Regulating Services	
Management	Stock status; catch compared with catch limits
Biomass	Biomass or abundance by feeding guild from surveys
Environment	Climate and ecosystem risk indicators listed in Table 2

Table 2: Risks to meeting fishery management objectives in New England

Risk categories	Observation indicators reported	Potential driver indicators reported
Climate and Ecosystem Risks		
Risks to Managing Spatially	Managed species (fish and cetacean) distribution shifts	Benthic and pelagic forage distribution; ocean temperature, changes in currents and Cold Pool
Risks to Managing Seasonally	Managed species spawning and migration timing changes	Habitat timing: Length of ocean summer, Cold Pool seasonal persistence
Risks to Setting Catch Limits	Managed species body condition and recruitment changes	Benthic and pelagic forage quality & abundance: ocean temperature & acidification
Other Ocean Uses Risks		
Offshore Wind Risks	Fishery revenue and landings from wind lease areas by species and port	Wind development speed; Protected species presence and hotspots

Document Orientation

The figure format is illustrated in Fig 1a. Both long-term and short-term trends are assessed and plotted if statistically significant at the $p < 0.05$ level. An orange line signifies a positive trend, and purple signifies a negative trend. To minimize bias introduced by small sample size, time series with less than 30 years are assessed using the short-term trend methodology applied over the extent of the time period. Dashed lines represent mean values of time series unless the indicator is an anomaly, in which case the dashed line is equal to 0. Shaded regions indicate the past ten years. If there are no new data for the most recent year, the shaded region will still cover this time period. Indicators are scaled at several levels: coastwide; by state groups (Mid-Atlantic: NY, NJ, DE, MD, VA, NC; New England: ME, NH, MA, RI, CT); or by Ecosystem Production Unit (EPU), including the Mid-Atlantic Bight (MAB), Georges Bank (GB), and Gulf of Maine (GOM) (Fig. 1b).

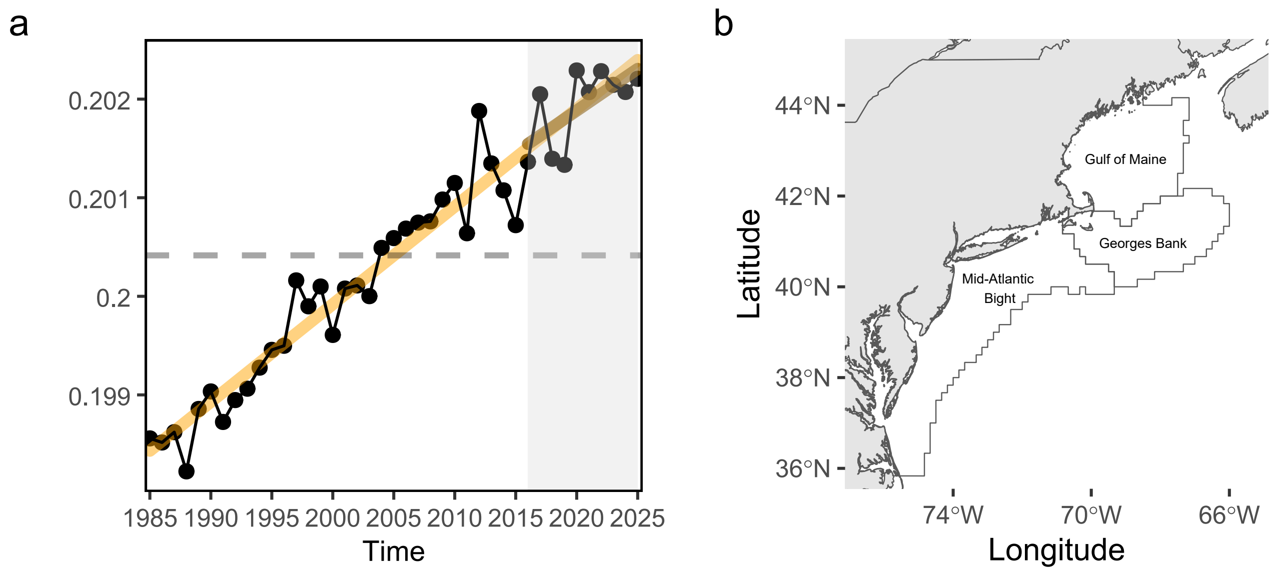


Figure 1: Document orientation. a) Key to figures: orange line - significant long-term increasing trend (purple for decreasing), dark orange line - significant increasing short-term trend (dark purple for decreasing), dashed line - time-series mean. b)The Northeast Large Marine Ecosystem: Ecological production units (EPUs) defined for the Gulf of Maine (GOM), Georges Bank (GB), and the Mid-Atlantic Bight (MAB).

Fish and invertebrates are aggregated into similar feeding categories (Table 3) to evaluate ecosystem level trends in predators and prey.

Table 3: Feeding guilds and management bodies.

Guild	MAFMC	Joint	NEFMC	State or Other
Apex Predator				shark uncl, swordfish, yellowfin tuna, bluefin tuna
Piscivore	summer flounder, bluefish, northern shortfin squid, longfin squid	spiny dogfish, goosefish	winter skate, clearnose skate, thorny skate, offshore hake, silver hake, atlantic cod, pollock, white hake, red hake, atlantic halibut, windowpane, acadian redfish	sea lamprey, sandbar shark, atlantic angel shark, atlantic torpedo, conger eel, spotted hake, cusk, fourspot flounder, john dory, atlantic cutlassfish, blue runner, striped bass, weakfish, sea raven, northern stargazer, banded rudderfish, atlantic sharpnose shark, inshore lizardfish, atlantic brief squid, northern sennet, king mackerel, spanish mackerel

Table 3: Feeding guilds and management bodies.

Guild	MAFMC	Joint	NEFMC	State or Other
Planktivore	atlantic mackerel, chub mackerel, butterfish		atlantic herring	harvestfishes, smelts, round herring, alewife, blueback herring, american shad, menhaden, bay anchovy, striped anchovy, rainbow smelt, atlantic argentine, slender snipe eel, atlantic silverside, northern pipefish, atlantic moonfish, lookdown, blackbelly rosefish, lumpfish, northern sand lance, atlantic saury, mackerel scad, bigeye scad, round scad, rough scad, silver rag, weitzmans pearlsides, atlantic soft pout, sevenspine bay shrimp, pink glass shrimp, polar lebbeid, friendly blade shrimp, bristled longbeak, aesop shrimp, norwegian shrimp, northern shrimp, brown rock shrimp, atlantic thread herring, spanish sardine, atlantic bumper, harvestfish, striated argentine, silver anchovy
Benthivore	black sea bass, scup, tilefish		barndoor skate, rosette skate, little skate, smooth skate, haddock, american plaice, yellowtail flounder, winter flounder, witch flounder, atlantic wolffish, ocean pout, crab,red deepsea	crab,unc, hagfish, porgy,red, sea bass,nk, atlantic hagfish, roughtail stingray, smooth dogfish, chain dogfish, bluntnose stingray, bullnose ray, southern stingray, longfin hake, fourbeard rockling, marlin-spike, gulf stream flounder, longspine snipefish, blackmouth bass, threespine stickleback, smallmouth flounder, hogchoker, bigeye, atlantic croaker, pigfish, northern kingfish, silver perch, spot, deepbody boarfish, sculpin uncl, moustache sculpin, longhorn sculpin, alligatorfish, grubby, atlantic seasnail, northern searobin, striped searobin, armored searobin, cunner, tautog, snakeblenny, daubed shanny, radiated shanny, red goatfish, striped cusk-eel, wolf eelpout, wrymouth, fawn cusk-eel, northern puffer, striped burrfish, planehead filefish, gray triggerfish, shortnose greeneye, beardfish, cownose ray, american lobster, cancer crab uncl, jonah crab, atlantic rock crab, blue crab, spider crab uncl, horseshoe crab, coarsehand lady crab, lady crab, northern stone crab, snow crab, spiny butterfly ray, smooth butterfly ray, snakefish, atlantic midshipman, bank cusk-eel, red cornetfish, squid cuttlefish and octopod uncl, spoonarm octopus, bank sea bass, rock sea bass, sand perch, cobia, crevalle jack, vermilion snapper, tomtate, jolthead porgy, saucereye porgy, whitebone porgy, knobbed porgy, sheepshead porgy, littlehead porgy, silver porgy, pinfish, red porgy, porgy and pinfish uncl, banded drum, southern kingfish, atlantic spadefish, leopard searobin, dusky flounder, triggerfish filefish uncl, blackcheek tonguefish, orange filefish, queen triggerfish, ocean triggerfish
Benthos	atlantic surfclam, ocean quahog		sea scallop	sea cucumber, sea urchins, snails(conchs), sea urchin and sand dollar uncl, channeled whelk, blue mussel

Performance Relative to Fishery Management Objectives

In this section, we examine indicators related to broad, ecosystem-level fishery management objectives. We also provide hypotheses on the implications of these trends—why we are seeing them, what's driving them, and potential or observed regime shifts or changes in ecosystem structure. Identifying multiple drivers, regime shifts, and potential changes to ecosystem structure, as well as identifying the most vulnerable resources, can help managers determine whether anything needs to be done differently to meet objectives and how to prioritize upcoming issues/risks.

Seafood Production

Indicators: Landings; commercial and recreational

In New England, total commercial landings (includes bait and industrial uses), U.S. seafood landings (excludes industrial and bait uses), and NEFMC-managed landings have long-term declines (Fig. 2). Declines are seen in commercial landings by guild (Fig. 3), which include all species and all uses caught with GB and the GOM, and are reported in total and for NEFMC managed species only. Downward trends persist for piscivores and benthivores in both regions. Current high total landings for benthivores (GOM) are attributable to American lobster. High benthos landings (GB) are attributable to clams and scallops, although they are below the long-term mean in 2024 (Fig. 2). Current landings of planktivores and piscivores remain among the lowest points in the time series.

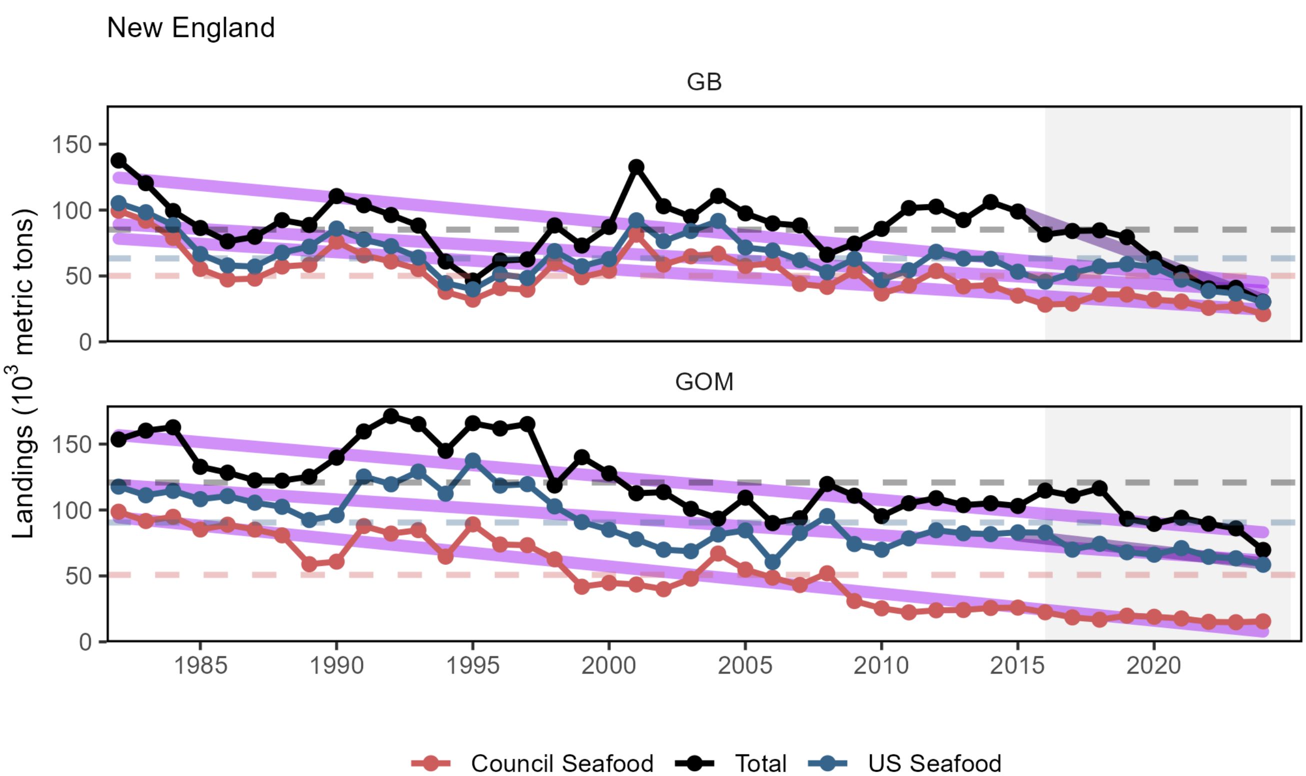


Figure 2: Total commercial landings (black), total U.S. seafood landings (blue), and New England managed U.S. seafood landings (red) for Georges Bank (GB, top) and the Gulf of Maine (GOM, bottom), with long-term significant declines (purple).

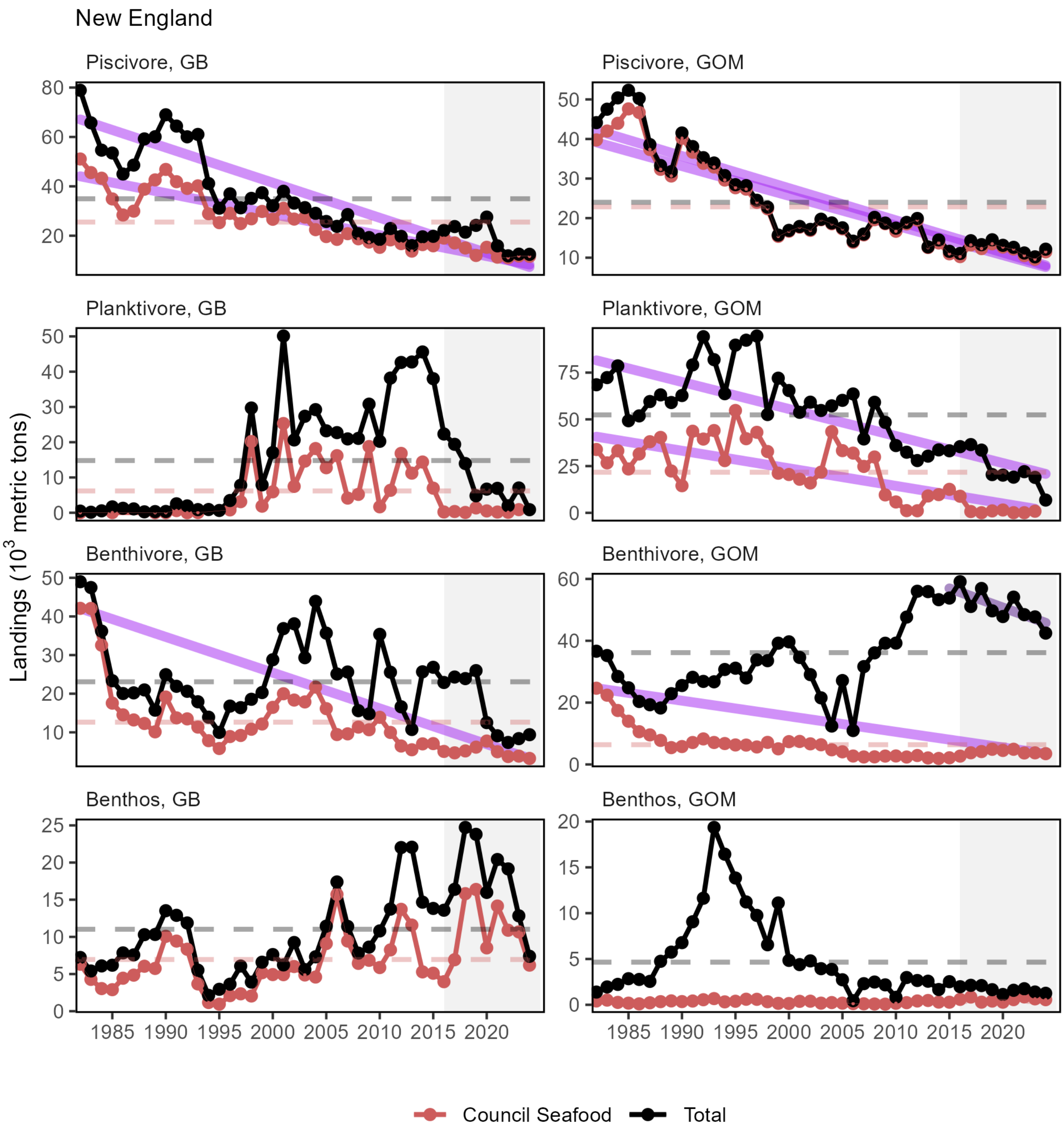


Figure 3: Total commercial landings (black) and New England Fishery Management Council managed U.S seafood landings (red) by feeding guild for the Gulf of Maine (GOM, right) and Georges Bank (GB, left), with significant long-term declines (purple).

New England ports face a moderate risk from environmental variability with no long-term trend, as evaluated by the 2025 Community Environmental Variability Risk Indicators (Fig. 4). These indicators assess port level risk to environmental variability based on dependence on species and their respective bioenvironmental vulnerabilities as assessed by regional experts. Total Vulnerability measures how much of a region's landings (or revenue) is dependent on species that are sensitive to different climate and environmental change factors including temperature and acidification.

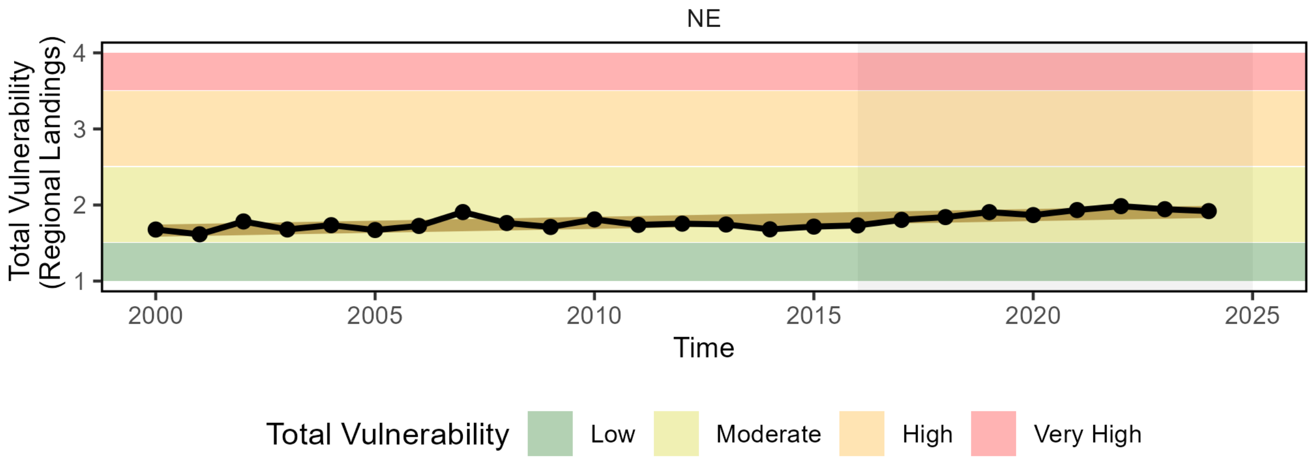


Figure 4: New England region total vulnerability of commercial landings (sum of New England port landings weighted by species vulnerability scores). Horizontal colored bars show different environmental variability risk levels.

In New England, recreational harvest (retained fish presumed to be eaten) shows a long-term decline with recent harvest remaining at a time series low (Fig. 5). This pattern may indicate a shift towards catch-and-release strategies as opposed to catch for harvest. Recreational shark landings have generally decreased for most shark groups through 2024 (Fig. 6). The recent low in pelagic shark landings is largely driven by regulatory changes implemented in 2018, followed by the closure of the shortfin mako fishery in 2022. These actions were intended to rebuild the North Atlantic shortfin mako stock and comply with binding recommendations by the International Commission for the Conservation of Atlantic Tunas (ICCAT).

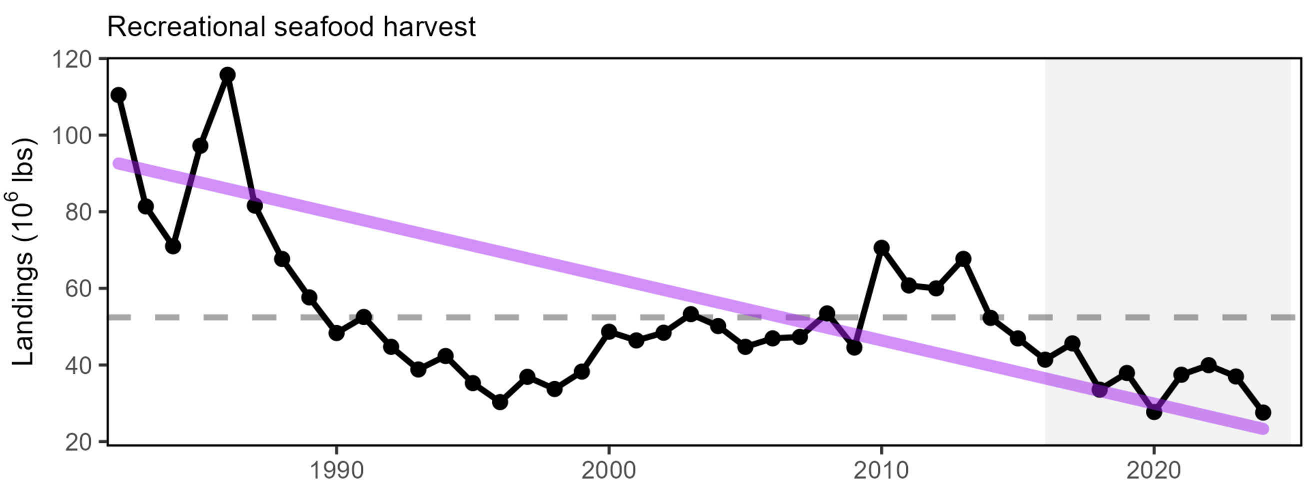


Figure 5: Total recreational seafood harvest (millions of pounds, black, long-term significant decrease, purple) in the New England region.

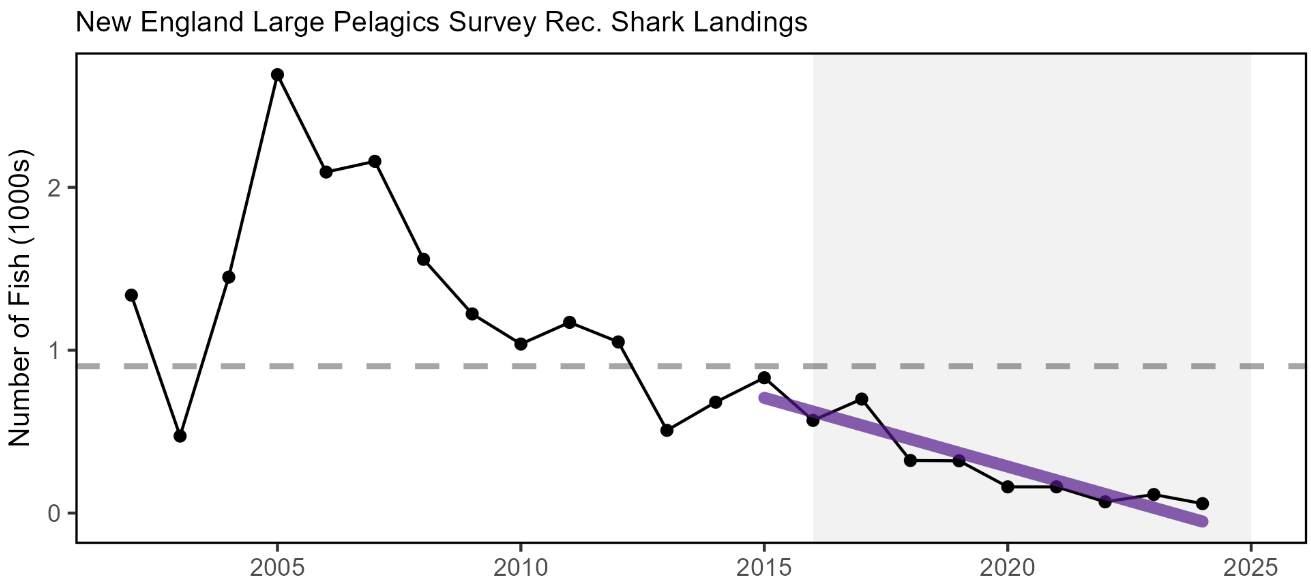


Figure 6: Recreational shark landings in the New England region from NOAA Fisheries' Large Pelagics Survey.

Aquaculture can comprise a significant proportion of seafood production in specific communities, but not all aquaculture production is included in total seafood landings above. In 2022, the Northeast region produced approximately 6,300 metric tons of aquacultured shellfish, with revenue of $133 million (Fisheries of the United States, 2022).

Implications

Declining commercial landings (total and seafood) and recreational harvest can be attributed to many interacting factors, including combinations of ecosystem and stock production, management actions, market conditions, and environmental change. While we cannot evaluate all possible drivers at present, here we evaluate the extent to which stock status, management, and system biomass trends may play a role.

Stock Status Single species management objectives (1. maintaining biomass above minimum thresholds and 2. maintaining fishing mortality below overfishing limits) are not being met for some NEFMC managed species. Specifically, 17 stocks are currently estimated to be below B_{MSY} targets and 10 below B_{MSY} thresholds (Fig. 7). However, the status of 12 stocks is unknown (Table 4). Although stock status and associated management constraints are likely contributing to decreased landings, these management actions are enacted in response to biomass, where less conservative regulations would not necessarily mean higher landings. To better address the role of management in future reports, we could examine how the total allowable catch (TAC) and the percentage of the TAC utilized for each species has changed through time.

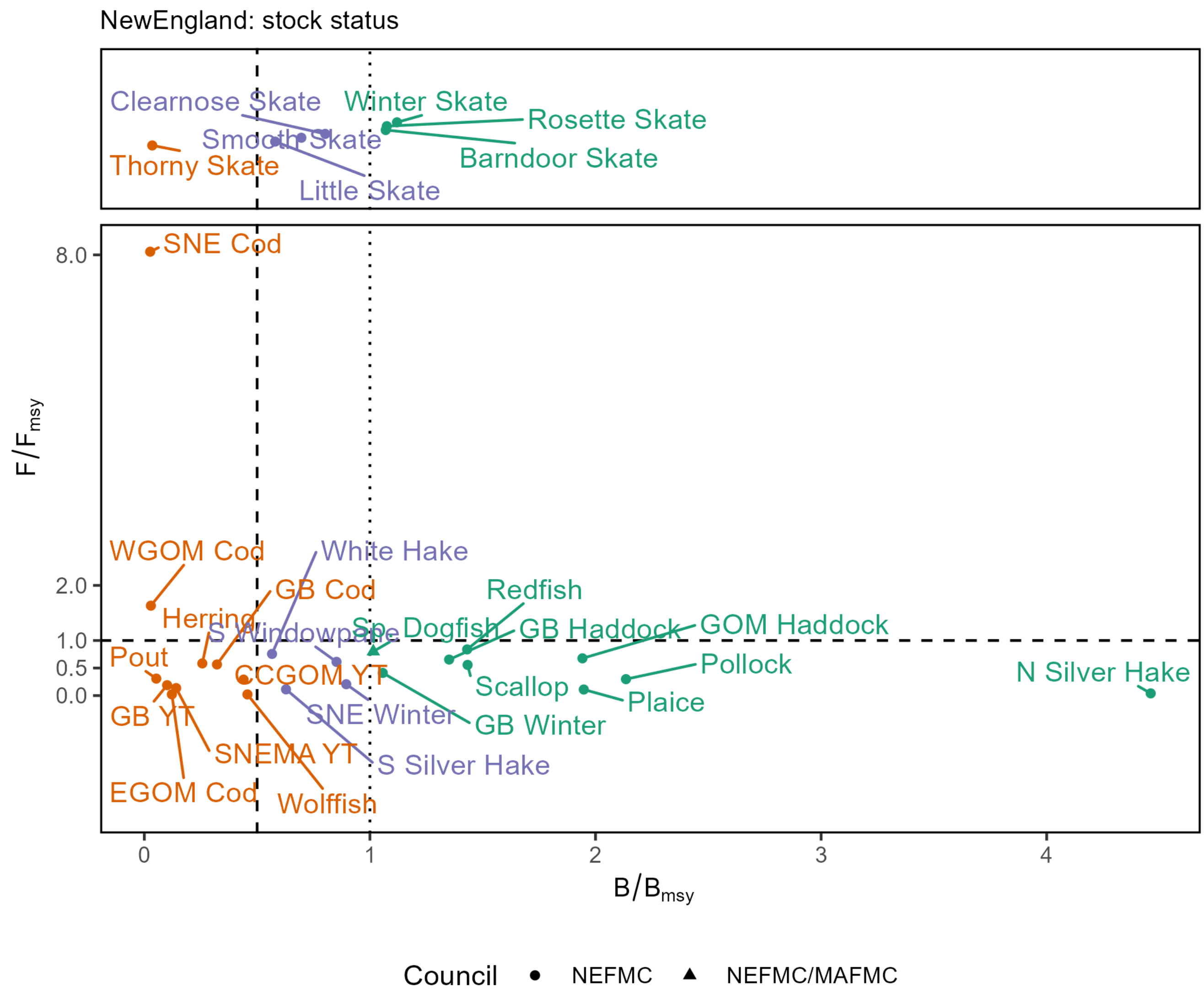


Figure 7: Summary of single species status for New England Fishery Management Council and jointly federally managed stocks (goosefish and spiny dogfish). The dotted vertical line at one is the target biomass reference point of B. The dashed lines are the management thresholds of B (vertical) or F (horizontal). Stocks with a B/B_{MSY} estimate but without an F/F_{MSY} estimate are denoted in a separate box plot (top). Colors denote stocks with $B/B_{MSY} < 0.5$ or F/F_{MSY} (orange), stocks $0.5 < B/B_{MSY} < 1$ (blue), and stocks $B/B_{MSY} > 1$ (green).CCGOM = Cape Cod Gulf of Maine, GOM = Gulf of Maine, GB = Georges Bank, SNEMA = Southern New England Mid Atlantic

Table 4: Unknown or partially known stock status for NEFMC and jointly managed species.

Stock
Atlantic salmon - Gulf of Maine
Red deepsea crab - Northwestern Atlantic
Atlantic halibut - Northwestern Atlantic Coast
Offshore hake - Northwestern Atlantic Coast
Red hake - Gulf of Maine / Northern Georges Bank
Red hake - Southern Georges Bank / Mid-Atlantic
Windowpane - Gulf of Maine / Georges Bank
Witch flounder - Northwestern Atlantic Coast
Goosefish - Gulf of Maine / Northern Georges Bank
Goosefish - Southern Georges Bank / Mid-Atlantic

System Biomass Declining landings are likely driven by the relative abundance of specific targeted species rather than major shifts in ecosystem trophic structure or feeding guilds. Scientific surveys show that Aggregate biomass has been mostly stable or increasing in both regions (Fig. 8 & Fig. 9). The benthivores biomass recently peaked due to a large haddock recruitment, but appears to be returning to average levels. Planktivore biomass on GB continues to rise due to increased Atlantic mackerel. On GB, trends in piscivores are mixed, and benthos are increasing in both seasons. State-level data show the Massachusetts survey (Fig. 10) mirroring the increase in fall planktivores but noting a spring decrease in fish-eaters and a year-round decline in benthos; the New Hampshire/Maine survey remains too short to establish definitive trends.

Effect on Seafood Production With the poor or unknown stock status of many managed species, the decline in commercial seafood landings in the Gulf of Maine most likely reflects lower catch quotas implemented to rebuild overfished stocks, as well as market dynamics.

The recent decline in recreational seafood harvest(Fig. 5) is likely associated with a combination of targeted management actions, shifting social behaviors, data collection changes, and potentially low biomass of targeted species. The decline in recreational shark landings can partially be attributed to management actions intended to reduce fishing mortality on mako sharks. The lower than average landings since 2018 for species other than sharks could be driven by either changes in fishing behavior or reflect the modified methodology in NOAA Fisheries' Marine Recreational Information Program survey in 2018.

Future commercial and recreational landings are likely to be driven by environmental changes that require continued monitoring. Fisheries and communities rely on different combinations of stocks, and individual stocks will respond differently to these drivers. Some key drivers include :

- **Unprecedented Climate Shifts**: Global ocean temperatures have reached record highs (see 2025 Highlights section) and the Northeast US shelf has experienced long-term warming.
- **Distribution Shifts**: Stocks are shifting towards the northeast and into deeper waters throughout the Northeast US Large Marine Ecosystem (see Climate Risks section).
- **Ecosystem production**: Changes in ecosystem composition and biological production are impacting the stability of the ecosystem and pose risks to setting catch limits.
- **Community Risks**: Changes in the ecosystem can affect the stability of fisheries and pose risks to fishing communities.

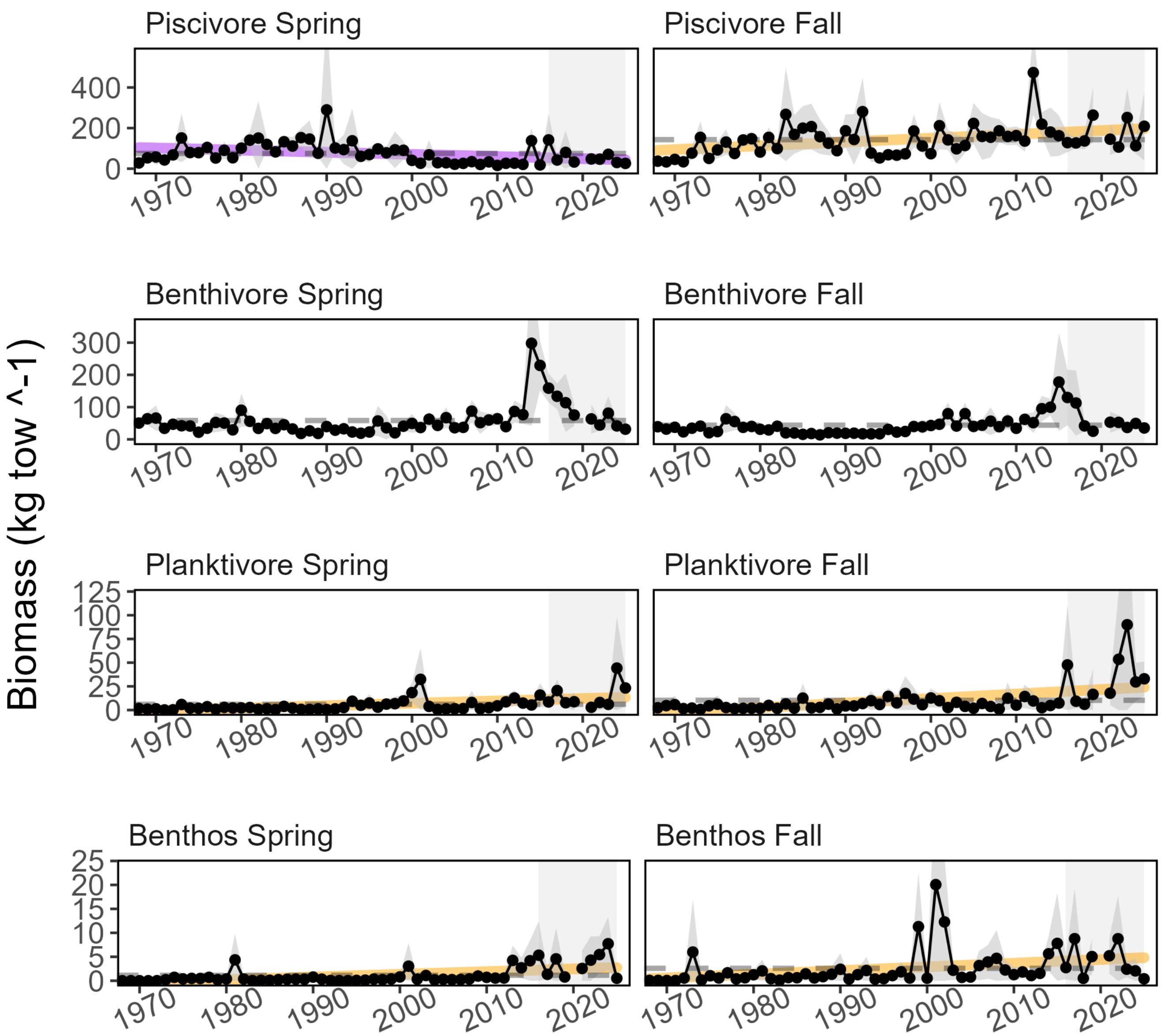


Figure 8: Spring (left) and fall (right) surveyed biomass on Georges Bank, with long-term increasing (orange), long-term decreasing (purple), and short-term decreasing (dark purple, piscivore spring) trends. The shaded area around each annual mean represents 2 standard deviations from the mean.

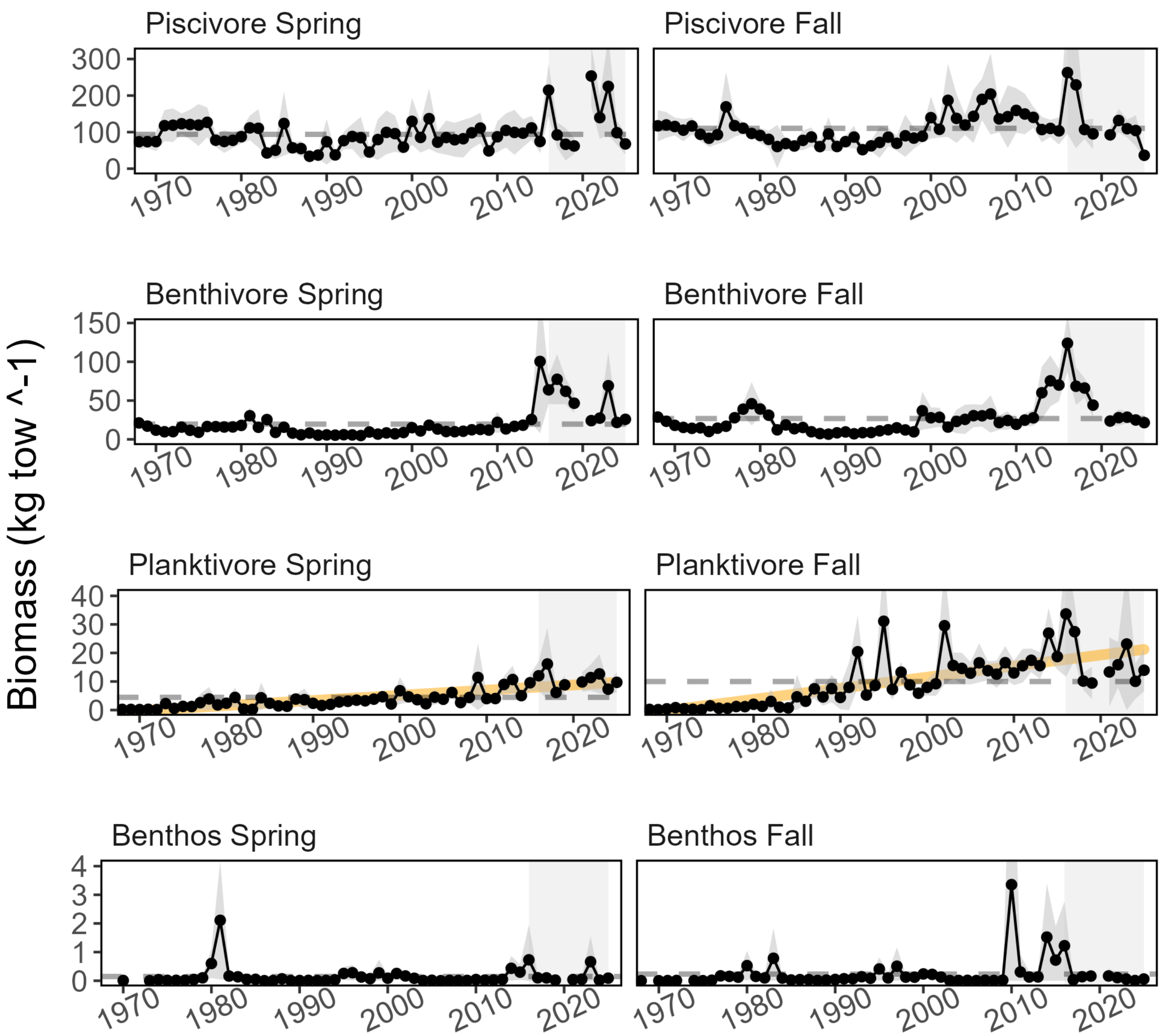


Figure 9: Spring (left) and fall (right) surveyed biomass in the Gulf of Maine, with increasing long-term trends (orange). The shaded area around each annual mean represents 2 standard deviations from the mean.

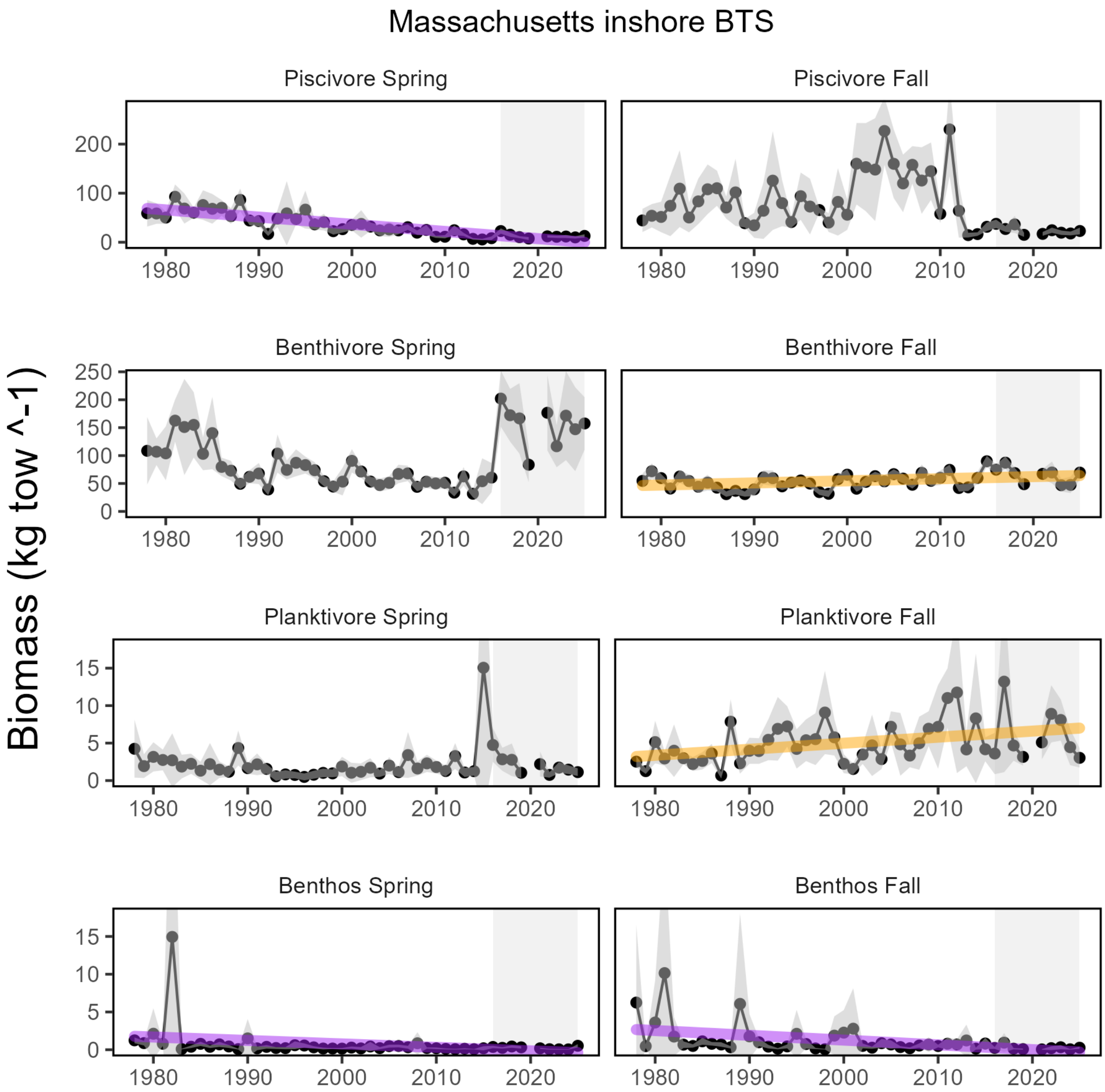


Figure 10: Spring (left) and fall (right) surveyed biomass from the state of Massachusetts inshore survey, with increasing (orange) and decreasing (purple) long-term trends. The shaded area around each annual mean represents 2 standard deviations from the mean.

Commercial Profits

Indicators: revenue (a proxy for profits)

Total commercial revenues from all species is below the long-term mean for GB and near the long-term mean for the GOM in 2024 (Fig. 11). In addition, revenue from NEFMC managed species shows a long-term decline in the GOM. GB continues to exhibit a cyclical nature with regards to revenue, largely driven by rotational management of Atlantic sea scallops.

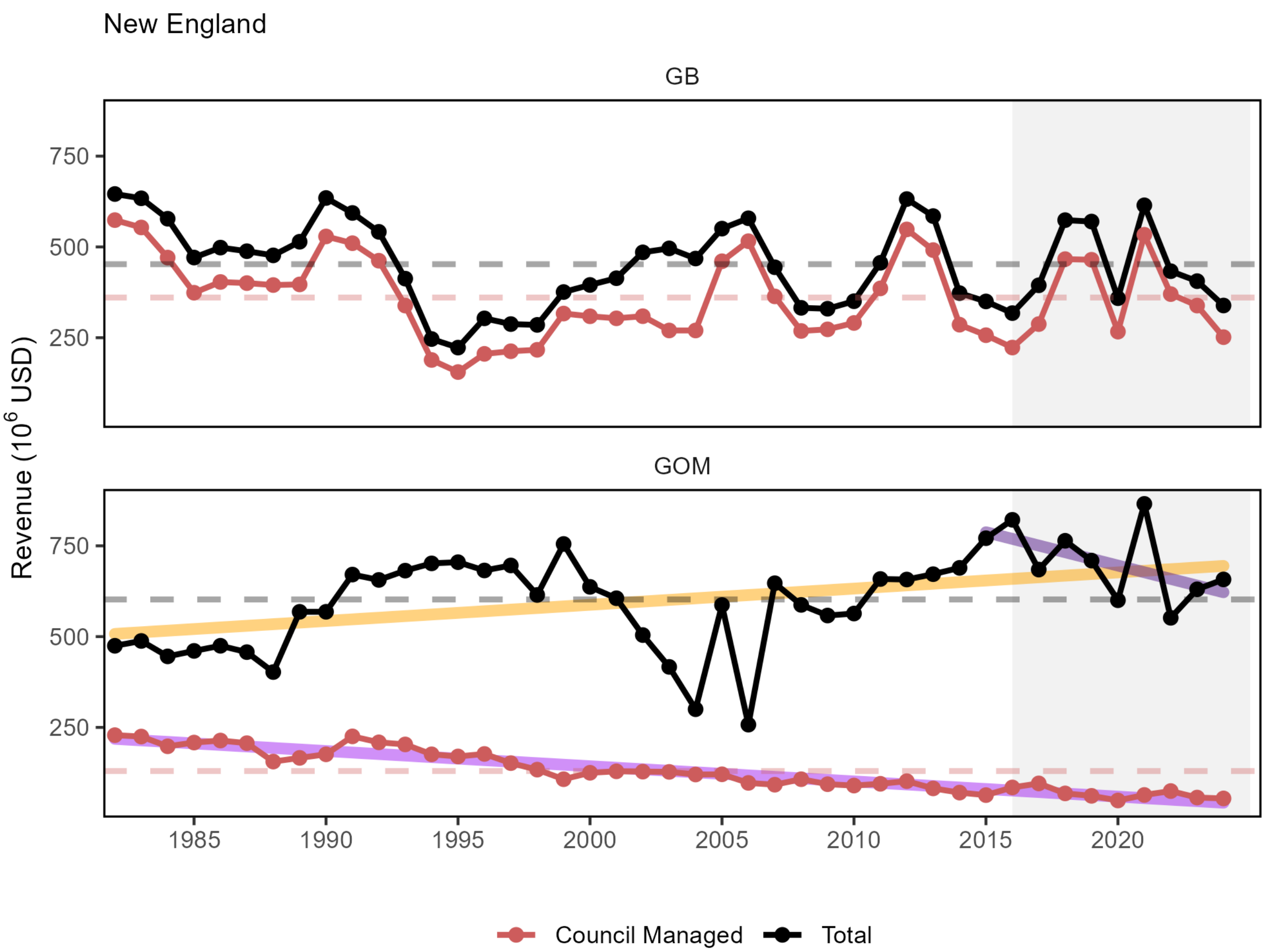


Figure 11: Commercial revenue through 2024 for Georges Bank (top) and the Gulf of Maine (bottom): total (black) and from New England Fishery Management Council managed species (red), with significant long-term increase (orange), and long-term (light purple) and short-term (dark purple) declines. Dashed lines represent the long-term annual mean.

Revenue earned by harvesting resources is a function of both the quantity landed of each species and the prices paid for landings. Therefore, total revenue patterns can be in part driven by harvest levels, the mix of species landed, price changes, or a combination of these. The Bennet Indicator (BI) decomposes revenue change into two parts, one driven by changing quantities (volumes), and a second driven by changing prices. All changes are in relation to a base year (1982). The 1982 base year was selected because that is the first year the relevant data is available and it allows for an extended period of time to evaluate market trends and dynamics.

In the GB region, revenues have been consistently lower than the 1982 baseline throughout the time series. The changes in total revenue in GB was primarily driven by volumes prior to 2010 rather than by prices (Fig.12).In more recent years, prices have played a larger role in revenues which are lower than baseline (such as in 2020).However, lower landings played a larger role in relative revenue declines in 2023 and 2024.

In the GOM, revenues have been above the 1982 baseline since 2007. In years prior, increases in the late 90s and early 2000s were primarily driven by higher prices. While prices remained strong from 2000 - 2006, revenues declined due to lower landings. Since 2006, the primary driver of revenue changes from year to year. In 2024, high revenues were driven by higher prices.

Breaking down the GB revenue by guild (Fig. 13), both the volume and price trend have been largely driven by benthivores (lobster) and benthos (scallops, quahogs and surfclams). In the GOM region, increased prices for benthivores (lobster) drove the year-over-year increases in overall prices. Benthivores also had a large influence on the overall volume indicator in the GOM.

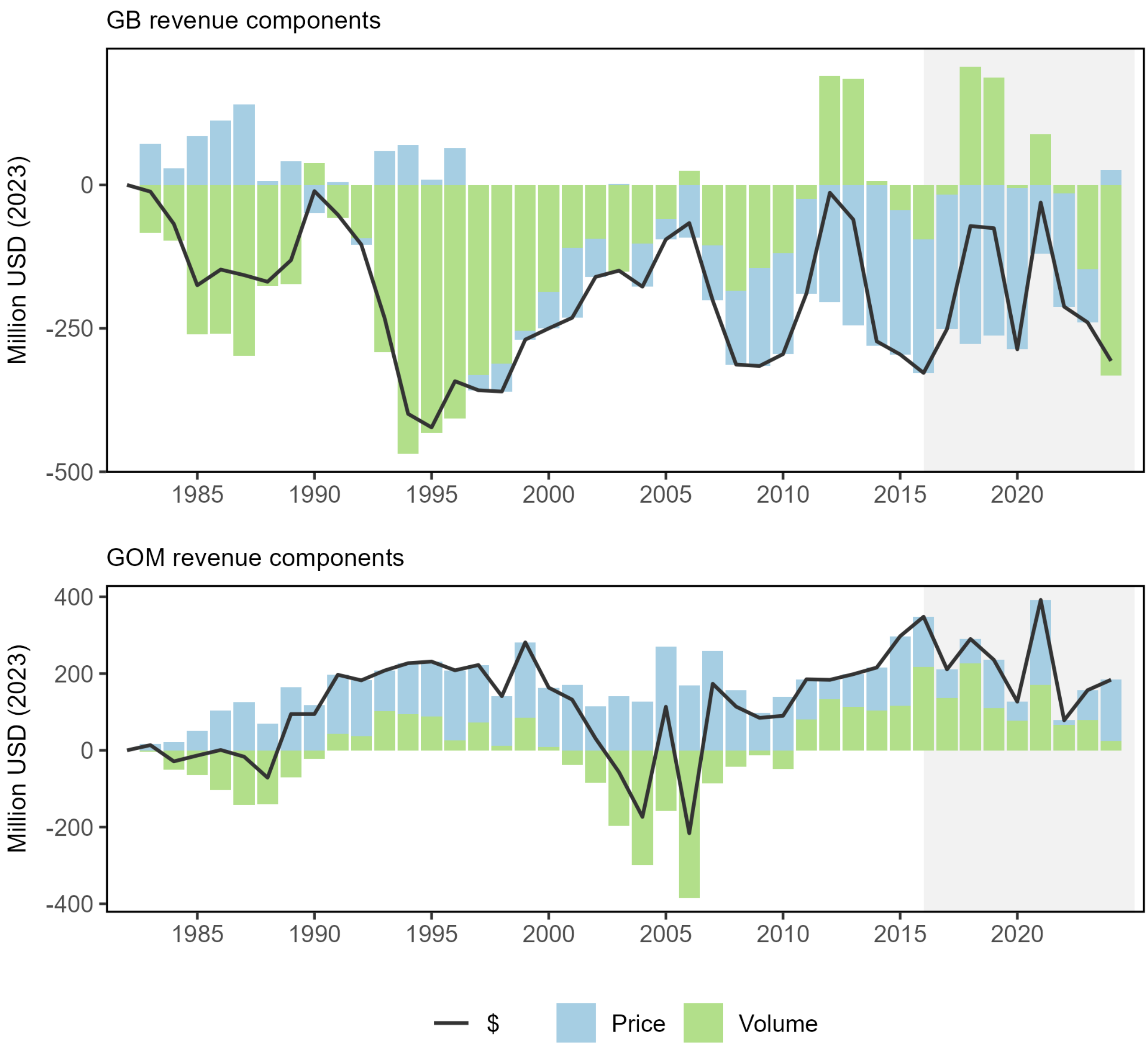


Figure 12: Revenue change from 1982 values in 2024 dollars (black); Price (blue), and Volume Indicators (green) for total commercial landings in Georges Bank (GB: top) and the Gulf of Maine (GOM: bottom).

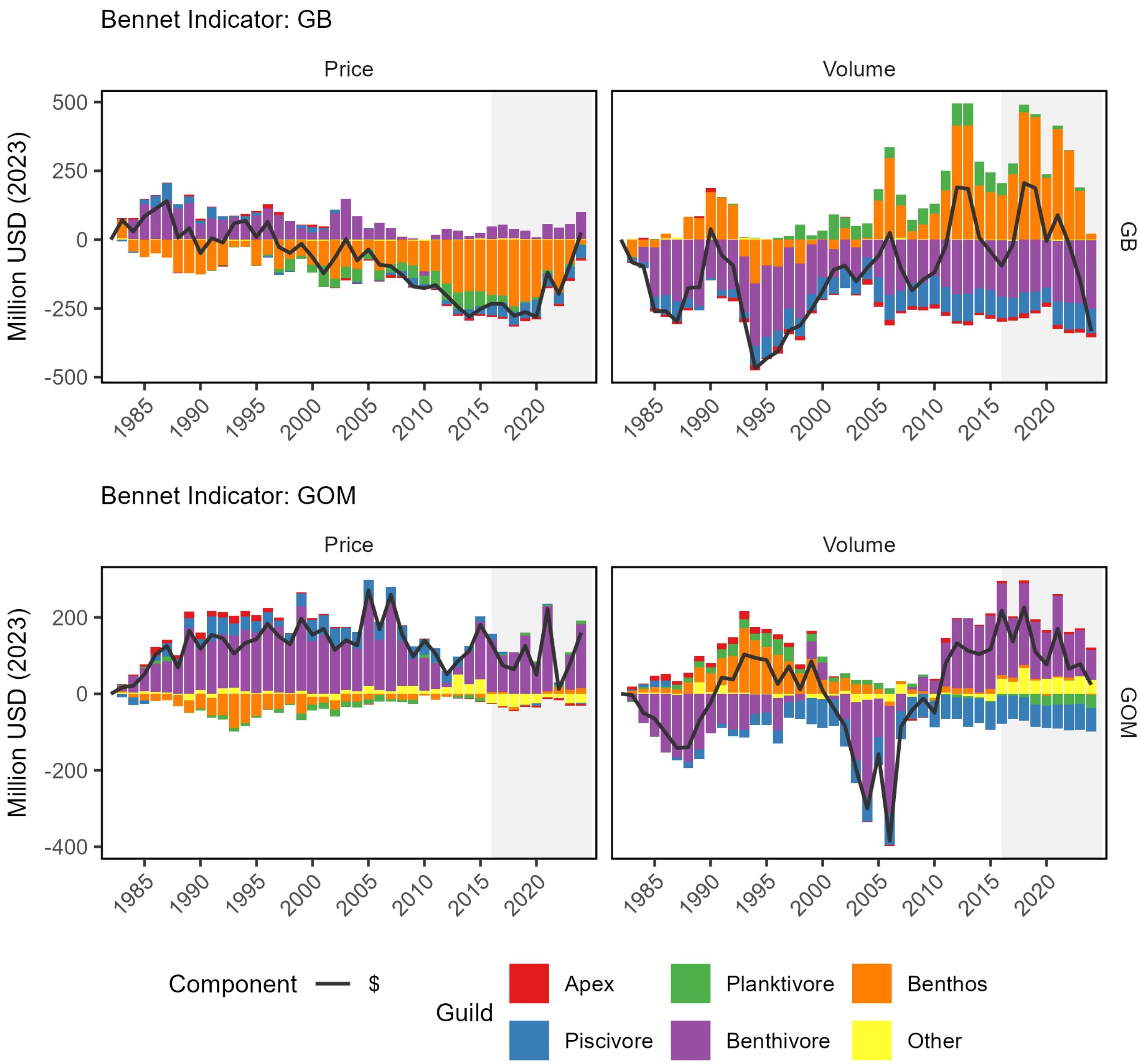


Figure 13: Total price and volume indicators in 2024 dollars (black) for commercial landings, and individual guild contributions to each indicator from Georges Bank (GB: top panels) and the Gulf of Maine (GOM: bottom panels).

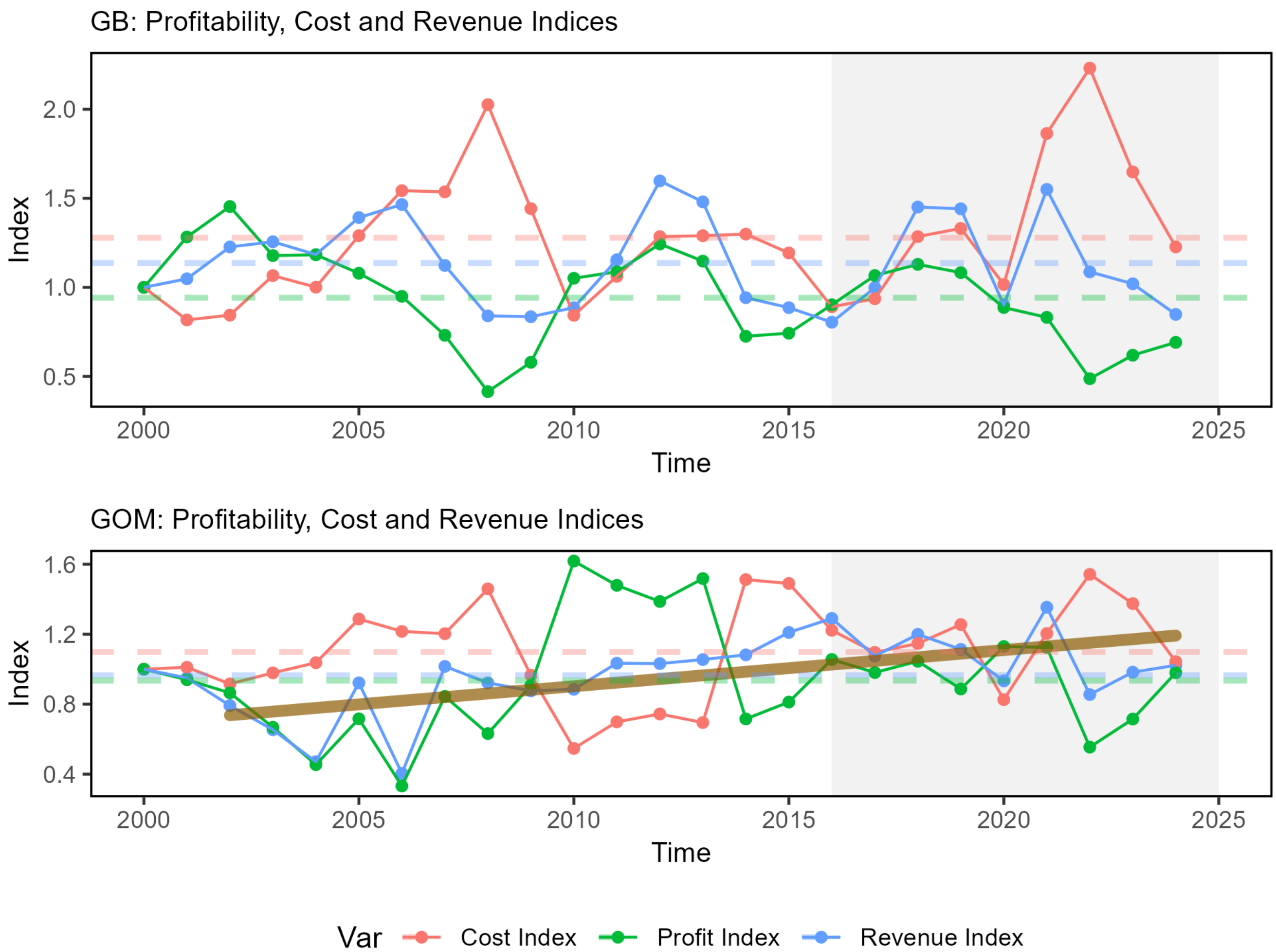


Figure 14: Profitability indices for Georges Bank (GB, top) and the Gulf of Maine (GOM, bottom): cost index (red), profit index (green), and revenue index (blue). Dashed lines represent the long-term annual means for each index. Long-term increasing trend (orange) in the GOM associated with revenue index.

This year, we present new indicators of profitability: indices of cost, revenue, and profit (Fig. 14). In this index, costs pertain to trip costs, excluding labor, estimated for all federal trips in the region. The profit indicator is net-revenue, determined as the difference between trip revenue and trip costs. Trips were spatially allocated to compile regional indices. Indices are presented as values relative to those from 2000, the first year in the dataset.

For trips in GB, high costs and low revenue had caused a low profits over the last 3 years, but recent drops in costs have helped compensate for low revenue. GB profits have no long-term trend, but a cyclical revenue driven by rotational scallop management can impact profitability. In the GOM, the profit index closely follows the same trends as the revenue index with the exception of 2010 - 2013 where low costs created a surge in the profit index. In 2024, the GOM profit index returned to near the long-term average with average costs and revenue.

For New England ports, total vulnerability of revenue was moderate in 2024 with no long-term trend (Fig. 15). This suggests that while New England commercial fishing is moderately reliant on climate-sensitive species, this proportion has not significantly changed since 2000.

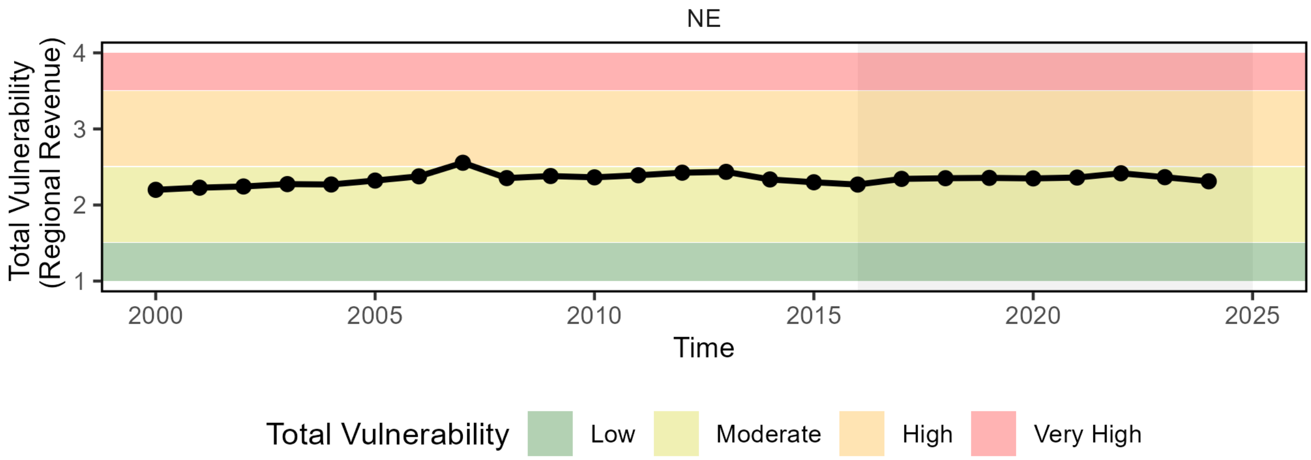


Figure 15: New England region total vulnerability of commercial revenue (sum of New England port landings weighted by species vulnerability scores). Horizontal colored bars show different environmental variability risk levels.

Implications

The overall volume of lobster and scallops, quahogs and surfclams have dictated the revenue trends within the GB region. In the GOM, lobster prices and landings are primarily responsible for the overall high revenues over the time series. Notably, both lobsters and scallops are sensitive to ocean warming and acidification and it is important to monitor the effects of these and other ecosystem drivers.

Recreational Opportunities

Indicators: Angler trips, fleet diversity

Recreational effort (angler trips) increased from 1982 to 2010, but has since declined to just below the long-term average (Fig. 16). Recreational fleets are defined as private vessels, shore-based fishing, or party-charter vessels. Recreational fleet diversity, or the relative importance of each fleet type, has remained relatively stable over the latter half of the time series (Fig. 17). Billfish landings were notably high in 2025 (See 2025 Highlights Section), but long-term time series are in development.

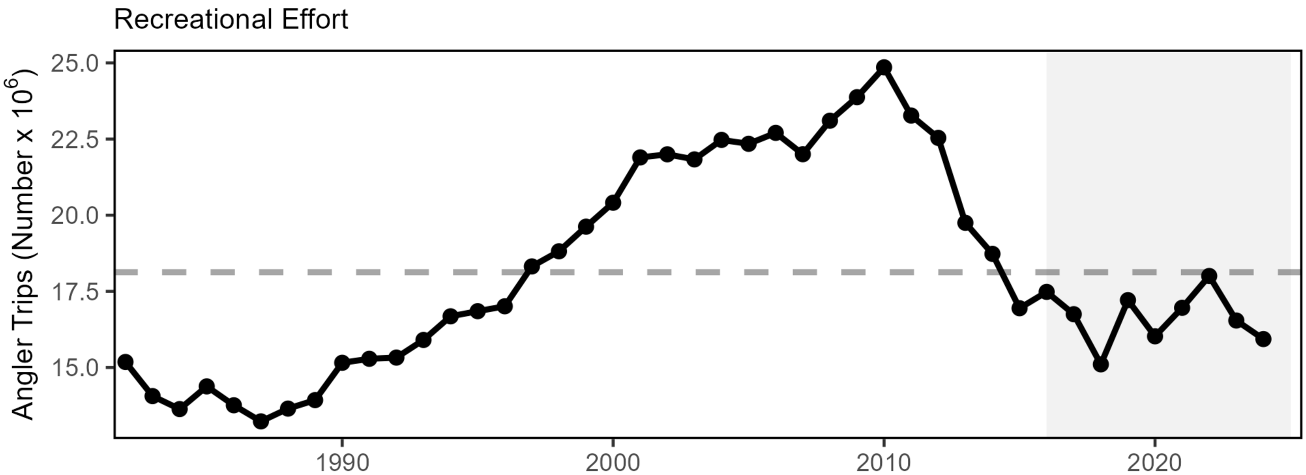


Figure 16: Recreational effort (total number of recreational angler trips from 1980-2024) in New England. Derived from NOAA Fisheries Marine Recreational Information Program's Effort Time Series Query.

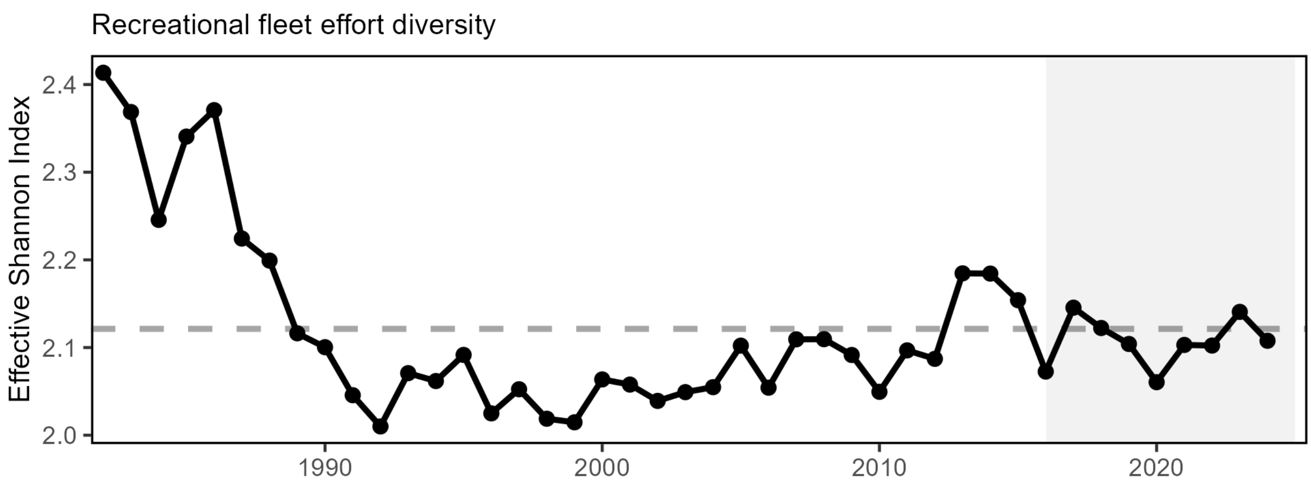


Figure 17: Recreational fleet effort diversity from 1980-2024 in New England.

Implications

The absence of a long-term trend in recreational angler trips and fleet effort diversity suggests relative stability in the overall number of recreational opportunities in the region.

Social and Community Risks

Fisheries management seeks to provide for sustained participation of fishing communities and to avoid adverse economic impacts to fishing communities. A new composite indicator (Port Commercial Fishing Activity Indicator or PCFA) utilizes NOAA data on dealers, fish landings, and commercial permits to explore trends in commercial fishing activity over time in top ports. This information can be used to understand how changes in fish stocks, regulations, and other social-ecological factors may have disparately impacted ports throughout the Greater Atlantic region.

The recreational engagement index has not been updated from last year and will be updated with similar methods as PCFA in future reports. The recreational engagement index demonstrates participation levels in recreational fishing in a given community relative to other coastal communities in a region.

The Community Social Vulnerability Indicators (CSVI) utilize U.S. Census American Community Survey data to describe social characteristics at the municipality level (i.e., not just the fishing community) and provide context for the municipalities utilized by commercial fishing industry participants. Fishing industry participants that live in and/or utilize resources in municipalities with relatively concerning socio-demographic conditions may be more vulnerable to changes. The personal disruption index addresses factors that reduce adaptability to change such as unemployment or educational level. The poverty index is a composite index that indicates a community's financial standing relative to other communities. The population composition index characterizes groups within communities that may be more vulnerable to change. CSVI information for communities highlighted in the PCFA and recreational engagement index have been updated with the most recent census data.

Coastal fishing communities worldwide have or are likely to experience social, economic, and cultural impacts from climate change, both negative (e.g., loss of infrastructure, fish stock decline) and positive (e.g., increased abundance of valuable species). Changes in marine fisheries as a consequence of climate change will require adaptation by coastal fishing communities and fisheries managers alike. The Community Environmental Variability Risk Indicators (CEVRI) were developed to help examine trends in risk related to dependence on species vulnerable to climate and environmental changes.

Indicators: Port Commercial Fishing Activity and Community Social Vulnerability

The Port Commercial Fishing Activity Indicator (PCFA) (Fig. 18) highlights significant shifts in industry engagement across major regional ports. New Bedford, Gloucester, and Boston, MA and Portland, ME, have lower fishing activity compared to their 2007–2011 averages. Because New Bedford and Boston also rank medium-high for socio-demographic vulnerability, industry participants in these municipalities face a higher risk from these changing conditions. Conversely, several communities show substantial growth in fishing activity. Chatham, MA, along with Stonington, Friendship, Harpswell, ME, are seeing increased port activity since 2007-2011.

Of the top 10 most active recreational communities, only Seabrook, NH had medium or higher ranks for at least one socio-demographic indicator (Table 6) (Fig. 19)examined here (poverty, personal disruption, population composition). This suggests that future changes to recreational fishing conditions may disproportionately impact Seabrook.

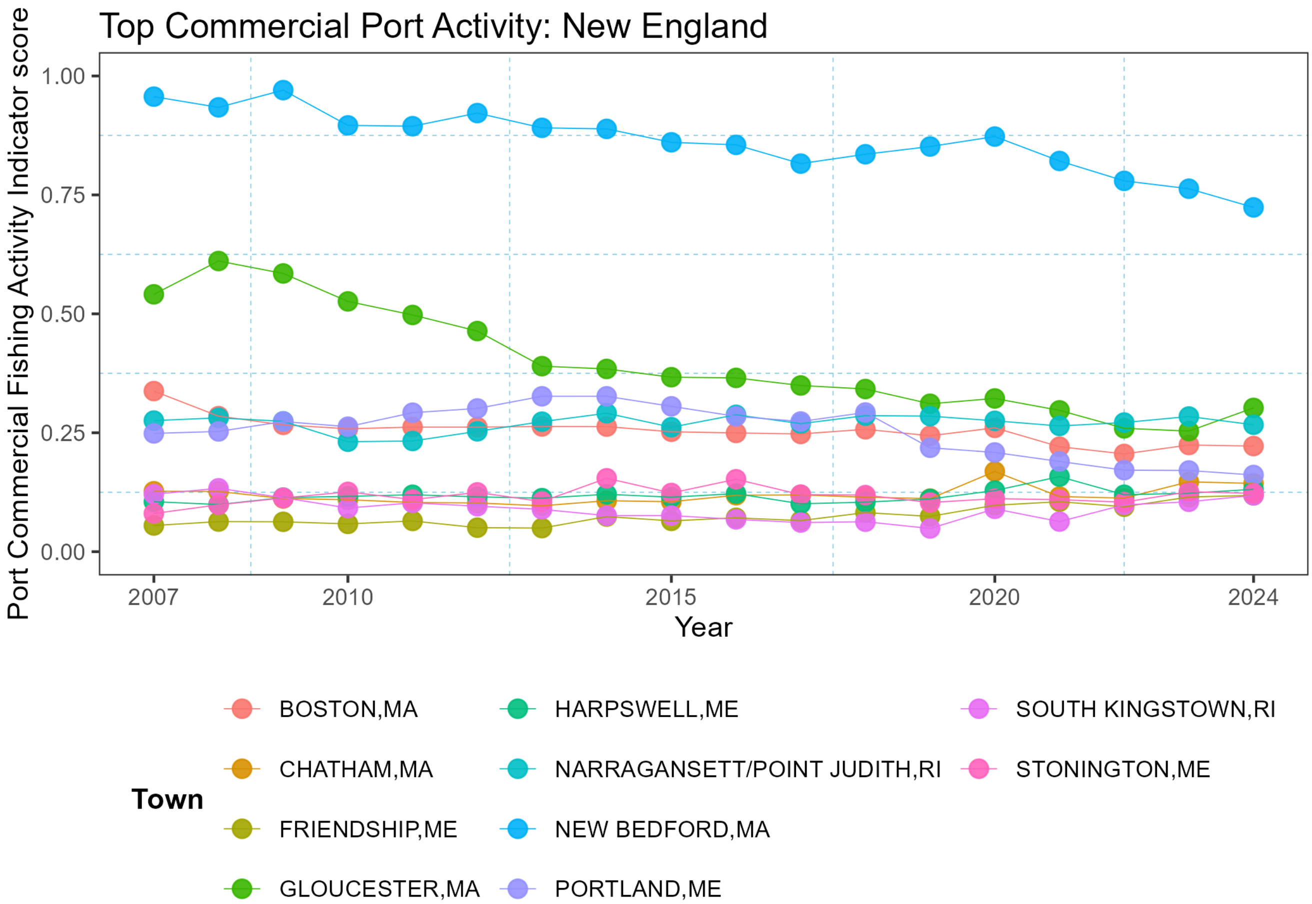


Figure 18: Port Commercial Fishing Activity Indicator scores over time in the top 10 commercially active fishing ports in New England.

Table 5: Community Vulnerability factors for the municipalities housing the top 10 commercially active New England Ports

Community	Personal Disruption	Population Composition	Poverty
New Bedford, MA	high	med high	med high
Boston, MA	med	med high	med high
Gloucester, MA	low	low	med
Chatham, MA	low	low	low
Portland, ME	low	low	low
Harpswell, ME	low	low	low
Stonington, ME	low	low	low
Friendship, ME	low	low	low
Narragansett/Point Judith, RI	low	low	low
South Kingstown, RI	low	low	low

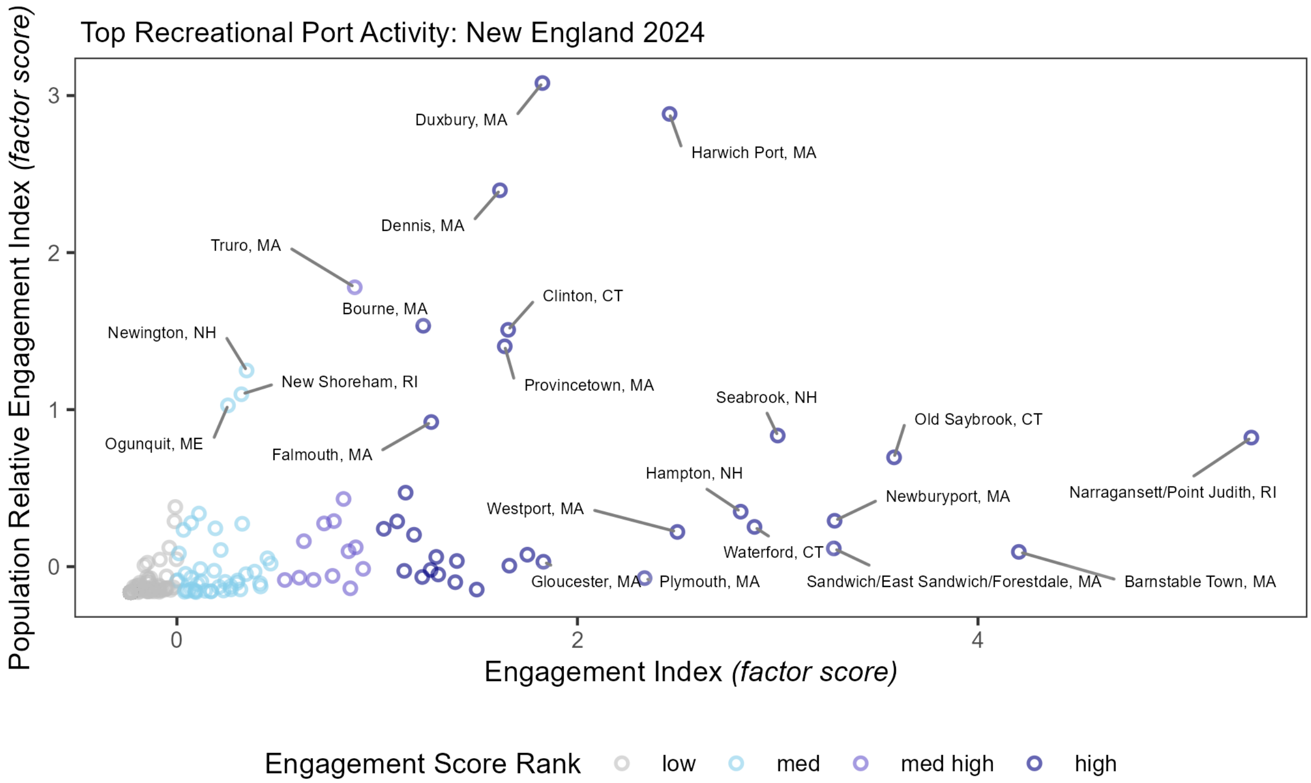


Figure 19: Recreational engagement and population relative engagement with labels for the top recreationally engaged fishing communities in New England (last updated 2024).

Table 6: Community Vulnerability factors for the top 10 recreationally engaged New England Ports

Community	Personal Disruption	Population Composition	Poverty
Seabrook, NH	med	low	med
Old Saybrook, CT	low	low	low
Waterford, CT	low	low	low
Harwich Port, MA	low	low	low
Newburyport, MA	low	low	low
Barnstable Town, MA	low	low	low
Sandwich/East Sandwich/Forestdale, MA	low	low	low
Westport, MA	low	low	low
Hampton, NH	low	low	low
Narragansett/Point Judith, RI	low	low	low

Indicators: Community Environmental Variability Risk in New England

Community Environmental Variability Risk Indicators (CEVRI) measure risk by linking commercial landings and revenue to specific climate sensitivity factors, including temperature, ocean acidification, and stock status using the

Climate Vulnerability Assessment (CVA) scores. These indicators calculate total sensitivity and vulnerability scores based on a community's dependence on species vulnerable to climate change. Risk scores range from low (1) to high (4), increasing as a community relies more heavily on species at higher risk from environmental shifts.While there is no long-term trend in risk across New England communities, the proportion of communities with moderate risk is decreasing and shifting more towards high or very high risk scores (Fig. 20). This shift demonstrates that regional communities are increasing their dependence on species that are highly vulnerable to changing ocean conditions for their commercial revenue. Strategies for management should account for this increased reliance on climate-sensitive stocks.

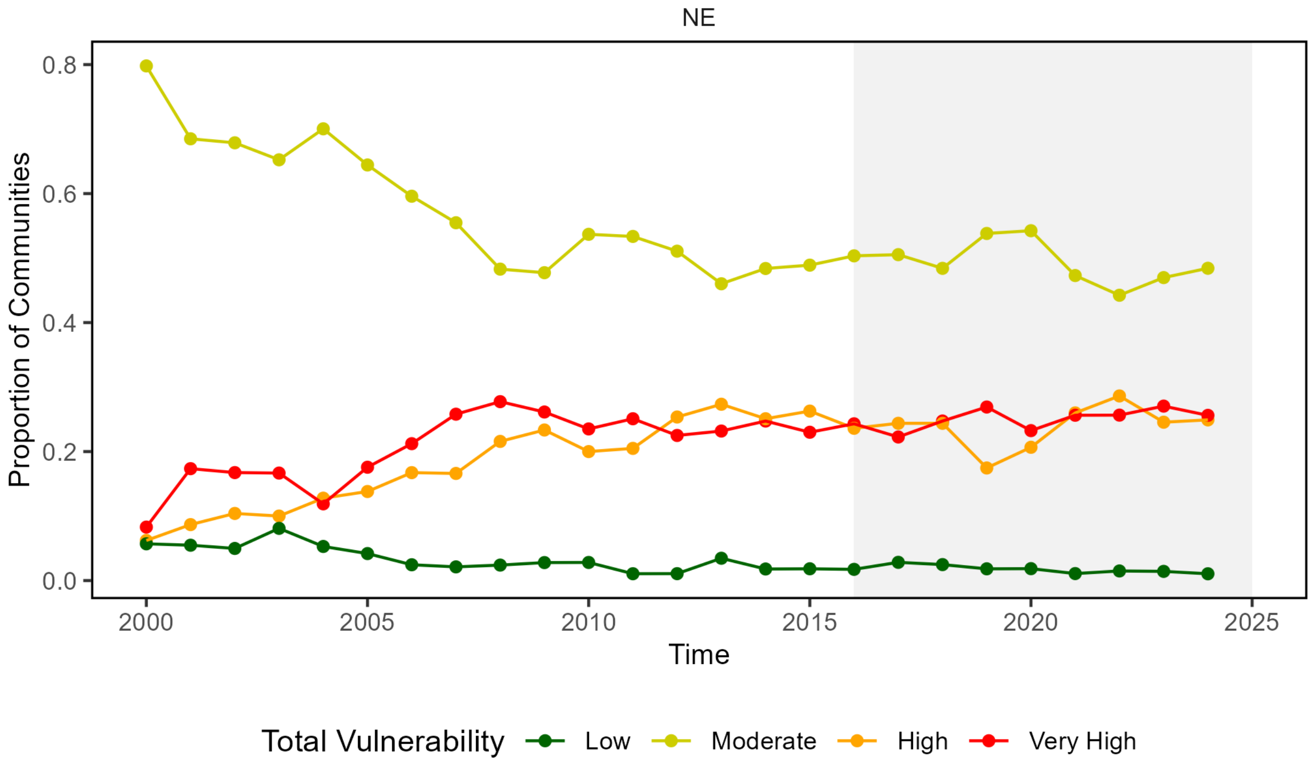


Figure 20: Proportion of New England communities at each revenue vulnerability level over time. Total vulnerability ranges from low (green), moderate (yellow), high (orange), to very high (red).

Implications

Social and demographic indicators highlight potential vulnerabilities in New England's most active commercial fishing ports. Industry participants in these locations face increased risk from shifting fishing patterns, whether driven by new regulations or broader ecosystem changes. Because many of these primary communities show medium to high socio-demographic risk, they may lack the necessary resources to adapt effectively to industry transitions.

Protected Species

Fishery management objectives for protected species generally focus on reducing threats and on habitat conservation/restoration. Specific actions include managing bycatch to remain below potential biological removal (PBR) thresholds, recovering endangered populations, and monitoring unusual mortality events (UMEs). Protected species include marine mammals protected under the Marine Mammal Protection Act, endangered and threatened species protected under the Endangered Species Act, and migratory birds protected under the Migratory Bird Treaty Act.

In the Northeast U.S., endangered/threatened species include Atlantic salmon, Atlantic and shortnose sturgeon, all sea turtle species, giant manta ray, oceanic whitetip shark, and five baleen whales. Here we report on performance relative to these objectives, as well as how observed and predicted ecosystem changes in the Northeast U.S may impact these objectives in the future.

Indicators: bycatch, population (adult and juvenile) numbers, mortalities

The management objective for harbor porpoise has been met, as the average index (Fig. 21) remains below the current PBR threshold.

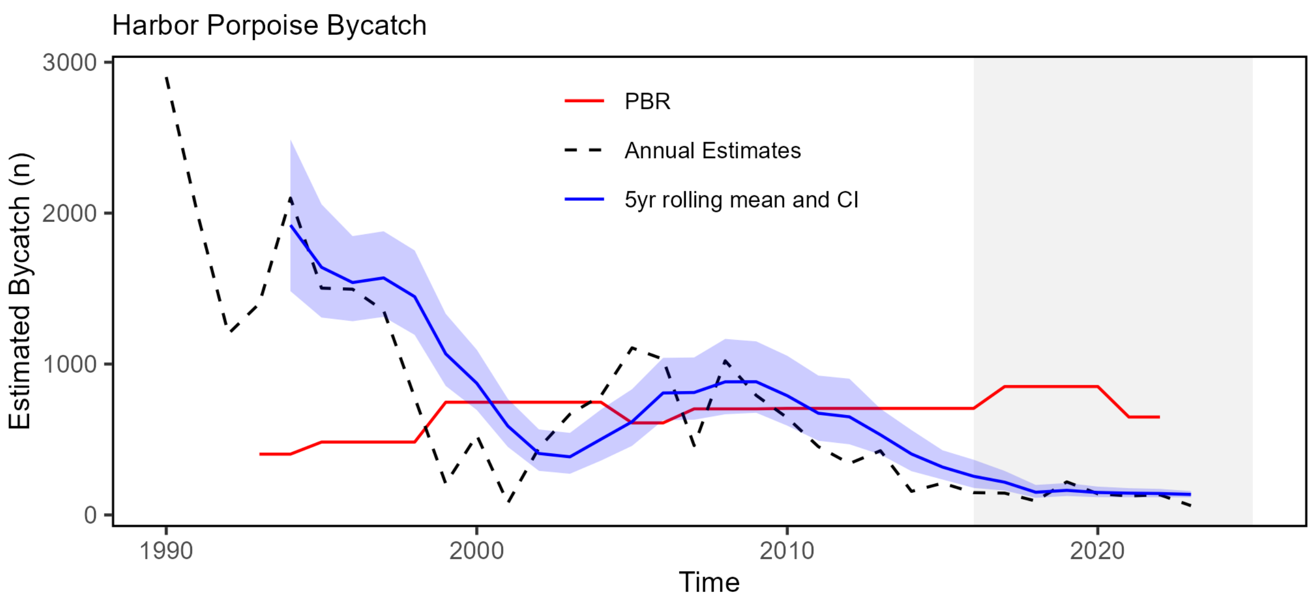


Figure 21: Harbor porpoise average bycatch estimate for Mid-Atlantic and New England gillnet fisheries (blue, confidence interval shaded) and the potential biological removal (red). The dashed line (black) represents the annual estimated bycatch.

The annual estimate for gray seal bycatch, most of which occurs in New England, has generally declined since 2019, in part driven by declining gillnet landings, although, post-2019 estimates have greater uncertainty stemming from low observer coverage. The U.S. and Canadian range-wide PBR for gray seals is 12,052. While the PBR for the U.S. portion of this stock was reduced to 756 animals (Fig. 22), bycatch is unlikely to exceed the range-wide PBR due to incomplete data on anthropogenic mortality and serious injury. Thus the bycatch management objective for gray seals has been met.

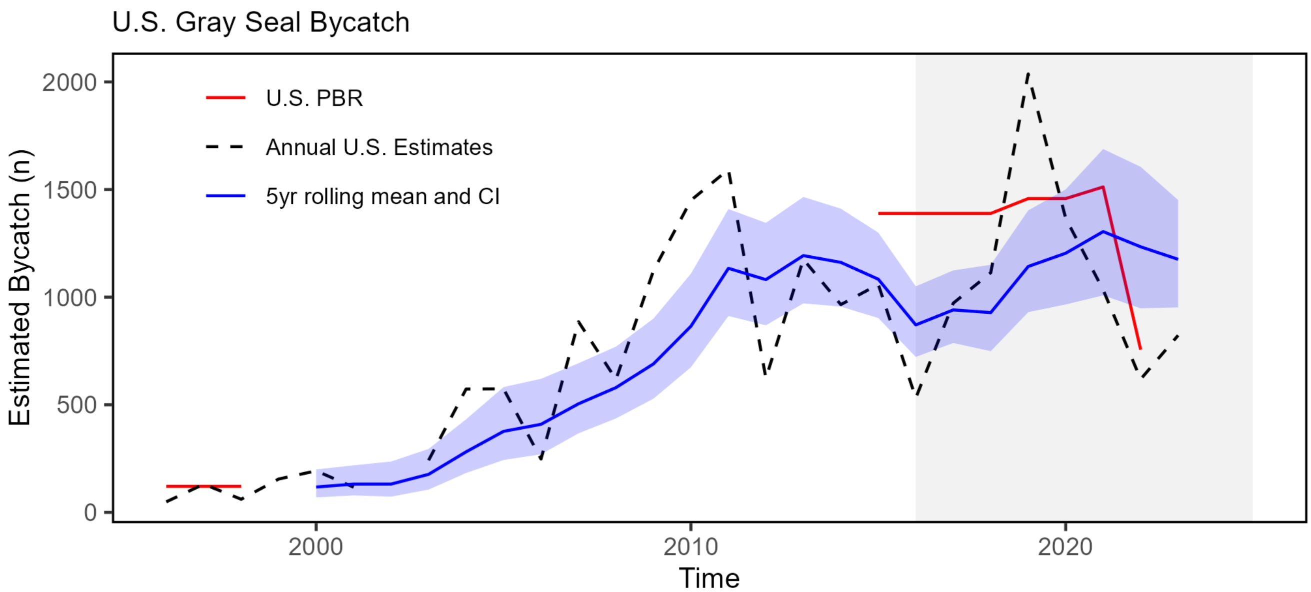


Figure 22: Gray seal five-year average bycatch estimate for New England and Mid-Atlantic U.S. gillnet fisheries (blue, with confidence interval shaded) and the potential U.S. biological removal (red). The range-wide potential biological removal (PBR), including both U.S. and Canadian portions of the population, is 12,052 in the draft 2024 SAR. The dashed line (black) represents the annual estimated bycatch.

The North Atlantic right whale population was on a recovery trajectory until a steep decline after 2010 (Fig. 23). While the right whale population has exhibited slow growth since 2020, it continues to experience annual mortalities above recovery thresholds. Reduced survival rates of adult females lead to diverging abundance trends between sexes. It is estimated that there are approximately 70 reproductively active adult females remaining in the population.

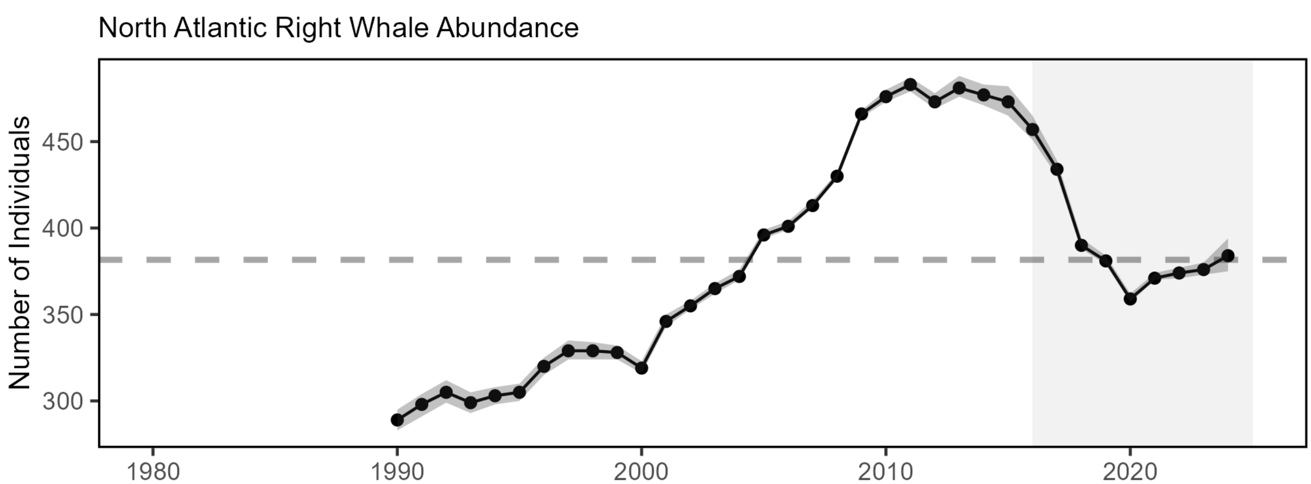


Figure 23: Estimated North Atlantic right whale abundance on the Northeast Shelf. 95% confidence interval shaded in gray around the line.

North Atlantic right whale calf counts have generally declined after 2009 to the point of having zero new calves observed in 2018 (Fig. 24). However, since 2020, calf births have been closer to the long-term average, with 11 calves born in 2025.

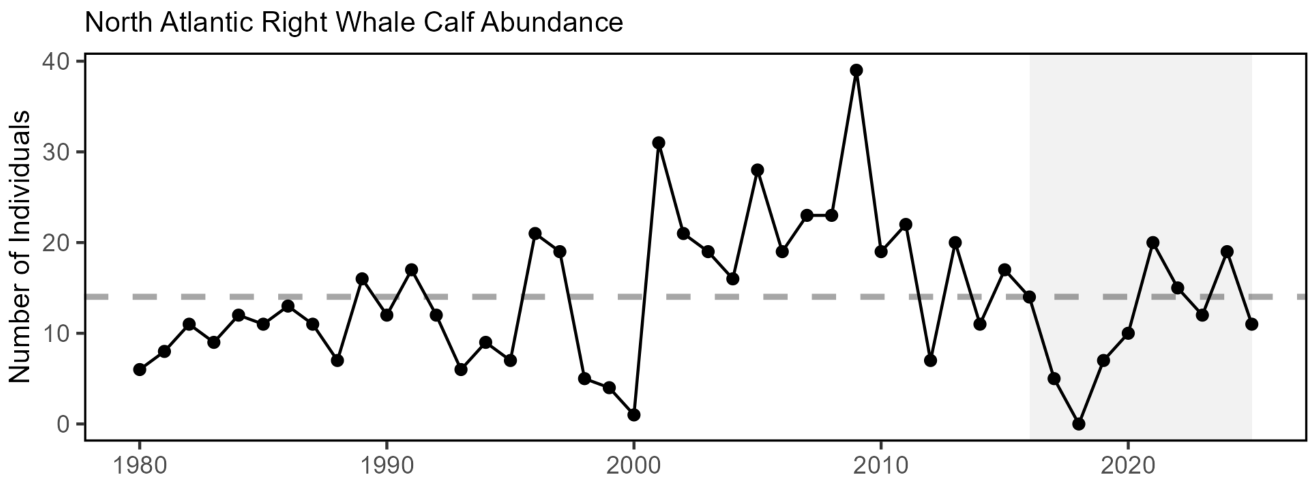


Figure 24: Number of North Atlantic right whale calf births since 1980.

Human interaction from entanglements or vessel strikes remains the primary cause of death in an ongoing North Atlantic right whale Unusual Mortality Event (UME) since 2017. As of January 5, 2026, the UME includes 168 individual whales: 41 confirmed mortalities (19 US; 22 Canada), 40 serious injuries, and 87 sublethal injuries or illnesses. Recent research suggests that many mortalities go unobserved and the true number of mortalities are about three times the count of the observed mortalities.

There is an ongoing UME for humpback whales (2016-present) and Atlantic minke whales (2018-present); suspected causes include human interactions. A UME for Northeast pinnipeds that began in 2018 for infectious disease is non-active pending closure as of February 2026.

Implications

Bycatch management measures have been implemented to maintain bycatch below PBR thresholds. The downward trend in harbor porpoise bycatch could also be due to a decrease in harbor porpoise abundance in U.S. waters, reducing their overlap with fisheries, and a decrease in gillnet effort. The increasing trend in 5-year average gray seal bycatch may be related to an increase in the gray seal population (U.S. pup counts; Fig. 25), supported by the dramatic rise over the last three decades in observed numbers of gray seal pups born at U.S. breeding sites plus an increase in adult seals at the breeding sites, some of which are supplemented by Canadian adults.

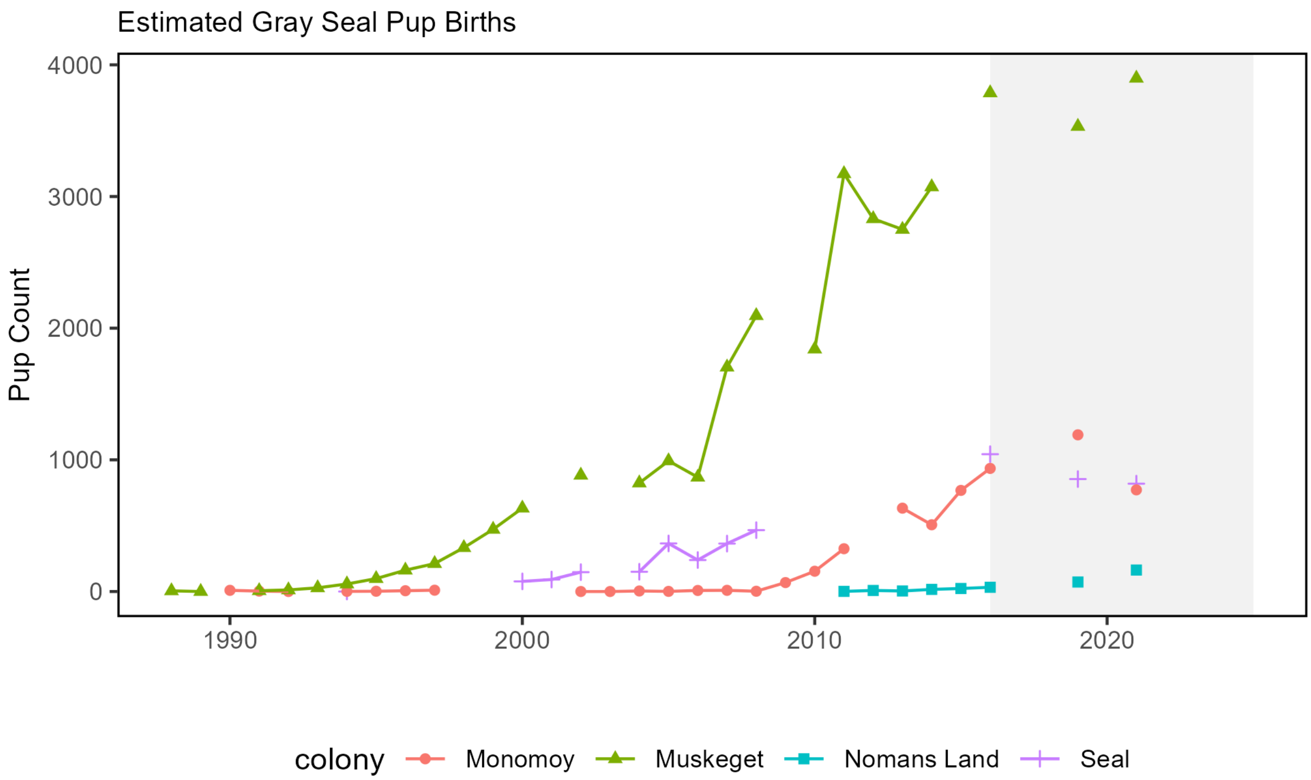


Figure 25: Estimated number of gray seal pups born at four United States pupping colonies at various times from 1988 to 2021.

Strong evidence exists to suggest that interactions between right whales and both the fixed gear fisheries in the U.S. and Canada and vessel strikes in the U.S. are contributing substantially to the decline of the species. Further, right whale distribution has changed since 2010. Recent research suggests that recent climate driven changes in ocean circulation have resulted in right whale distribution changes driven by increased warm water influx through the Northeast Channel, which has reduced the primary right whale prey (the copepod *Calanus finmarchicus*) in the central and eastern portions of the Gulf of Maine. Additional potential stressors include offshore wind development, which overlaps with important habitat areas used year-round by right whales, including mother and calf migration corridors and foraging habitat. Additional information can be found in the offshore wind risks section.

The UMEs are under investigation and are likely the result of multiple drivers. For all large whale UMEs, human interaction appears to have contributed to increased mortalities, although investigations are not complete.

A climate vulnerability assessment is published for Atlantic and Gulf marine mammal populations.

Stability

This year, we have updated the definition of stability for fisheries and ecosystems as a measure of how consistent we expect the system to be over time. Three components of stability are considered for the purpose of this report: volatility, adaptive capacity, and a shift from baseline. Volatility is a measure of predictability, where volatile conditions indicate that future years are more likely to be different than the recent past. Adaptive capacity refers to a system's ability to respond to changes without fundamentally changing its composition or structure. A shift from baseline refers to a systemic shift in a system towards a new status, where prior conditions may no longer be the norm. Measures of volatility are currently being developed. Therefore, we assess fisheries and ecosystem stability as "stable" if there is no notable change in adaptive capacity or shifts from a historic baseline, and "not stable" if there are changes in either of these components.

Fishery Stability Fisheries in Georges Bank and the Gulf of Maine are dominated by single species. Total landings are declining in both regions, although overall revenue does not have a long-term trend. Revenue from Council-managed fisheries in the GOM and GB have declined over time. However, revenue per unit effort remains steady or increasing over time for most gear types, indicating financial viability of current fishing operations. Although the effective number of species being landed in the commercial fleet rebounded slightly from the historical low of 2021, the diversity in catch is still well below the series average, indicating increasing reliance on a smaller number of species. Commercial fishery fleet count (Fig. 26) is also below the time series average due to varying barriers to enter and invest into the fleet. While some opportunity to diversify catch has allowed crew and vessel owners to continue at a sustainable rate, other barriers such as shifting species distribution and population shifts leave commercial crew and vessel owners in vulnerable positions to adapt to these changes. In Georges Bank, cyclic landings and revenue patterns are driven by scallops and decrease the predictability of earnings from year to year. In the Gulf of Maine, landings and revenue are driven by lobster. The increasing importance of lobster over time is mirrored in the decreasing contribution of Council-managed fisheries to Gulf of Maine total landings and revenue.

Results from the Crew Survey suggest many commercial fishing crews in New England are dissatisfied with the predictability of their earnings, the amount of time away from home, and the physical fatigue and personal health impacts from the job. Additionally, the survey results demonstrate evidence of aging or "graying" of the fleet in New England, which combined with a lack of new entrants to the industry suggests that participation in commercial fishing is declining across the region.

Communities at Sea indicators show a decline in the number of New England fishing communities since 1996, suggesting a consolidation of fishing operations and employment concentrated into fewer ports. Fishing days on trawlers, a proxy for employment, has also declined over this time period, while employment in lobster communities has increased. Adaptive capacity indicators show that the ability to shift target species and fishing grounds varies by community, which is most limited in lobster potting communities. The Communities at Sea indicators combined with the declining fleet count and declining overall landings, suggests a reduced capacity for New England commercial fisheries to adapt to future change.

The number of recreational trips is below average, although there is no long-term trend, and recreational landings have been declining (Fig. 16). Low recreational landings may also be driven by a shift to catch-and-release fishing and stricter shark and large sport fish regulations. Recreational effort diversity is near average with no trend (Fig. 27) and there has been no shift in angling modes, suggesting steady recreational fishing opportunities. Recreational species catch diversity has increased over time (Fig. 28), indicating that anglers are catching a more varied mix of species, likely due to shifting species distributions.

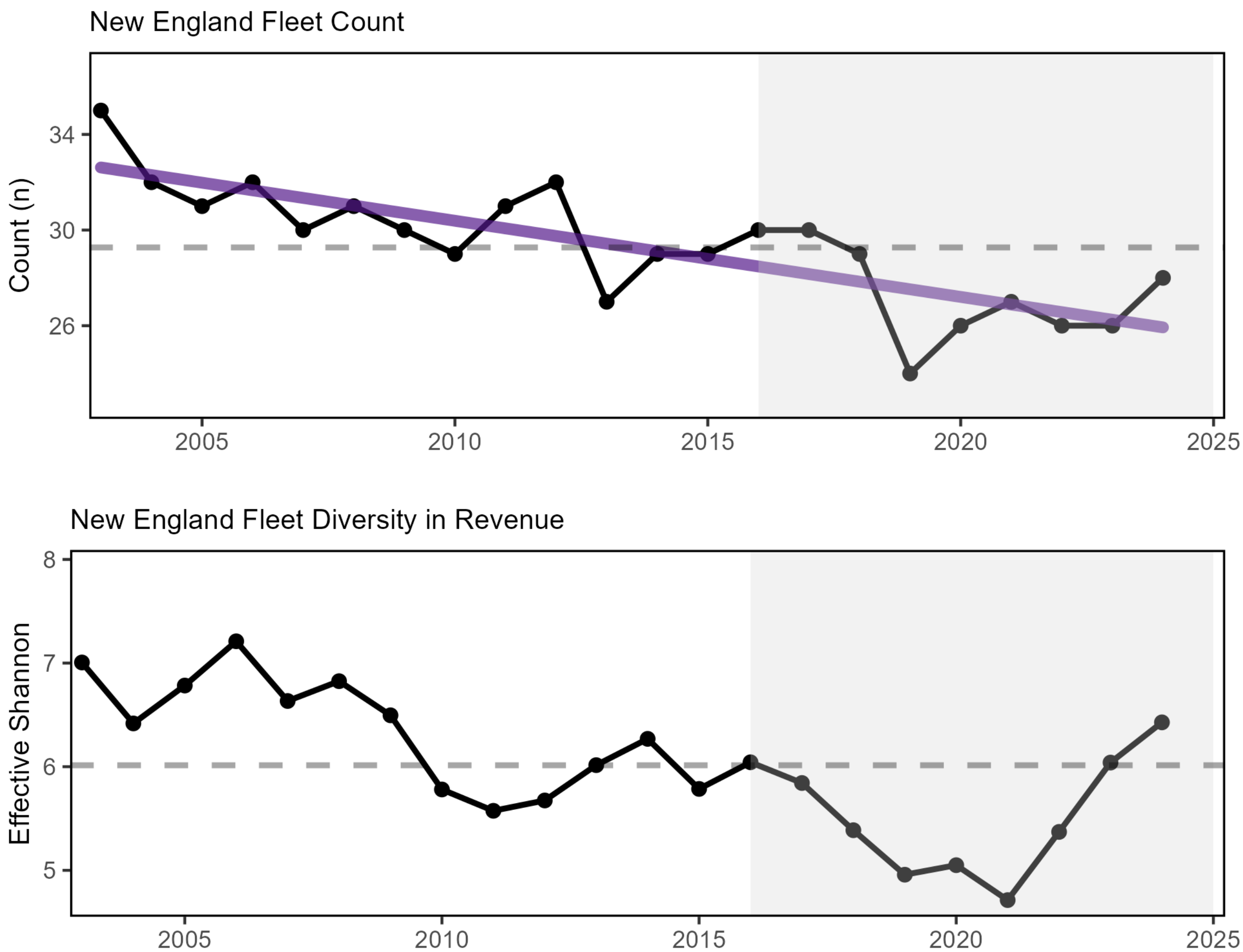


Figure 26: Commercial fleet count in New England with significant long-term decline (purple line).

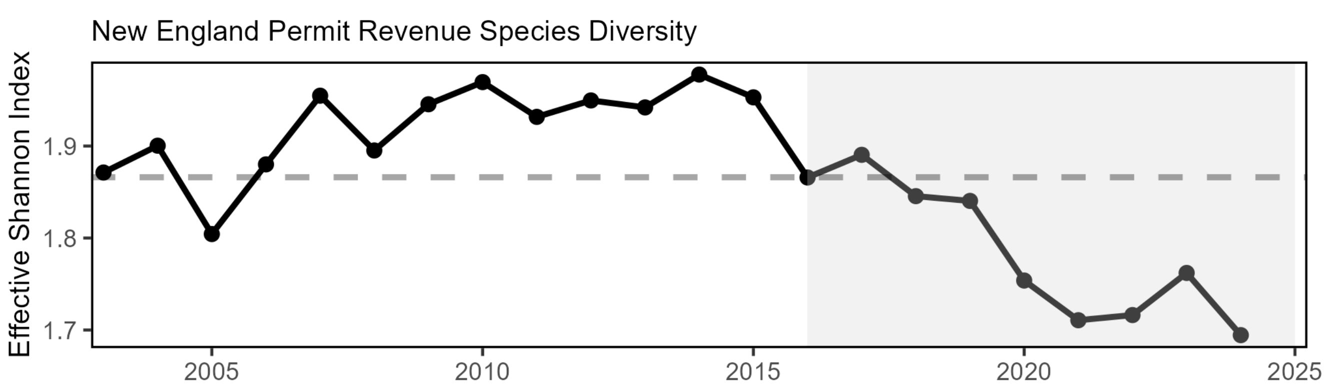


Figure 27: Species revenue diversity (permit-level species effective Shannon index) in New England.

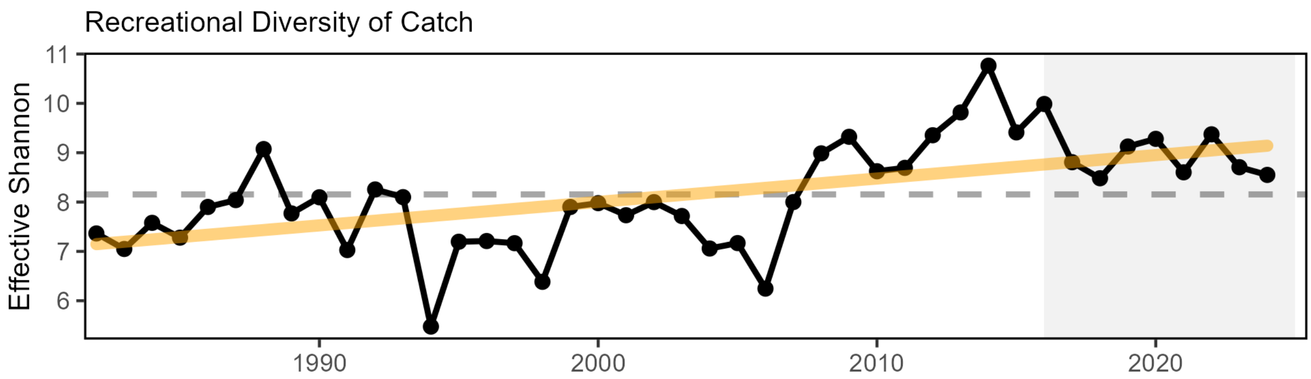


Figure 28: Diversity of recreational catch in New England, with long-term increasing trend (orange). Derived from NOAA Fisheries Marine Recreational Information Program's Catch Time Series Query.

Ecological Stability Long-term changes in biological production suggest the Georges Bank ecosystem is experiencing a system-wide shift. Total annual primary production (TPP) (Fig. 29)is a measure of the total amount of carbon (i.e., energy) produced by phytoplankton per year and is variable over time. Zooplankton biomass (Fig. 59) and the biomass of some groups of fish are also increasing (Fig. 8). However, the productivity of managed species has declined over time, suggesting that although the system remains productive, this productivity is driven by non-target species.

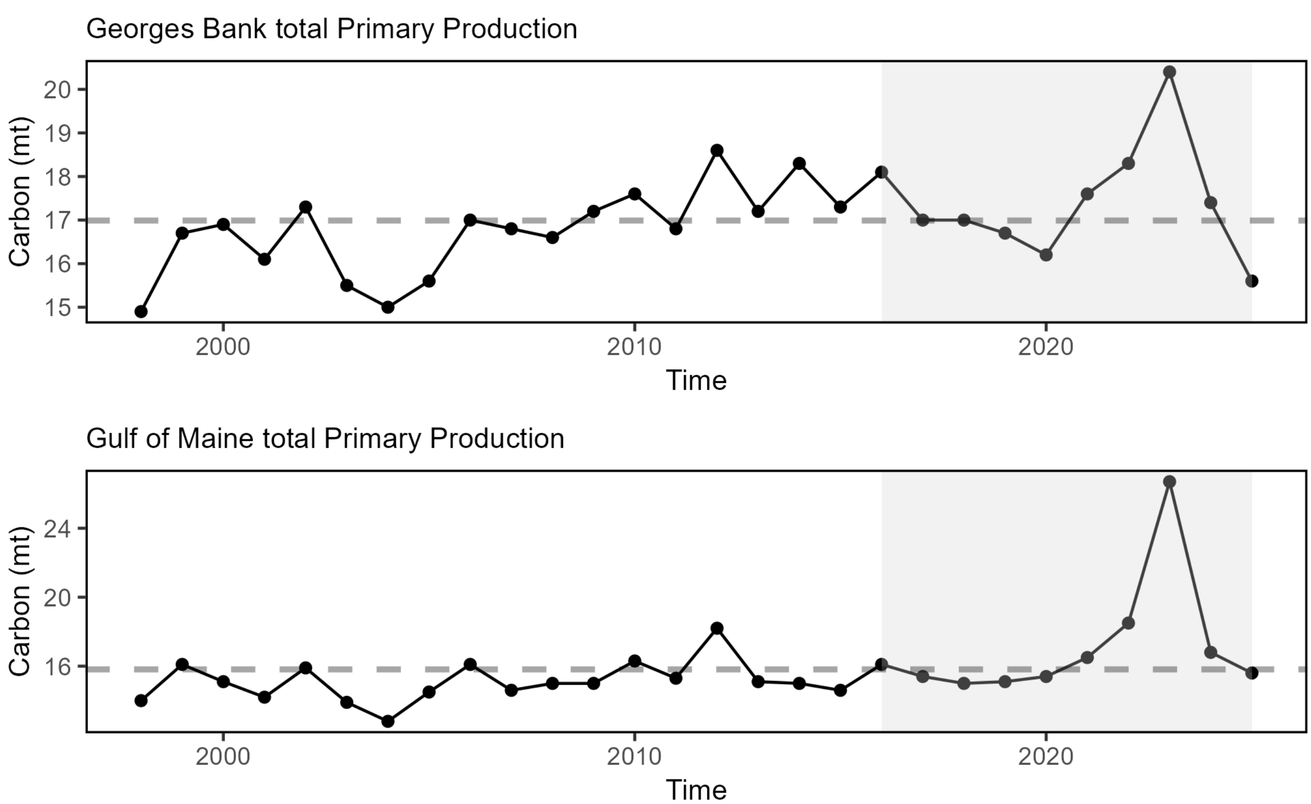


Figure 29: Total areal annual primary production by ecological production unit (Georges Bank, top; Gulf of Maine, bottom). The dashed line represents the long-term (1998-2025) annual mean.

The Gulf of Maine ecosystem has also continued to change over time leading to less predictable ecosystem conditions. Long-term primary productivity has remained relatively constant, but increases in planktivores and euphausiids suggest changing ecosystem dynamics and potential for complex interactions with higher trophic levels. The zooplankton community displays distinct regime shifts in composition corresponding to approximately decadal time scales, with the most recent shift in community composition occurring in 2023 (Fig. 30). Productivity of managed species has declined, with current levels below average, but it is unclear if that is the result of these ecosystem changes.

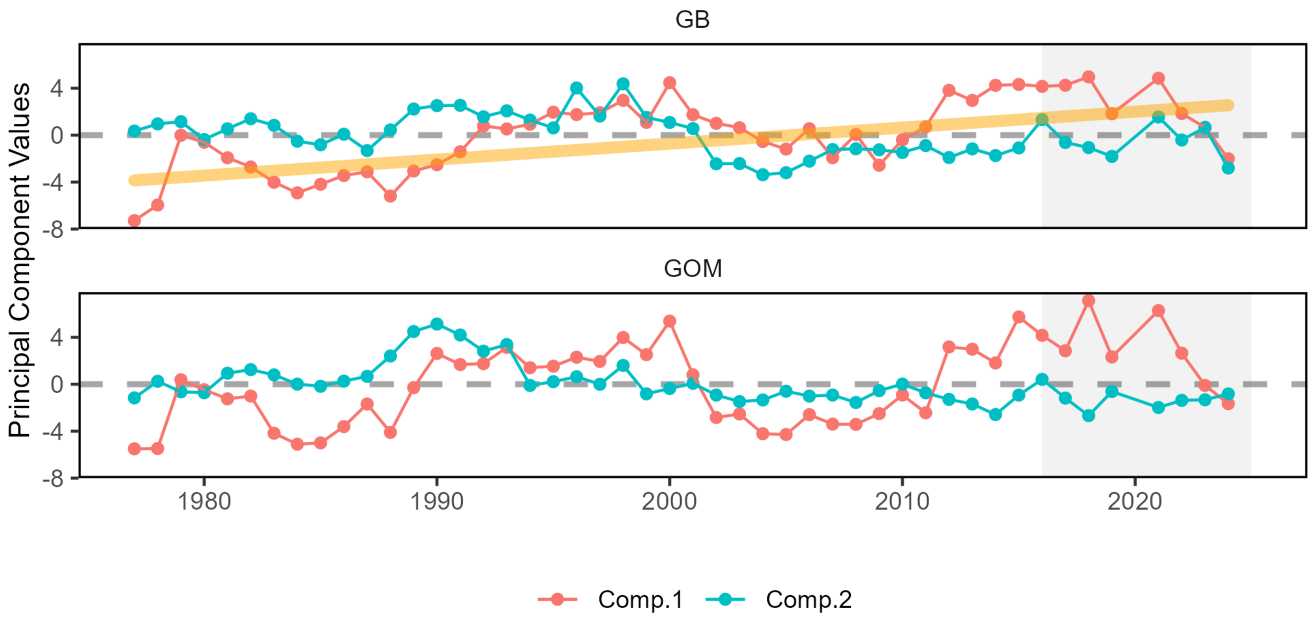


Figure 30: Principal component analysis of zooplankton community composition for Georges Bank (GB, top) and the Gulf of Maine (GOM, bottom). Lines show the first two principal components (colors), with a long-term increase in GB (orange).

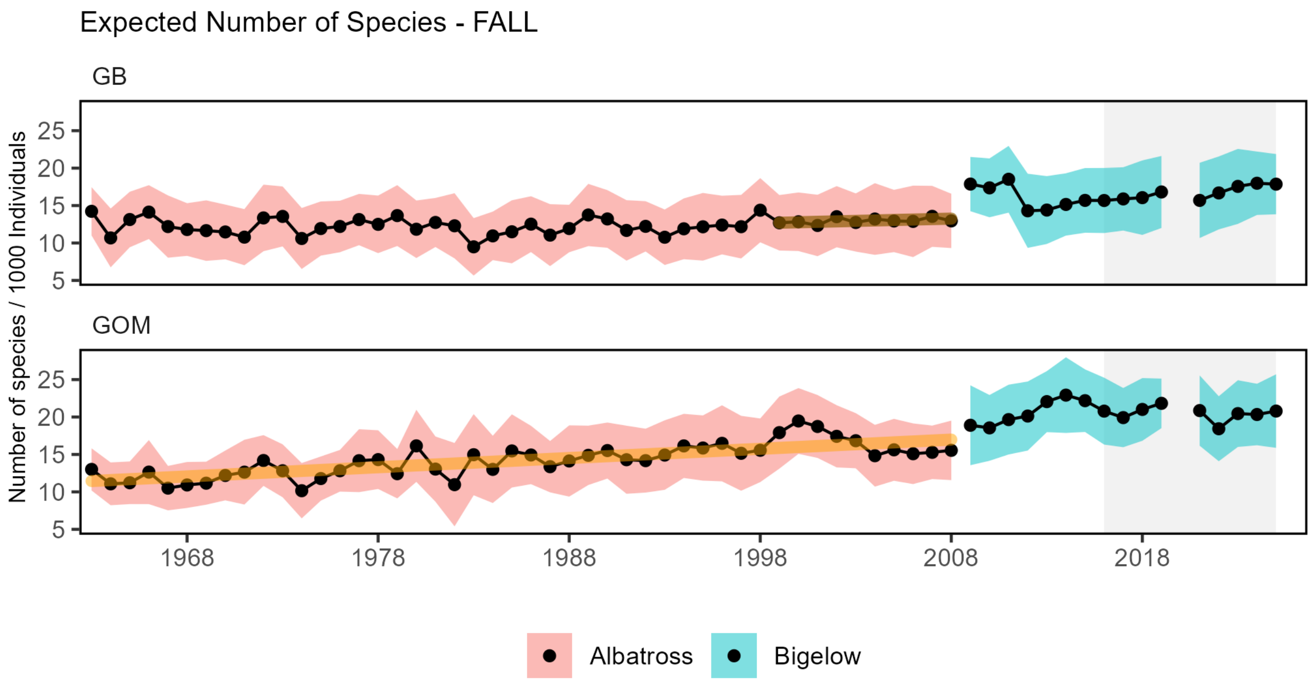


Figure 31: Adult fish diversity for Georges Bank (GB, top) and in the Gulf of Maine (GOM, bottom) with long-term (light orange) and short-term (dark orange) increasing trends, based on expected number of species in a standard number of individuals. Results from survey vessels Albatross (red) and Bigelow (blue) are reported separately due to catchability differences.

Functional traits, such as length at maturity, maximum body size, or fecundity, serve to synthesize change in complex, diverse communities by looking beyond species-specific trends. Furthermore, shifts in functional trait distributions for the fish community can indicate changes in ecosystem-scale resilience. There is evidence for shifts in functional trait distributions in New England (Fig. 32, Fig. 33). Georges Bank (GB) displayed few long-term trends other than reductions in fecundity in both fall and spring. The Gulf of Maine (GOM) displayed long-term trends consistent with shifts towards faster life history strategies particularly in the spring finfish community, including younger age and shorter length at maturity, lower fecundity, and faster growth rate. Interestingly, the spring finfish community in the GOM also displayed increases in trophic level.

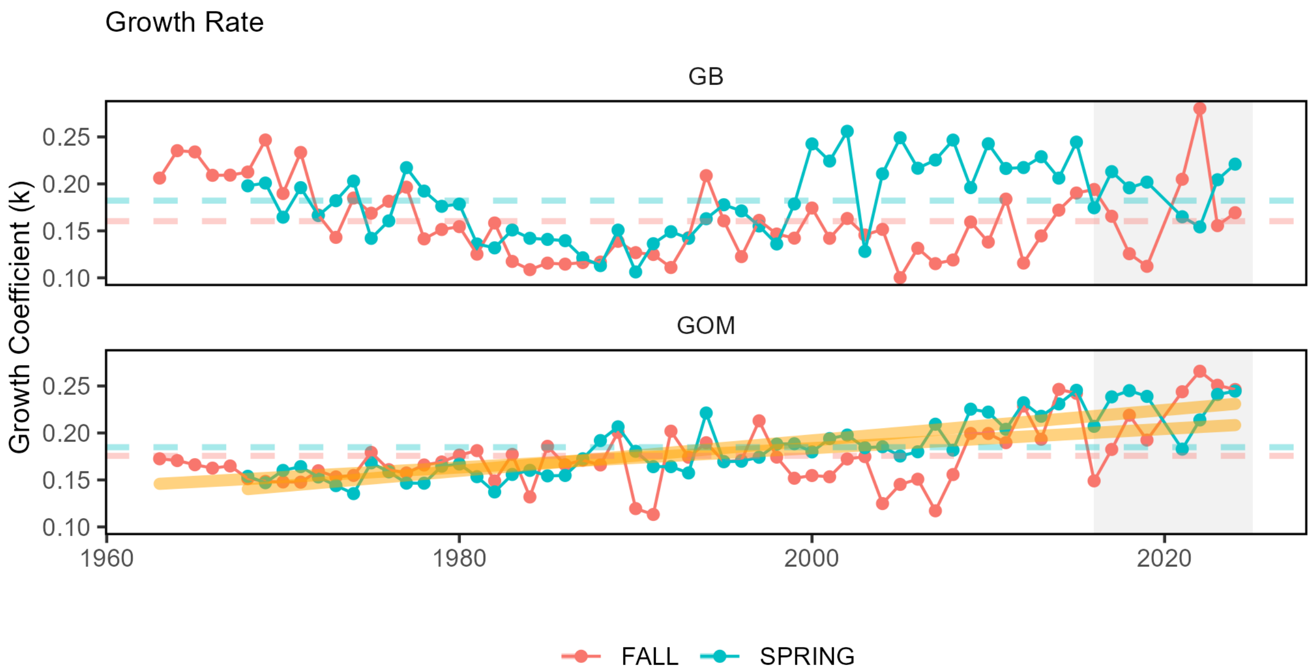


Figure 32: Fish community functional traits (growth rate) in Georges Bank (GB, top) and the Gulf of Maine (GOM, bottom) based on Fall (red) and Spring (blue) survey data with an increasing long-term trend (orange). Dashed lines represent the long-term annual mean for each survey.

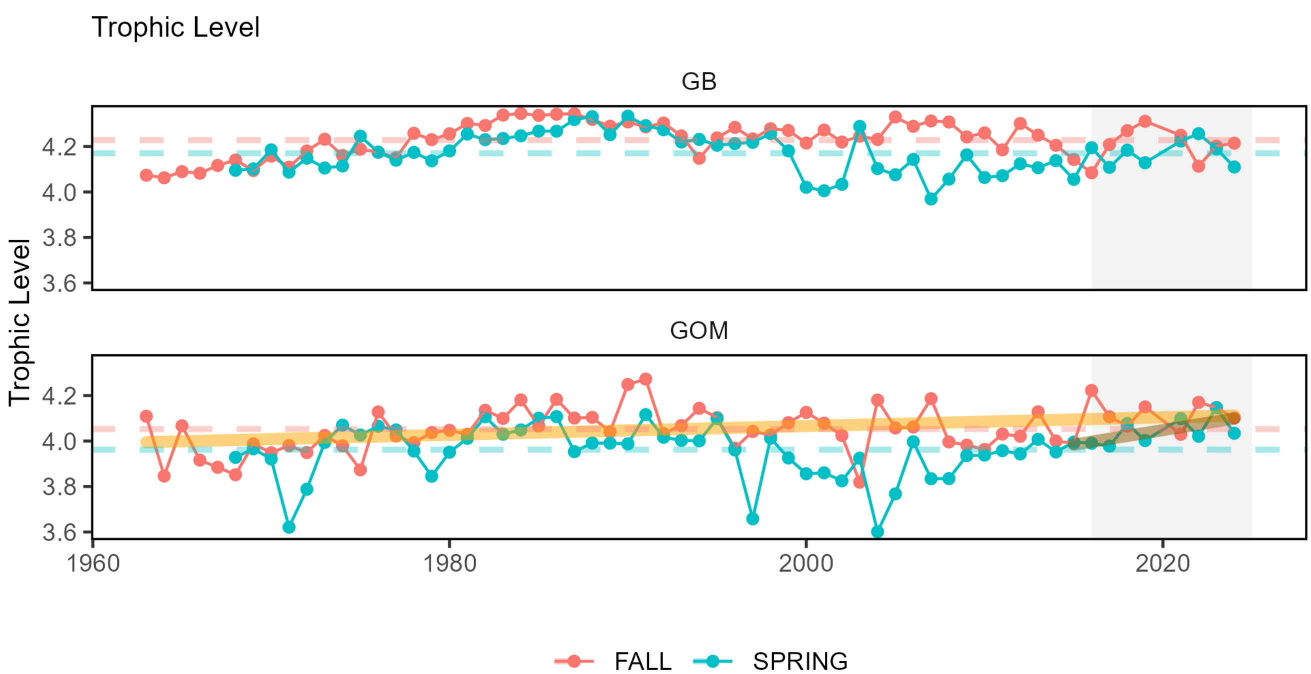


Figure 33: Fish community functional traits (trophic level) in Georges Bank (GB, top) and the Gulf of Maine (GOM, bottom) based on Fall (red) and Spring (blue) survey data with increasing long-term trend (orange) and increasing short-term trend (dark orange). Dashed lines represent the long-term annual mean for each survey.

Increasing Adult fish diversity (Fig. 31) and changes in functional traits such as the mean trophic level suggest that fish communities have changed from a historic baseline. Long-term trends in biomass and functional traits would not be expected in a stable system. However, because the biomass of functional groups of fish has remained relatively constant over time, the system appears able to adapt to change.

Implications

The long-term changes in GB suggest an increasingly productive ecosystem from zooplankton to higher trophic levels, but this is occurring simultaneously with low productivity of managed species. Over the same time period, fisheries on GB have experienced cyclic changes in revenue and increased reliance on a single species, sea scallops. Coupled with demographic changes in fisher populations and a decline in the number of New England fleets, this indicates that fisheries utilizing GB may have a lower capacity to adapt to the changing ecosystem. This lower adaptive capacity with a significant shift from baseline conditions in the ecosystem indicate that both the fishery and ecosystem are currently not stable.

Within the GOM, managed species continue to have low productivity, while there are long-term increases in large zooplankton and planktivores. Cyclic changes in zooplankton communities may make the impact of these changes unpredictable. As these changes in the ecosystem occur, an increasing proportion of total revenue is generated by the lobster fishery. This increased reliance on a single species reduces the region's ability to adapt to changes in resource availability and the environment. For these reasons both the GOM ecosystem and its fisheries are considered not stable.

Risks to Meeting Fishery Management Objectives

Climate and Ecosystem Change

Risks to managing spatially

Shifting species distributions, including changes in spatial extent or center of distribution, alter both species and fishery interactions. In particular, shifting species distributions can affect expected management outcomes when spatial allocations and bycatch measures are based on historical fish and protected species distributions. Species availability to surveys can also change as distributions shift within or outside of survey footprints, complicating the interpretation of survey trends.

Coastwide indicators are reviewed in this section to evaluate spatial change throughout the Northeast US shelf. Indicators are identical between the Mid-Atlantic and New England reports.

Indicators: Fish and protected species distribution shifts As noted in the Seafood Production Implications section, the combined center of distribution for 48 Northeast Shelf commercially or ecologically important fish species continues to show movement towards the northeast and generally into deeper water (Fig. 34). An analysis of recreational landings data from 2002 to 2019 found evidence of distribution shifts for several highly migratory species, including sharks, billfish and tunas.

Habitat model-based species richness suggests shifts of both cooler and warmer water species to the northeast. Similar patterns have been found for marine mammals, with multiple species shifting northeast between 2010 and 2017 in most seasons (Fig. 35).

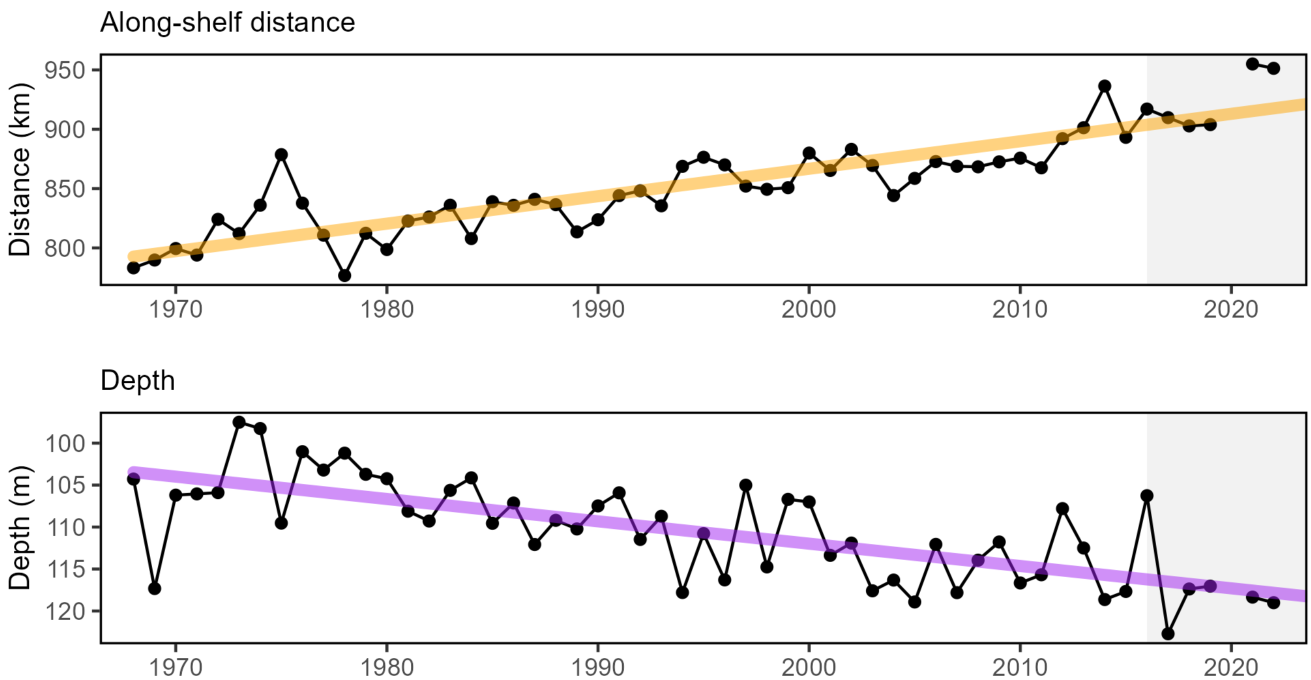


Figure 34: Aggregate species distribution metrics for species in the Northeast Large Marine Ecosystem: along shelf distance with long-term increasing trend (orange), and depth with long-term decreasing trend indicating deeper water (purple).

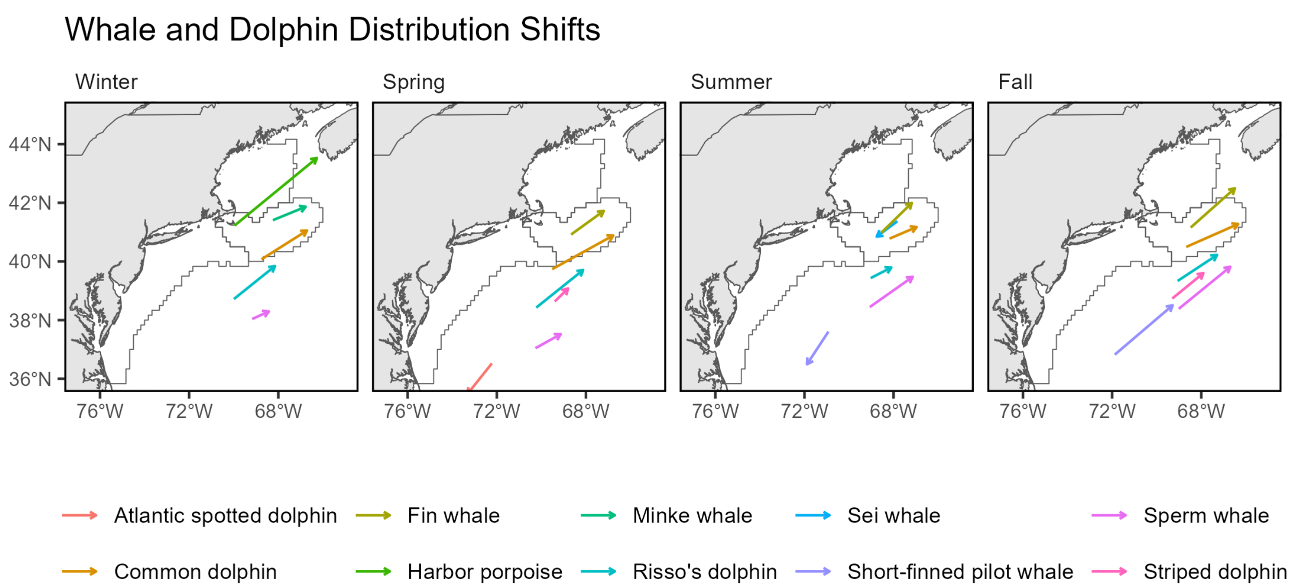


Figure 35: Direction and magnitude of core habitat shifts, represented by the length of the line of the seasonal weighted centroid for species with more than 70 km difference between 2010 and 2017 (tip of arrow).

Drivers: Mobile populations shift distributions to maintain suitable habitat and prey fields, possibly expanding ranges if new suitable habitat exists. Changes in managed species distribution is partially related to the distribution of forage biomass. Since 1982, the fall center of gravity of forage fish (20 species combined) has moved to the north and east (Fig. 36). Spring forage fish center of gravity has moved northward but without an eastward trend. Some of the whale and dolphin distribution shifts (Fig. 35) are likely in response to these forage fish shifts. Small copepods, widespread prey of many larval and juvenile fish, show a similar shift in center of gravity as forage fish, to the north and east in the fall, as well as northward in spring (Fig. 37.

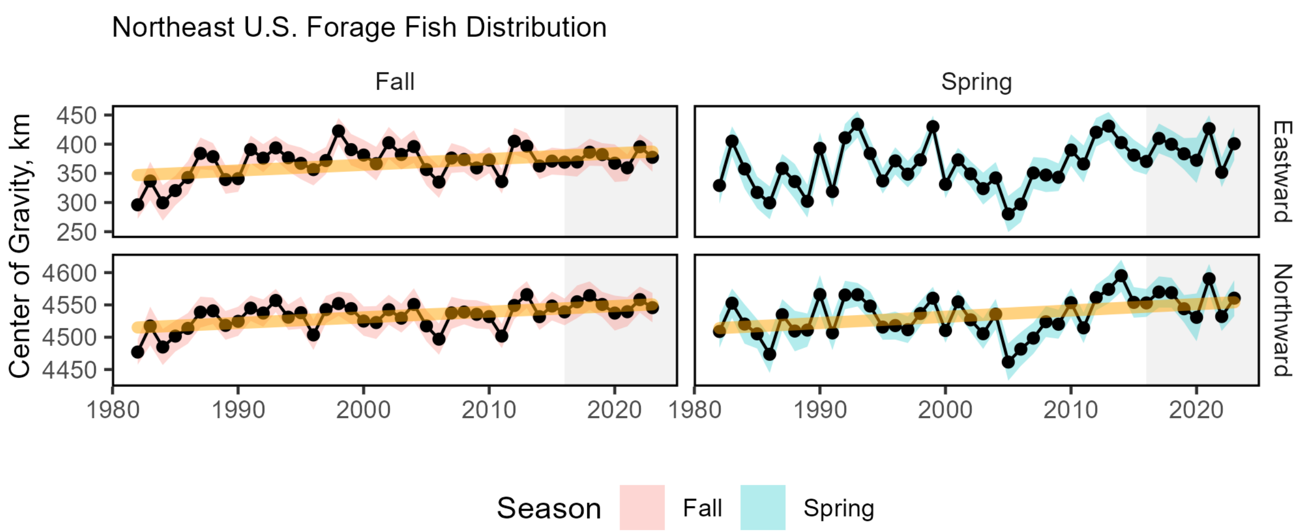


Figure 36: Eastward (top) and northward (bottom) shifts in the center of gravity for 20 forage fish species on the Northeast U.S. Shelf in fall (left) and spring (right), with long-term increasing trends (orange) for fall eastward and northward and spring northward center of gravity.

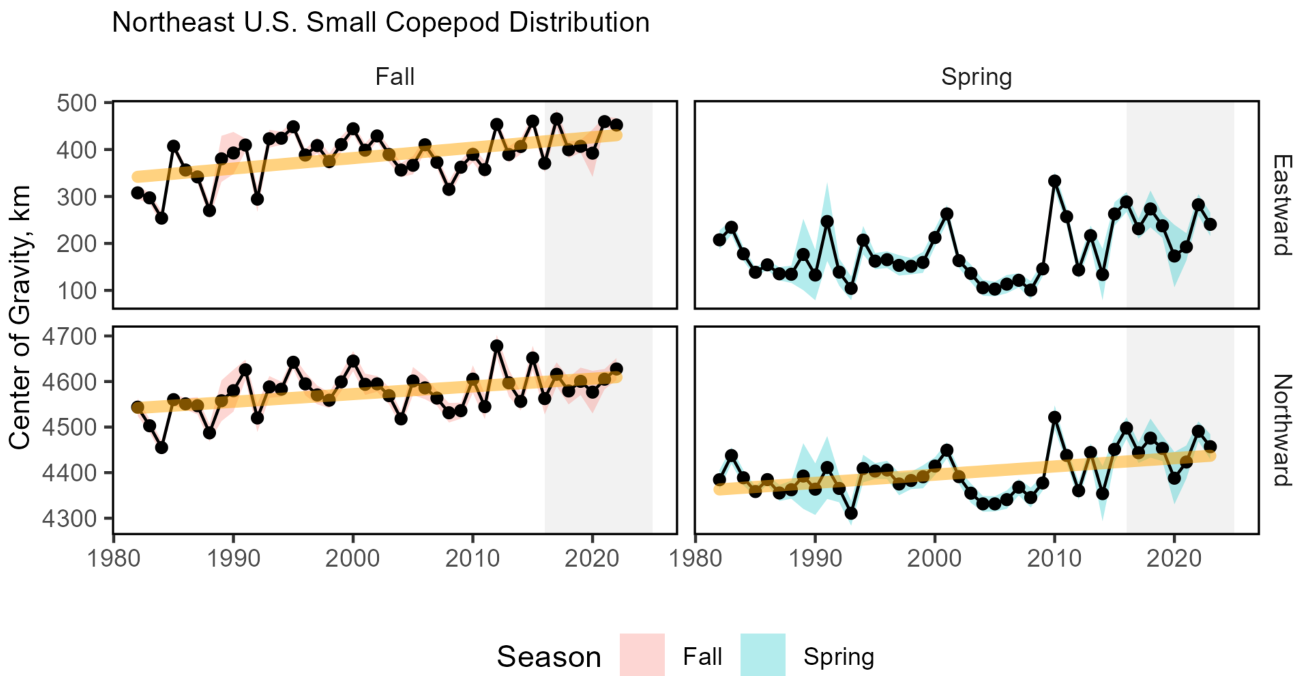


Figure 37: Eastward (top) and northward (bottom) shifts in the center of gravity for small copepod species on the Northeast U.S. Shelf in fall (left) and spring (right), with long-term increasing trends (orange) in fall eastward and fall and spring northward center of gravity

Megabenthos center of gravity shows a short-term eastward trend in spring (Fig. 38). Megabenthos are large, non-federally-managed benthic invertebrates sampled by scallop dredge, otter trawl, and the Campbell grab. These include crabs, decapods, and sea stars, which are often prey for many managed species.

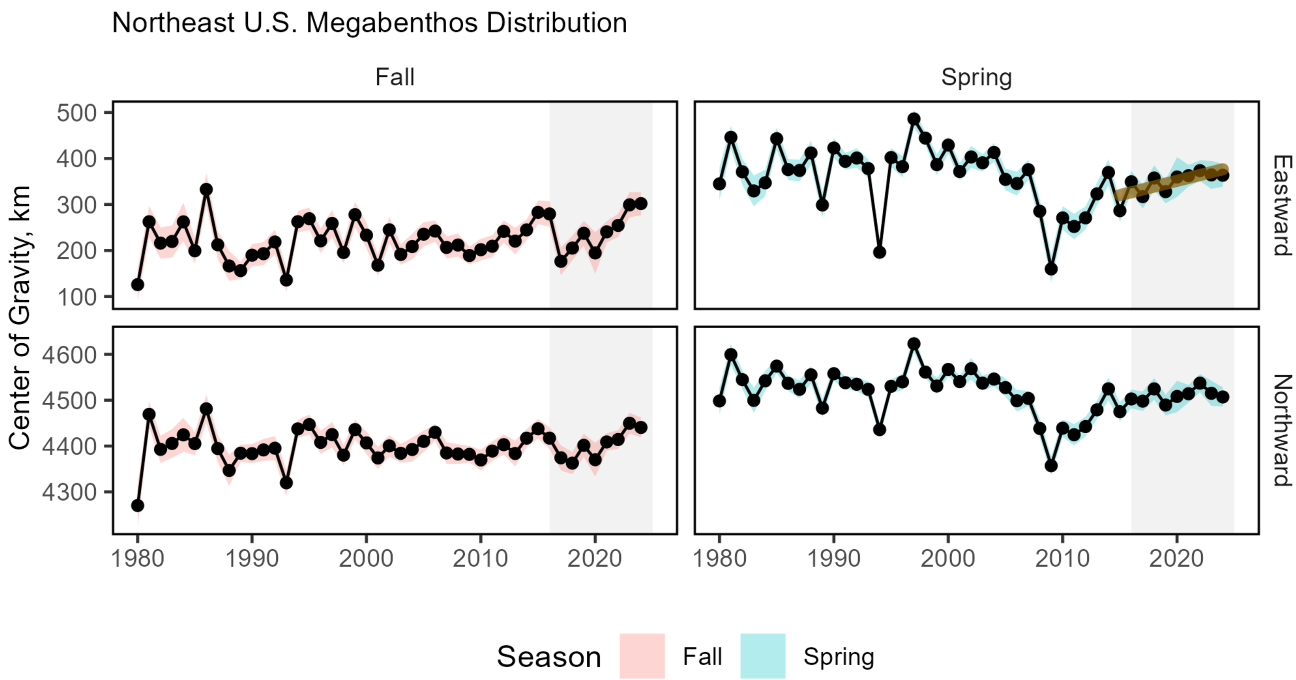


Figure 38: Eastward (top) and northward (bottom) shifts in the center of gravity for megabenthos species on the Northeast U.S. Shelf in fall (left) and spring (right), with short-term increasing trend (orange) for spring eastward center of gravity.

In contrast, macrobenthos center of gravity has shifted west and south in the spring (Fig. 39). Macrobenthos are small bottom-dwelling invertebrates including polychaete worms, small crustaceans, bivalves (non-commercial), gastropods, nemerteans, tunicates, cnidarians, brittle stars, sea cucumbers, and sand dollars, and are prey for many managed species.

Large copepods (including *Calanus finmarchicus*) and euphausiids do not have long-term trends in their centers of gravity (Fig. 40, 41). Some targeted species distributions may shift in response to these shifts in forage, copepod, and macrobenthos distributions.

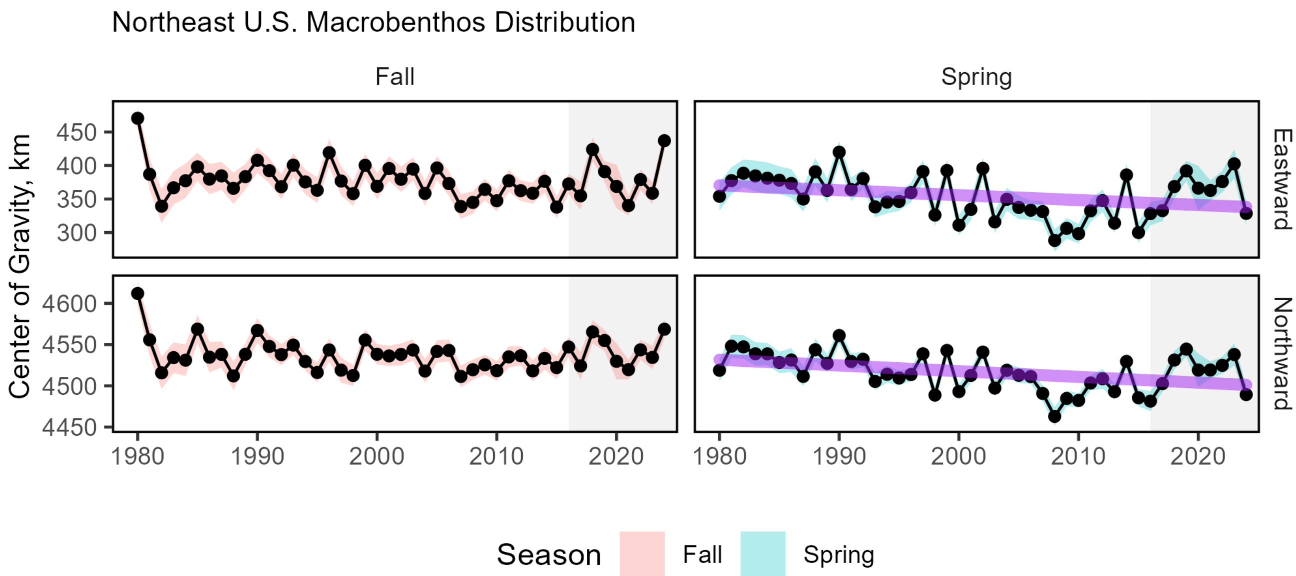


Figure 39: Eastward (top) and northward (bottom) shifts in the center of gravity for macrobenthos species on the Northeast U.S. Shelf in fall (left) and spring (right), with long-term decreasing trends (purple) for spring eastward and northward center of gravity.

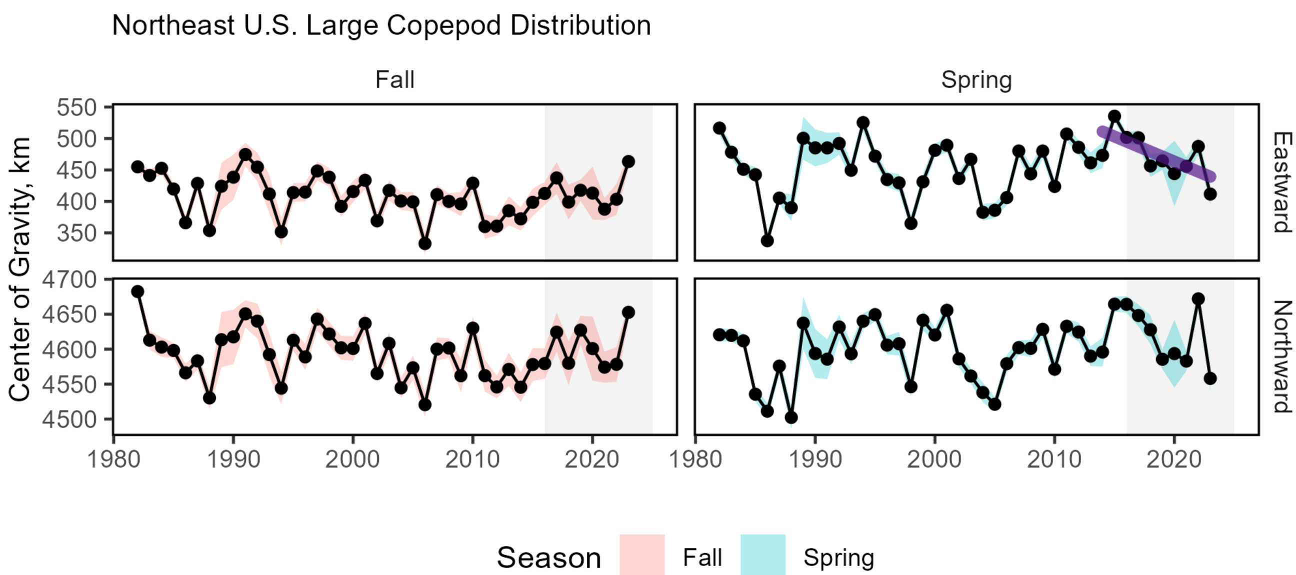


Figure 40: Eastward (top) and northward (bottom) shifts in the center of gravity for large copepod species (*Calanus finmarchicus*, *Metridia lucens*, *Calanus minor*, *Eucalanus sp.*, *Calanus spp.*) on the Northeast U.S. Shelf in fall (left) and spring (right).

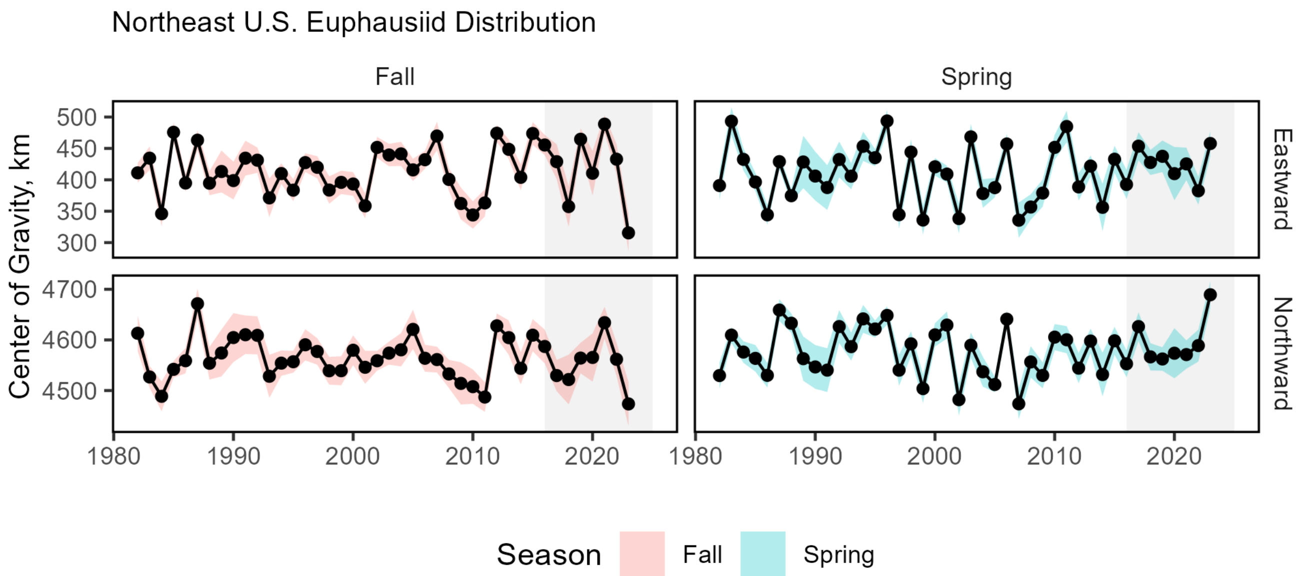


Figure 41: Eastward (top) and northward (bottom) shifts in the center of gravity for Euphausiid species on the Northeast U.S. Shelf in fall (left) and spring (right).

Ocean temperatures influence the distribution, seasonal timing, and productivity of managed species (see sections below). The Northeast US shelf, including New England, has experienced a continued warming trend for the long term annual sea surface (Fig. 45). GB and the GOM have experienced a seasonal warming trend for surface waters in all seasons but winter (42). Bottom temperature has also been increasing in GB (winter and spring) and in the GOM (spring and summer) (Figs. 44, 43). However, 2025 observations show cooler to average sea surface temperature in all seasons in GB and all seasons but summer in the GOM. Bottom temperature in 2025 has stayed near or below average in all seasons across New England. See the 2025 Highlights section for the recent events linked to these cooler conditions.

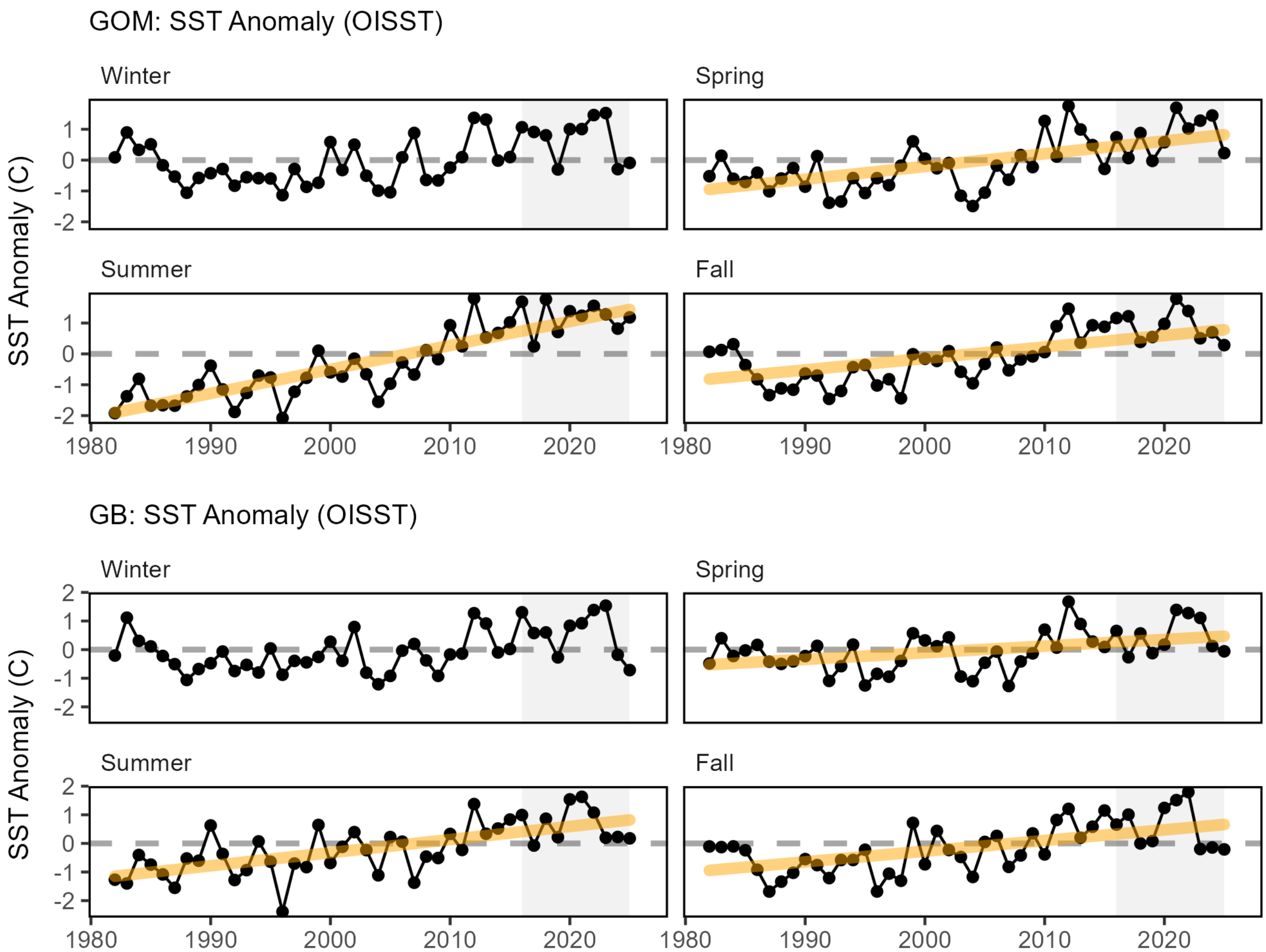


Figure 42: Seasonal Optimum Interpolation Sea Surface Temperature (OISST) anomaly by season for the Gulf of Maine (GOM, top) and Georges Bank (GB, bottom), with long-term increasing trends (orange).

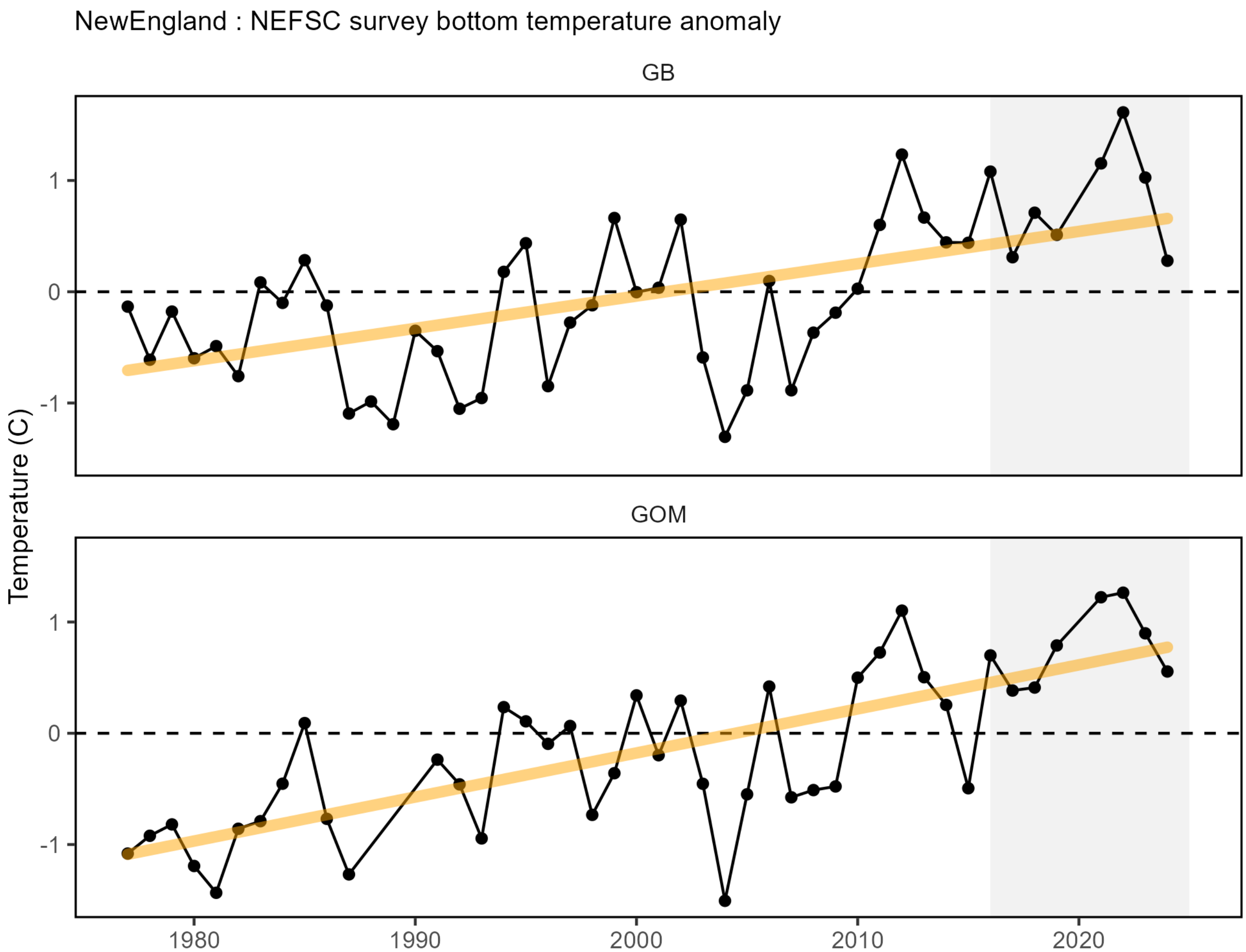


Figure 43: Annual in situ bottom temperature anomaly for Georges Bank (GB, top) and the Gulf of Maine (GOM, bottom), with long-term increasing trends (orange).

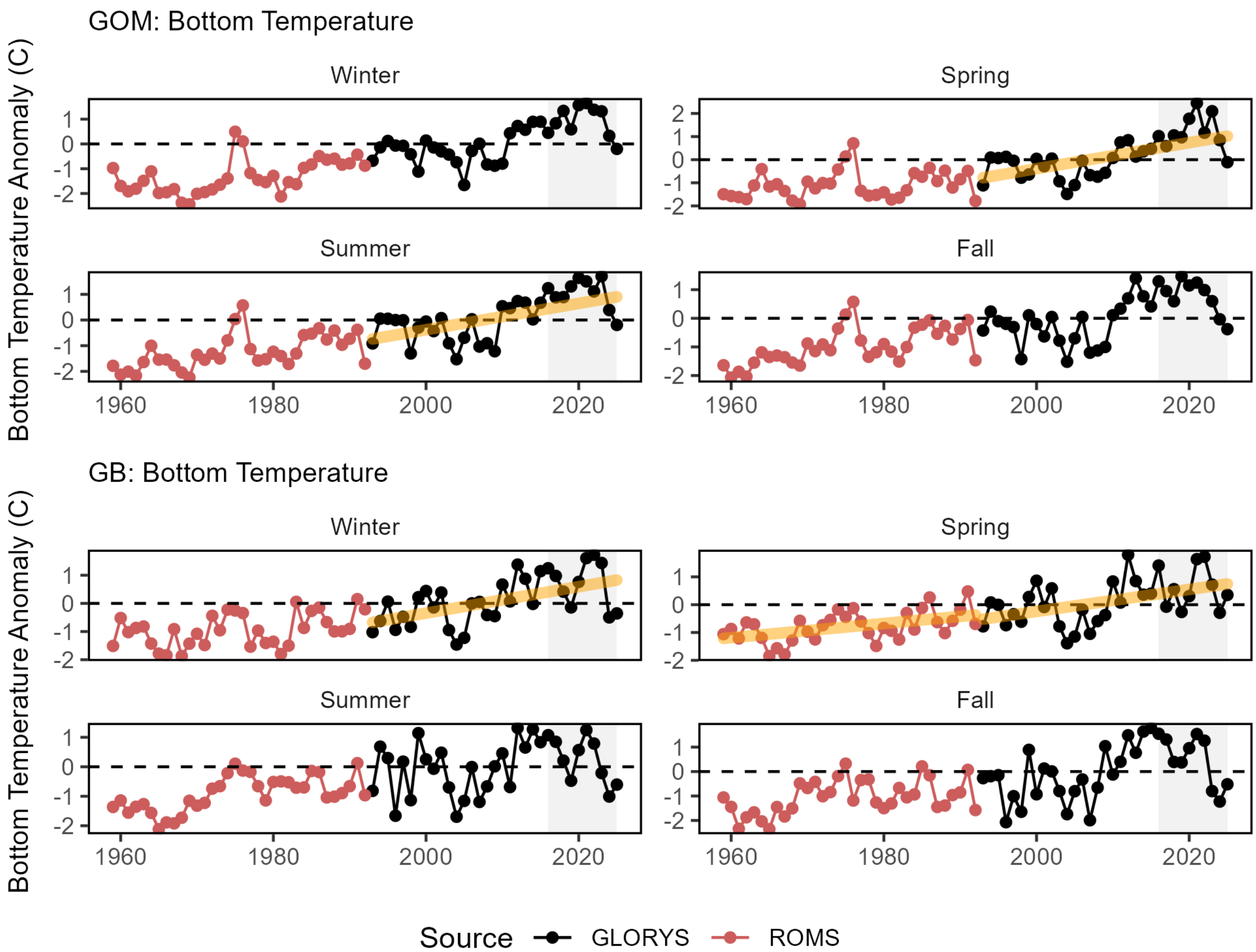


Figure 44: GLORYS (black) and debiased Regional Ocean Modeling System (ROMS) (red) seasonal bottom temperature anomaly for the Gulf of Maine (GOM, top) and Georges Bank (GB, bottom), with long-term increasing trends (orange).

Species suitable habitat can expand or contract when changes in temperature and major oceanographic conditions alter distinct water mass habitats. The variability of the Gulf Stream is a major driver of the predominant oceanographic conditions of the Northeast U.S. continental shelf.

The Gulf Stream has been shifted north of its long-term mean position over much of the last decade (Fig. 46). However, since 2023 the Gulf Stream has shifted southward and remained close to its mean position. With this shift, the supply of Labrador Slope Water has increased along the Northwest Atlantic Shelf. These changes are linked to the cooler water temperatures observed in 2024 and 2025 and shifts in the composition of source waters entering the Gulf of Maine through the Northeast Channel (see 2025 Highlights).

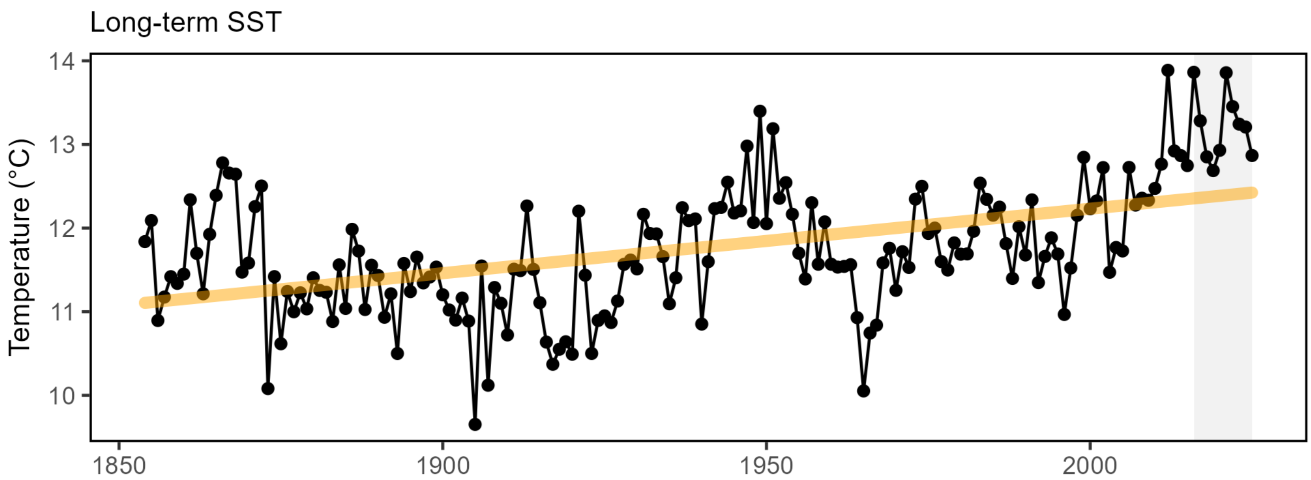


Figure 45: Northeast U.S. annual sea surface temperature (SST, black), with long-term increasing trend (orange).

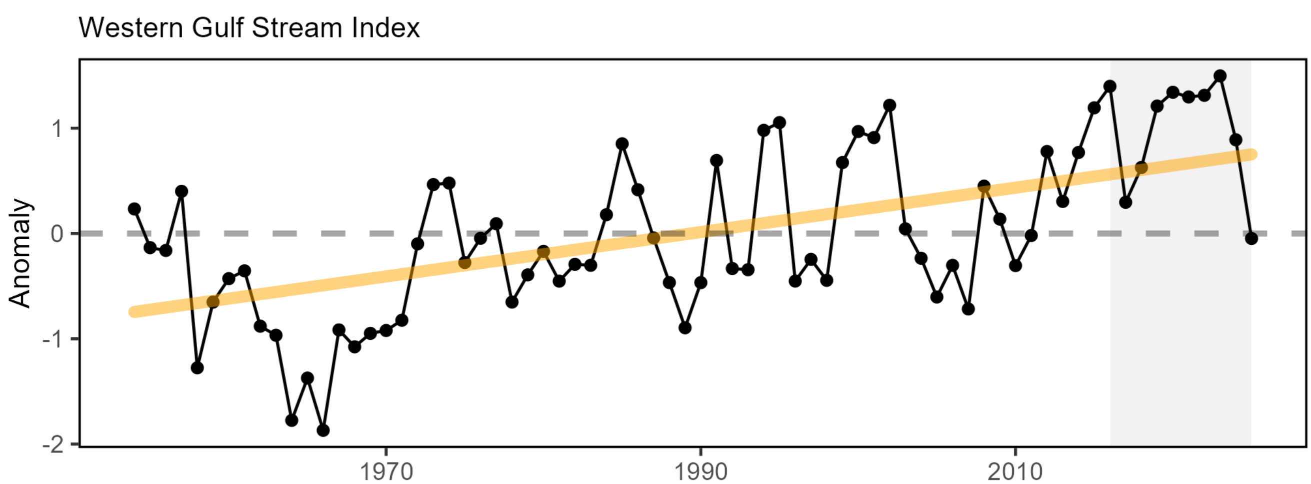


Figure 46: Index representing changes in the location of the western (between 64 and 55 degrees W) Gulf Stream north wall (black). Positive values represent a more northerly Gulf Stream position, with long-term increasing trend (orange).

Changes in ocean temperature and circulation alter habitat features such as the Mid-Atlantic Bight Cold Pool, a band of relatively cold near-bottom water present from spring to fall over the northern MAB. The Cold Pool represents essential fish spawning and nursery habitat, and affects fish distribution and behavior. The Cold Pool has been getting warmer and its areal extent has been shrinking over time (Fig. 47). In 2025, however, the Cold Pool temperature and extent were above the long-term average, likely due to the influx of Labrador Slope and Scotian Shelf waters into the system. Mobile target species that track a preferred temperature range can show increased interannual variability in their distributions as regional temperatures fluctuate over short periods of time.

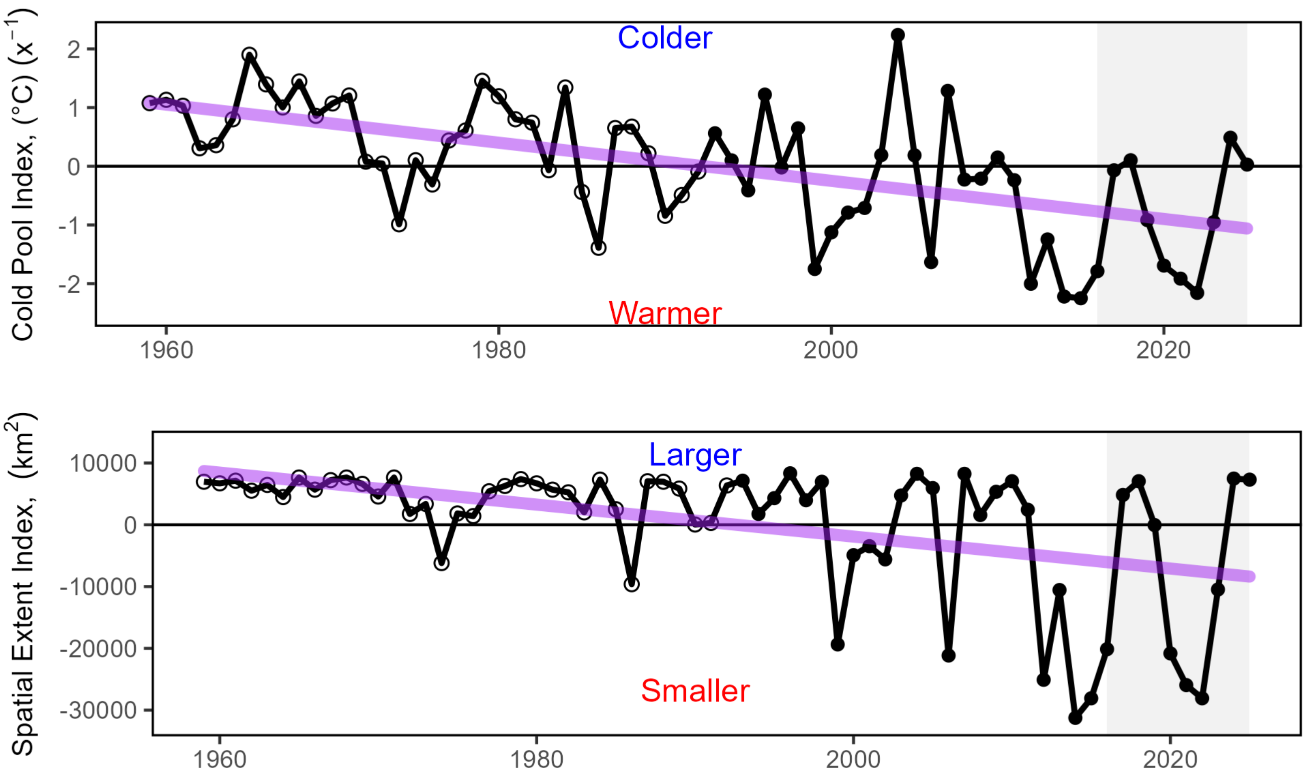


Figure 47: Seasonal cold pool mean temperature (top) and spatial extent index (bottom), based on bias-corrected Regional Ocean Modeling System-Northwest Atlantic (ROMS-NWA) (open circles) and GLORYS (closed circles), with long-term declining trends (purple).

Future Considerations Distribution shifts caused by changes in thermal habitat and ocean circulation are likely to continue as long as long-term trends persist. Episodic and short-term events (see 2024 Highlights and 2025 Highlights) may increase variability in the trends, however species distributions are unlikely to reverse to historical ranges in the short term. Increased mechanistic understanding of distribution drivers is needed to better understand future distribution shifts: species with high mobility or short lifespans react differently from immobile or long-lived species.

MOM6 decadal oceanographic forecasts suggest a tendency towards near-normal temperatures over the next decade due to decadal variability in regional circulation. 2026 seasonal forecasts show a high probability of below average surface and bottom temperatures in the winter months. Forecast uncertainty is higher during the spring and summer seasons, and above average conditions are predicted for the fall. These forecasts will continue to be evaluated to determine how well they are able to predict episodic and anomalous events that are outside of the long-term patterns.

Adapting management to changing stock distributions and dynamic ocean processes will require continued monitoring of populations in space and time while evaluating management measures against a range of possible future spatial distributions. The upcoming Climate Vulnerability Assessment 2.0 will also be incorporating MOM6 output and forecasts to help predict changes in species distributions and quantify species exposure to predicted future change. Processes like the East Coast Coordination Group and the HMS Climate Vulnerability Assessment can help coordinate management.

Risks to managing seasonally

The effectiveness of seasonal management actions (fishing seasons or area opening/closing periods) depends on a proper alignment with the seasonal life cycle events (phenology) of fish stocks (e.g., migration and spawning timing). If not accounted for, changes in the timing of these biological cycles can reduce the effectiveness of seasonal management measures. The timing of seasonal patterns can also change the interactions between fisheries and non-target species thus influencing bycatch and the availability of species to surveys.

Indicators: Timing shifts Indicators of phenological changes in fish populations require regular sampling and observations, and therefore a limited number of these indicators are currently available. One indicator shows shifts in spawning timing of haddock and yellowtail flounder. Spawning of both haddock stocks occurred earlier in the year, as indicated by more resting (post-spawning) stage fish in recent years compared to earlier in the time series (Fig. 48). The high percentage of northern stock (Cape Cod/GOM) yellowtail flounder females in the resting maturity stage shown earlier in the time series is reflective of spring surveys sampling them well before spawning, which peaked in June for the northern stock (Fig. 48). More recently, the females are much closer to spawning, indicating that yellowtail flounder are spawning earlier in the year. Similarly, increased catch of post-spawning fish in Southern New England indicates that the peak spawning of the southern stock could have also shifted to earlier in the year. Yellowtail flounder spawning is related to bottom temperature, week of year, and decade sampled for each of the three stocks. Changes to spawning times could impact the survival of early life stages of fish, subsequently affecting the population size, health, and market value.

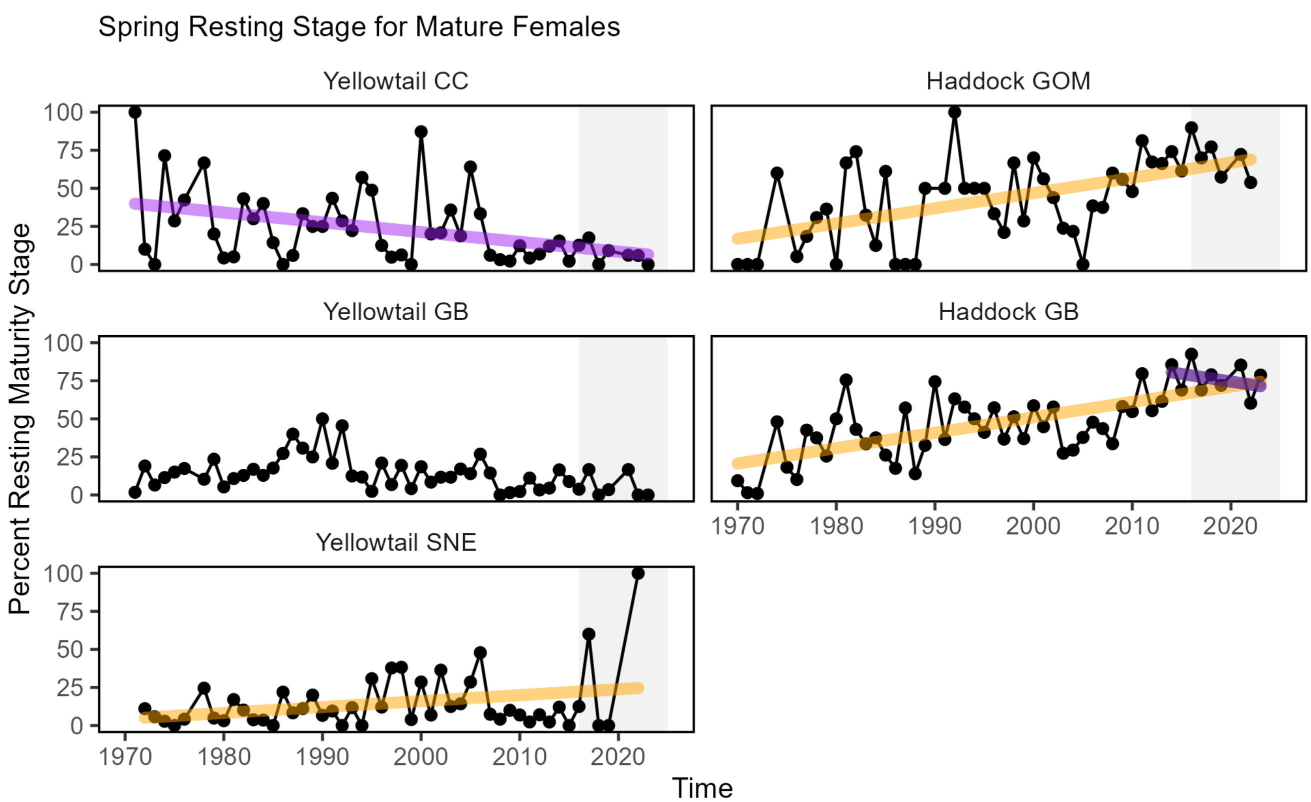


Figure 48: Percent resting stage (non-spawning) mature female fish (black) from spring Northeast Fisheries Science Center bottom trawl survey with significant long-term increases (orange), short-term decreases (dark purple), and long-term decreases (purple) from two haddock and three yellowtail flounder stocks: CC = Cape Cod, Gulf of Maine, GOM = Gulf of Maine, GB = Georges Bank, SNE = Southern New England.

Migration timing of some tuna and large whales has changed. An analysis of recreational fishing data between 2019 and 2022 identified multiple shifts in important HMS species. For example, bigeye tuna were caught 50 days earlier; small and large bluefin tuna were caught 38 and 80 days earlier respectively in Massachusetts; and blue marlin in New York were caught 27 days earlier. A separate analysis of acoustic telemetry data predicted delayed departure of southward-migrating sharks from the northeast region under future sea surface temperatures. These results are further supported by the Atlantic Highly Migratory Species Climate Vulnerability Assessment, which found that 57 of 58 highly migratory species and stocks have high or very high potential to shift distributions. In Cape Cod Bay, peak spring habitat use by right and humpback whales has shifted 18-19 days later between 1998 and 2018.

Understanding whether seasonal patterns are changing for stocks requires regular observations throughout the year. For example, baseline work on cetacean presence in Southern New England shows different seasonal use patterns for whale and dolphin species. Despite the importance of understanding seasonal patterns, we have few indicators that directly assess timing shifts of species. We plan on incorporating more indicators of timing shifts and phenology in future reports.

Drivers: The drivers of timing shifts in managed stocks are generally coupled to shifts in environmental or biological conditions, since these can result in changes in habitat quality or food availability within the year. Changes in the timing of fall phytoplankton blooms and seasonal shifts in zooplankton communities are indicators of changes in seasonal food availability to stocks.

Along with the overall warming trends in New England, ocean summer conditions have been lasting longer (Fig. 49) due to the earlier transition from cool spring conditions to warm summer conditions and the later transition from warm summer conditions to cooler fall temperatures. These transition dates relate how daily temperatures compare to the seasonal norm. However, in 2025 the duration of ocean summer conditions was near normal in the GOM and shorter than normal on GB. Changes in the timing of seasonal environmental cycles can alter biological processes (migrations, spawning, etc.) that are triggered by seasonal events.

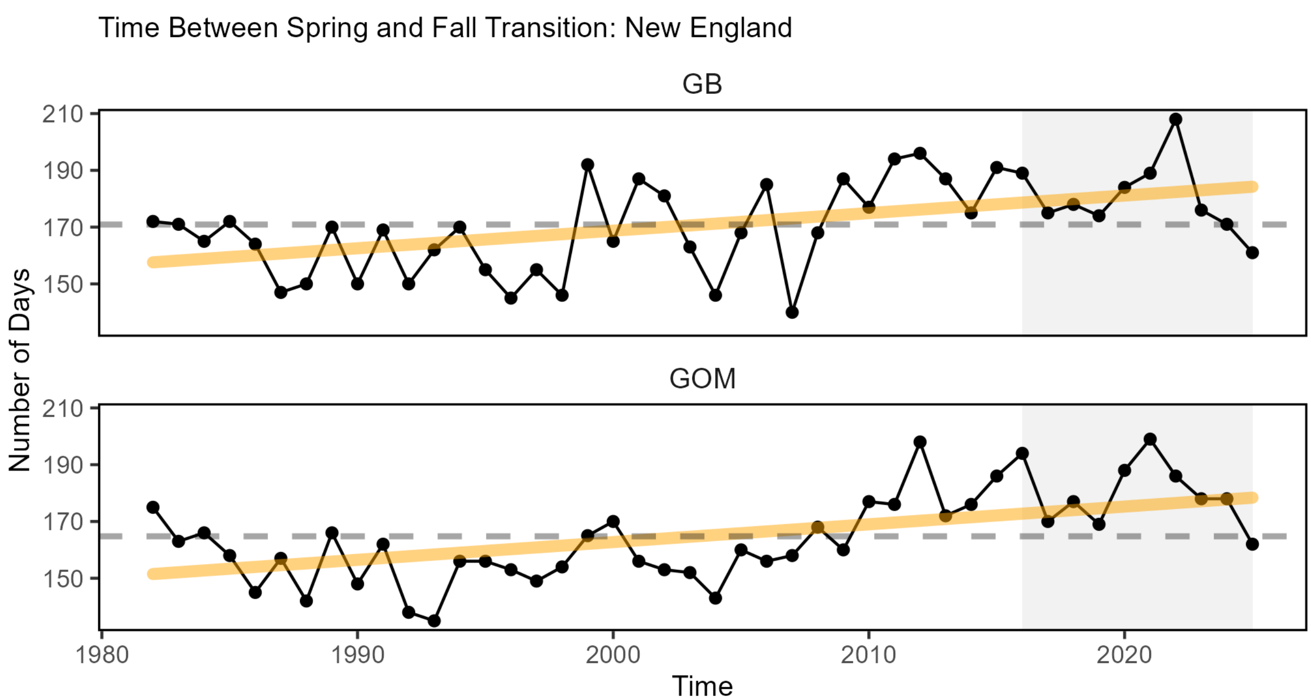


Figure 49: Ocean summer length in New England (Georges Bank (GB), top; Gulf of Maine (GOM), bottom): the annual total number of days between the spring thermal transition date and the fall thermal transition date (black), with a long-term increasing trend (orange). Transition dates are based on sea surface temperatures.

The Mid-Atlantic Bight Cold Pool is a summer to early fall feature that creates seasonally suitable habitat for many species, including some managed by the NEFMC. Cold Pool persistence has decreased, indicating that the duration of the Cold Pool habitat is shorter compared to the 1960s (Fig. 50). However, all Cold Pool indices were near or above the long-term average in 2025 and likely related to the influx of northern waters into the system (see 2024 Highlights). A change in the timing of the autumn breakdown of the Cold Pool may impact the recruitment of species that rely on it for seasonal cues and habitat. Southern New England-Mid-Atlantic yellowtail flounder recruitment and settlement are related to the strength of the Cold Pool (a factor of extent and persistence). The correlation of pre-recruit settlers to the Cold Pool is thought to represent a bottleneck in yellowtail flounder life history, whereby a local and temporary increase in bottom temperature can negatively impact the survival of settlers. Including environmental covariates on yellowtail recruitment reduced retrospective patterns and improved predictive skill in the stock assessment model. This connection is especially important given the long-term decline in the duration of the Cold Pool.

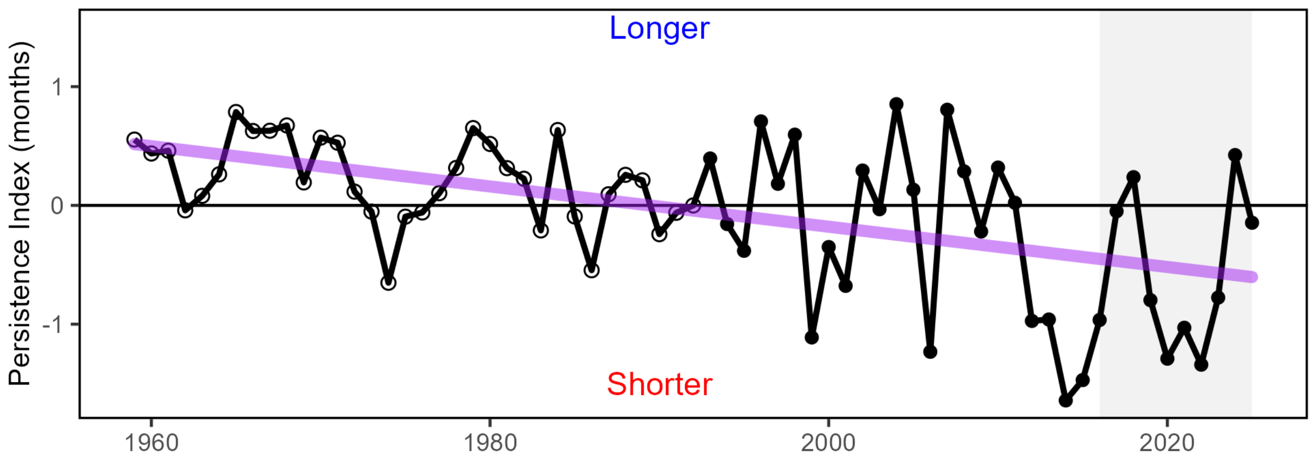


Figure 50: The Mid-Atlantic Bight Cold Pool persistence index based on bias-corrected Regional Ocean Modeling System-Northwest Atlantic(open circles) and GLORYS (closed circles), with significant long-term decline (purple).

The seasonal timing of phytoplankton blooms shows a tendency towards an increased fall bloom over time in the GOM and GB, with chlorophyll concentrations significantly increasing in October and November (GB) and October and December (GOM) (Fig. 51). This increased production at the base of the food web may increase prey availability, and fall blooms in particular have been associated with increased recruitment for species such as haddock.

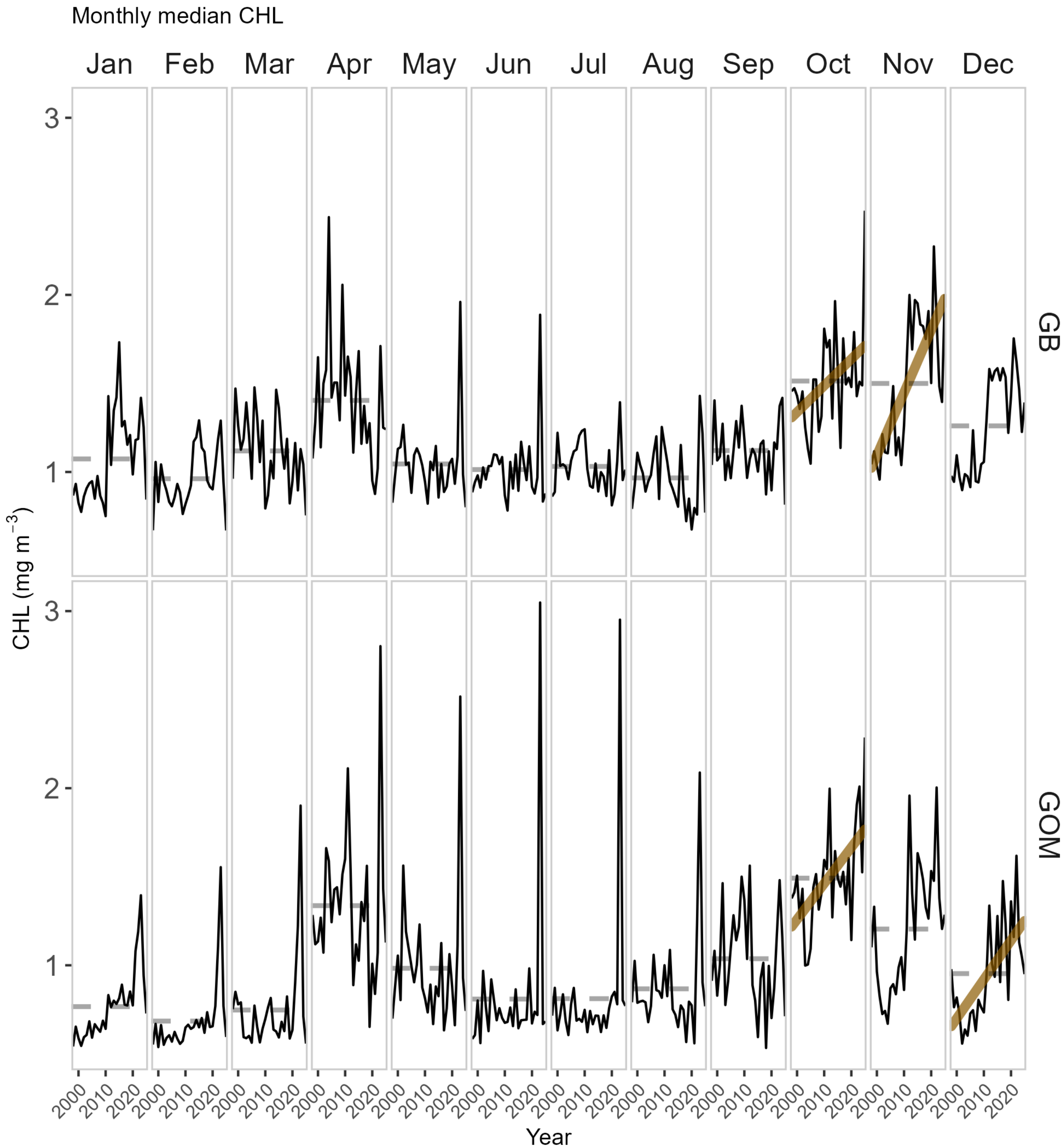


Figure 51: Monthly median chlorophyll a concentration time series for Georges Bank (GB, top) and Gulf of Maine (GOM, bottom), with increasing long-term trends (orange).

Future Considerations Species are reliant on environmental processes (e.g., phytoplankton bloom timing, thermal transition, or the duration of the Cold Pool) to dictate the timing of their behavior. Some changes are episodic and have interannual variability, while others may be shifting away from a historic baseline on the scales of years to decades. Other species may rely on the general seasonal succession of environmental drivers (e.g., the timing of the fall turnover) to cue biological processes, and long-term trends in seasonal transitions are unlikely to reverse in coming years. Thus, timing shifts in migration or spawning may continue. Management actions that rely on effective alignment of fisheries availability and biological processes should continue to evaluate whether prior assumptions on seasonal timings still hold, and new indicators should be developed to monitor timing shifts for stocks.

Risks to setting catch limits

The efficacy of short-term stock projections and rebuilding plans rely on accurate understanding of processes affecting stock growth, reproduction, and natural mortality. These biological processes are often driven by underlying environmental change. If not considered in management, environmental change may increase the risk that established stock-level biological reference points no longer reflect the current population and increase projection uncertainty, both of which can contribute to quota misspecification.

Indicators: Fish productivity and condition shifts Indicators of fish productivity derived from observations (surveys) or models (stock assessments) show variability over the time series. Since 2020, fish productivity has been below the long-term average productivity (derived from NEFSC bottom trawl survey), and 2025 was below average for all managed species (Fig. 52). A similar analysis based on stock assessment model outputs shows a decline in productivity over the time series with relatively high productivity in the 1990s and relatively low productivity in the 2000s (recruitment per spawning stock biomass anomaly). Fish productivity can be affected by parental condition, environmental conditions, timing and availability of prey for recruits, as well as retention of recruits within favorable habitat. In years where offshore advection is high in a depth range and month when a fish species spawns, fish productivity and recruitment may be reduced. Other signs of changing productivity in New England are the declines in common tern chicks per nest (Fig. 53) and continued low overall Atlantic salmon abundance (Fig. 54) despite short-term increases in return rates and salmon numbers.

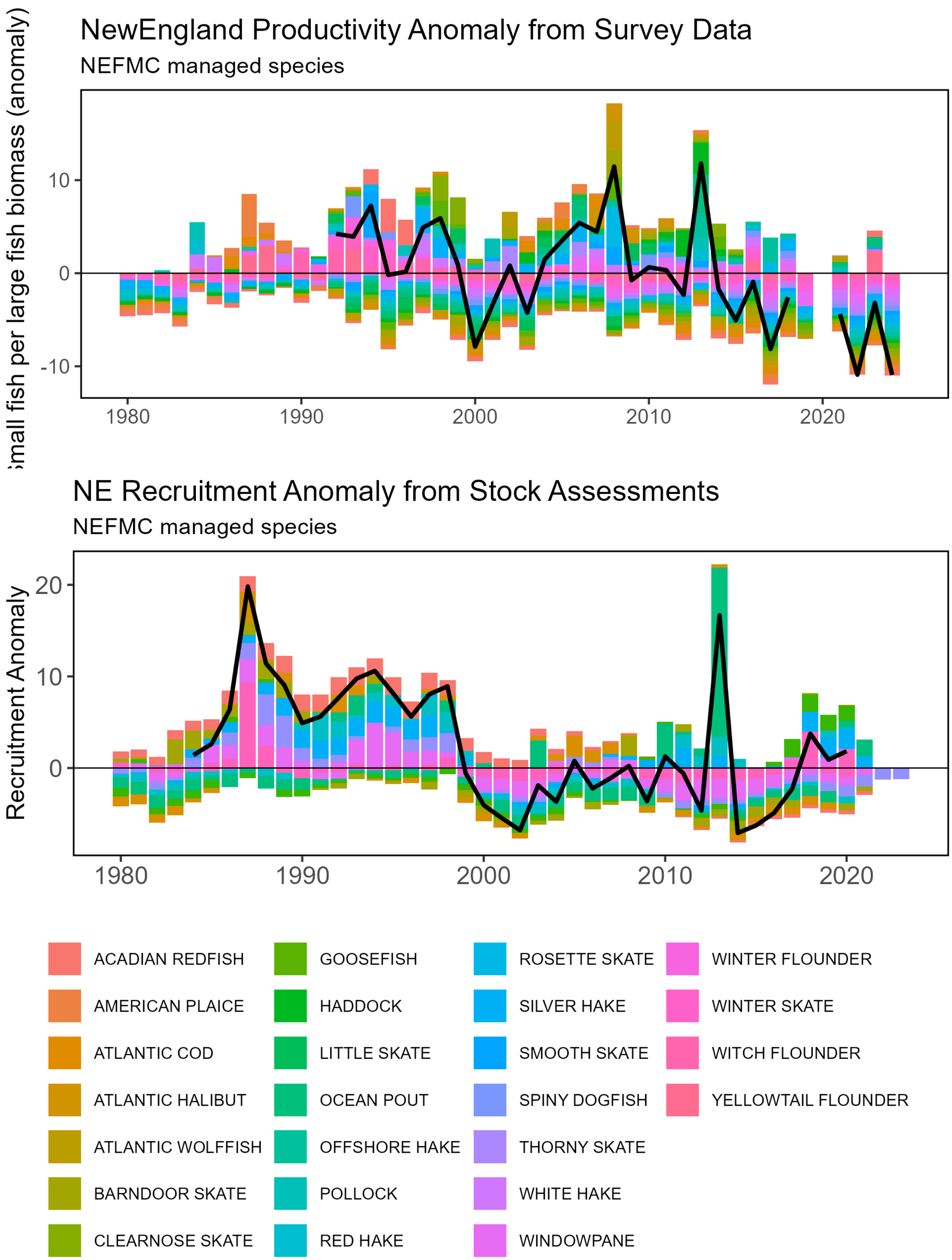


Figure 52: Fish productivity measures. Top: Small-fish-per-large-fish survey biomass anomaly for species managed by the New England Fishery Management Council (NEFMC). Bottom: assessment recruitment per spawning stock biomass anomaly for stocks managed by the NEFMC. The summed anomaly across species is shown by the black line, drawn across all years with the same number of stocks analyzed.

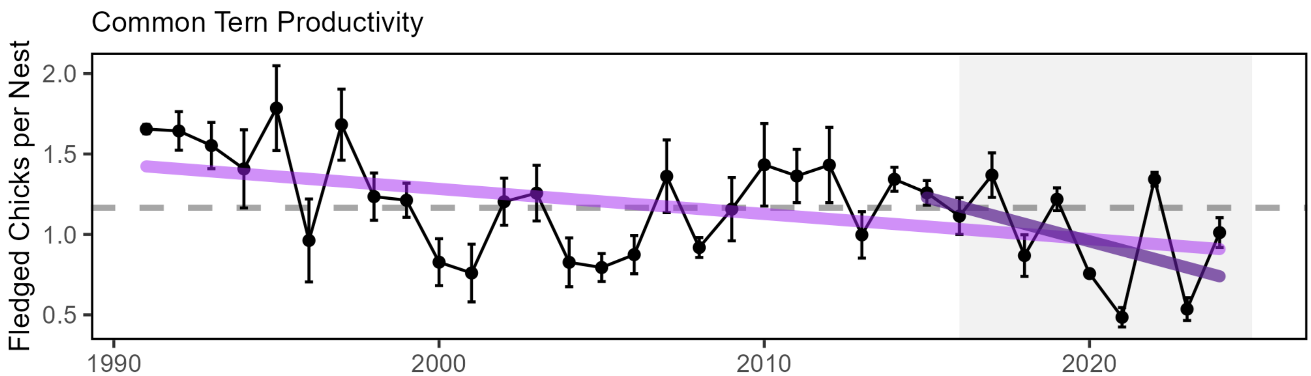


Figure 53: Common tern productivity - the number of fledged chicks per nest - at seven Gulf of Maine colonies managed by the National Audubon Society's Seabird Restoration Program, with significant long-term (purple) and short-term (dark purple) declines.

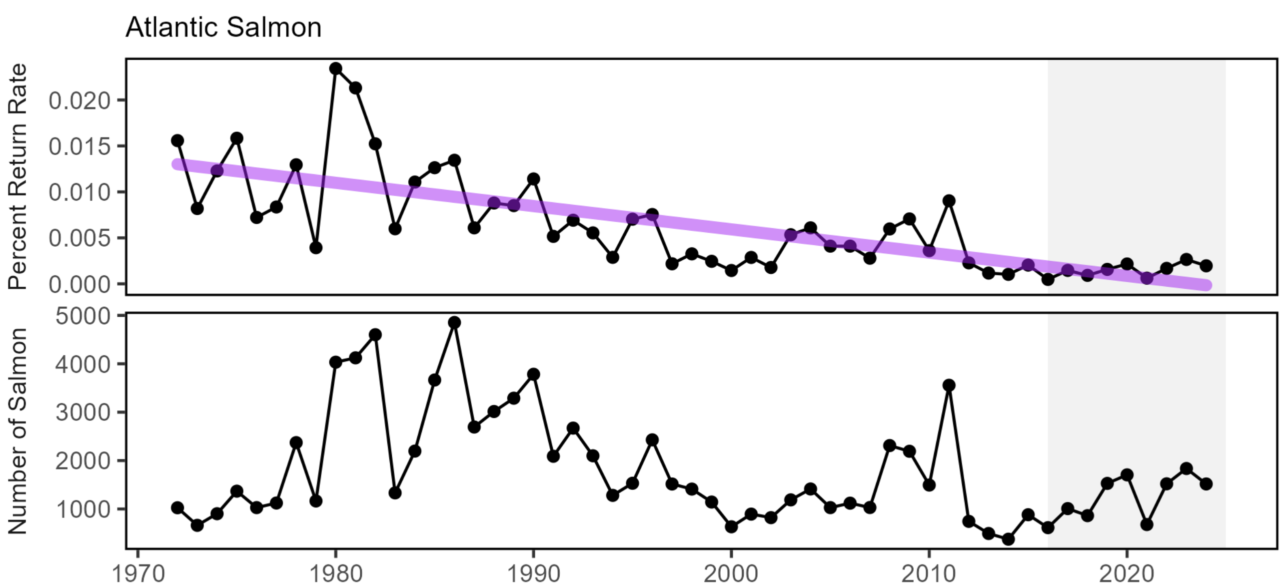


Figure 54: Percent return rate of two year old hatchery Atlantic salmon (top) and number (bottom) of all Atlantic salmon returns to the Penobscot River Gulf of Maine rivers since 1972. Long-term decreasing trend for percent return rate in purple.

The health of individual fish (i.e., fish condition) can contribute to population productivity through improved growth, reproduction, and survival. Fish condition in the Gulf of Maine and Georges Bank regions were generally high to very high prior to 2000, low to very low from 2001-2010 (concurrent with declines in fish productivity, Fig. 52), and mixed since 2011. In 2025, fish condition was below or close to average for most species on both Georges Bank and in the Gulf of Maine (Fig. 55). Preliminary analyses show that years dominated by small copepods and warmer spring temperatures may improve fish condition for Atlantic mackerel and butterfish. Similar environmental drivers may be important to other species.

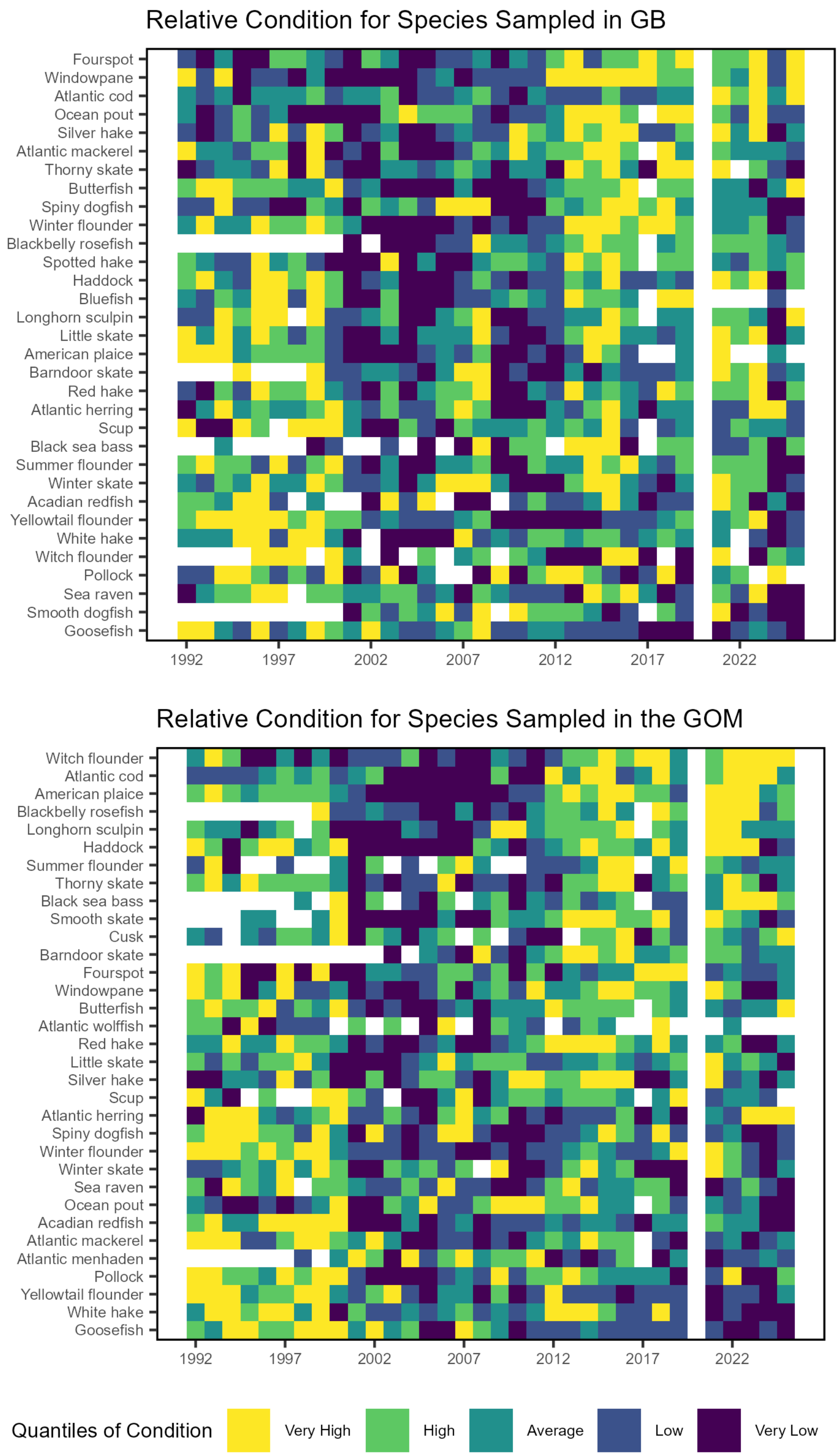


Figure 55: Condition factor for fish species in New England (top: Georges Bank, GB; bottom: Gulf of Maine, GOM) based on fall Northeast Fisheries Science Center bottom trawl survey data. No survey was conducted in 2020.

Drivers Fish productivity and condition are the cumulative effects of physiological, ecological, and environmental factors. Major factors include increased metabolic demands from increasing temperature and changes in the availability and quality of prey. Long-term environmental trends and episodic extreme temperatures, ocean acidification, and low oxygen events represent multiple stressors that can affect growth rates, reproductive success, recruitment, and cause mortality.

Biological Drivers: Forage quality and abundance Management should account for energetic links between prey and predators, as shifts in forage quality and abundance directly alter the health, productivity, and movement of managed and protected species. The total energy available to higher trophic level predators is determined by the mass and energy density (ED) of prey. Protecting this forage base is essential for maintaining overall ecosystem function and continued stock productivity and condition.

Forage energy content (Fig. 56) fluctuates based on growth, reproduction, and environmental productivity. High-energy New England species include alewife, Atlantic mackerel, and Atlantic herring. Alewife provide the highest ED in the GOM during the fall. Atlantic mackerel show higher abundance and ED in the GOM than on GB during fall. Atlantic herring offer a consistent year-round energy source, though values vary between spring and fall spawning groups. Butterfish abundance has increased over the last five years in both regions during the fall, providing an additional high-energy prey option.

Moderate-energy species, including longfin squid, shortfin squid, and silver hake, provide a stable but lower ED food supply. Squid abundance is generally lower in the GOM than on GB. Silver hake remain highly abundant in the GOM with stable ED across spring and fall. Northern sand lance offer intermediate energy but are only available in the spring before burying in the seafloor to overwinter.

Declining prey energy density creates significant risks for both forage and predator stocks. In prey species like silver hake, lower ED can reduce spawning success and recruitment. For predators, including managed species such as goosefish and spiny dogfish, lower-quality prey leads to poorer physical health and reduced reproductive output.

Shifts in forage abundance directly influence managed species productivity. While New England fall forage biomass remains stable, long-term increases are observed in the spring GOM. Biomass peaked during the 1980s in the fall. Increased spring GOM (Fig. 57) forage biomass may improve fish health and reproductive output during spawning seasons when energy reserves are typically low. However, this benefit may be offset by lower prey energy densities, particularly during periods of higher water temperatures when predator metabolic demands increase.

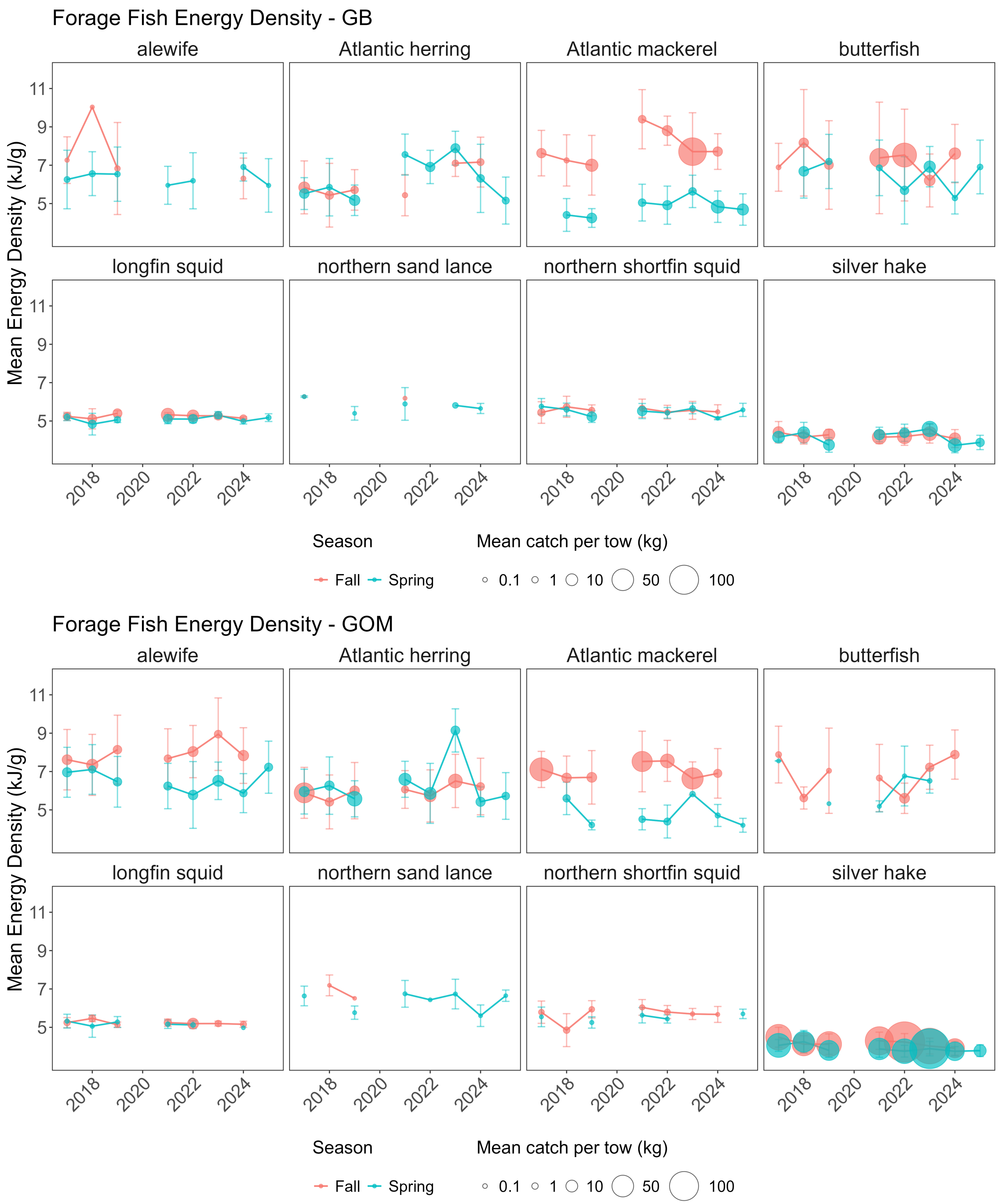


Figure 56: Energy density (mean and standard deviation) of eight forage species from Northeast Fisheries Science Center bottom trawl surveys by season and year. Symbol size represents abundance (mean kg/tow) estimated from bottom trawl survey tows in Georges Bank (GB, top) and the GOM (bottom).

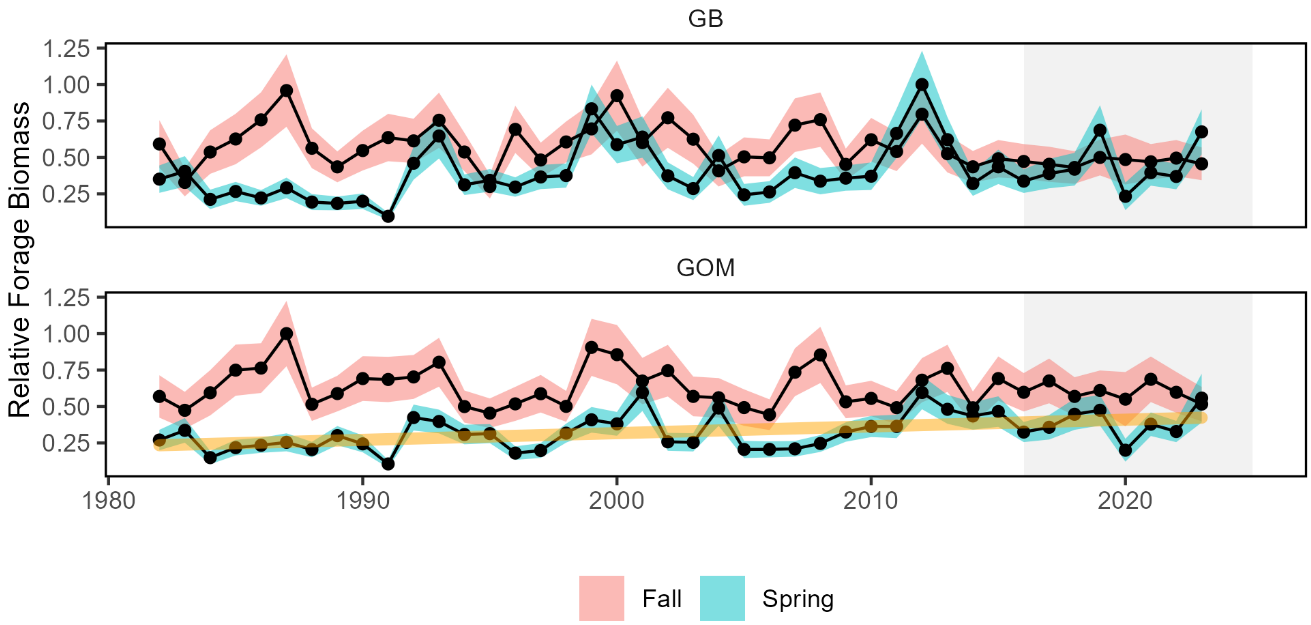


Figure 57: Forage fish index in Georges Bank (GB, top) and the Gulf of Maine (GOM, bottom, significant long-term increase for spring in orange) for spring (blue) and fall (red) surveys. Index values are relative to the maximum observation within a region across surveys.

Benthic invertebrates are extremely important forage for some managed species (e.g., flatfish, juvenile cod and haddock) Macrobenthos indices show long term declines in spring. In contrast, megabenthos indices show long-term increases during the fall in both GB and GOM (Fig. 58). Fish productivity may be negatively impacted in recent years for fish such as flounders and juvenile fish that target macrobenthos such as small crustaceans and polychaetes in the spring, and positively impacted for fish such as larger skates, hakes and gadids that target megabenthos such as crabs.

Biological Drivers: Lower trophic levels Phytoplankton are the foundation of the marine food web and are the primary food source for zooplankton and filter feeders such as shellfish. Multiple environmental and oceanographic drivers affect the abundance, composition, spatial distribution, and productivity of phytoplankton. While changes in phytoplankton productivity could affect fish productivity (including forage), there is no clear long-term trend in New England total primary production (Fig. 29).

New England zooplankton abundance is shifting in ways that could impact fish condition and marine mammal prey availability. In the Gulf of Maine (GOM), increased small-bodied copepods and euphausiids are linked to improved condition in species like Atlantic mackerel, and baleen whales (humpback, sei, and fin) may benefit from long-term increases in prey availability, although euphausiid biomass has been recently high variable (Fig. 59). Conversely, large-bodied copepods in Georges Bank (GB) have declined recently. Zooplankton energy density varies by season and location, with high-energy large copepods peaking from April through June. Since 2023, zooplankton communities have reverted to compositions similar to pre-1990 and 2000-2011 periods; research is currently underway to determine the drivers and management implications of these shifts.

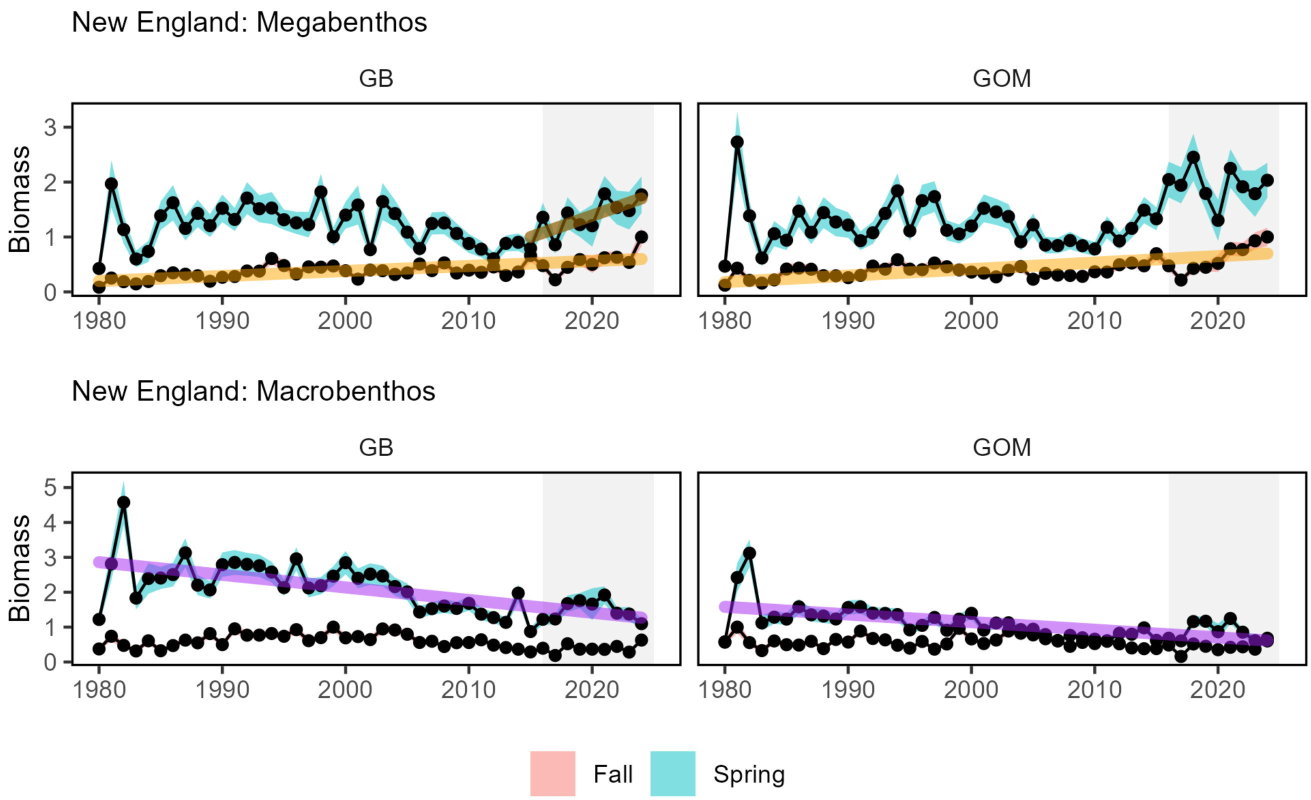


Figure 58: Changes in spring (blue) and fall (red) benthos abundance in New England for megabenthos (top) and macrobenthos (bottom), with significant long-term increasing (orange), short-term increasing (dark orange), and long-term decreasing (purple) trends.

Calanus finmarchicus abundance has declined (Fig. 59) in the GOM following a 2008 shift in oceanographic conditions, which poses a risk to the critically endangered North Atlantic right whale and key energy link in subarctic ecosystems. This lipid-rich copepod can comprise 71% of the total zooplankton biomass. Observations in the Wilkinson Basin indicate that the spring and summer abundance and biomass of *Calanus* in 2024 was comparable to 2005. However, late-stage abundance has declined 64% in fall and 71% in winter. Consequently, overall mesozooplankton biomass in 2024 was only 27% of 2005 levels (Fig. 60).

The seasonal differences in *Calanus* are driven by five factors: 1. Late winter and early spring phytoplankton levels control reproductive output. 2. Source water origin determines supply, with higher concentrations in Scotian/Labrador shelf water than in warm slope water. 3. Variable currents dictate how *Calanus* is transported and retained in deep basins. 4. Invertebrate predator populations fluctuate based on spring *Calanus* abundance. 5. Higher summer and fall temperatures increase predator metabolic demands and predation pressure.

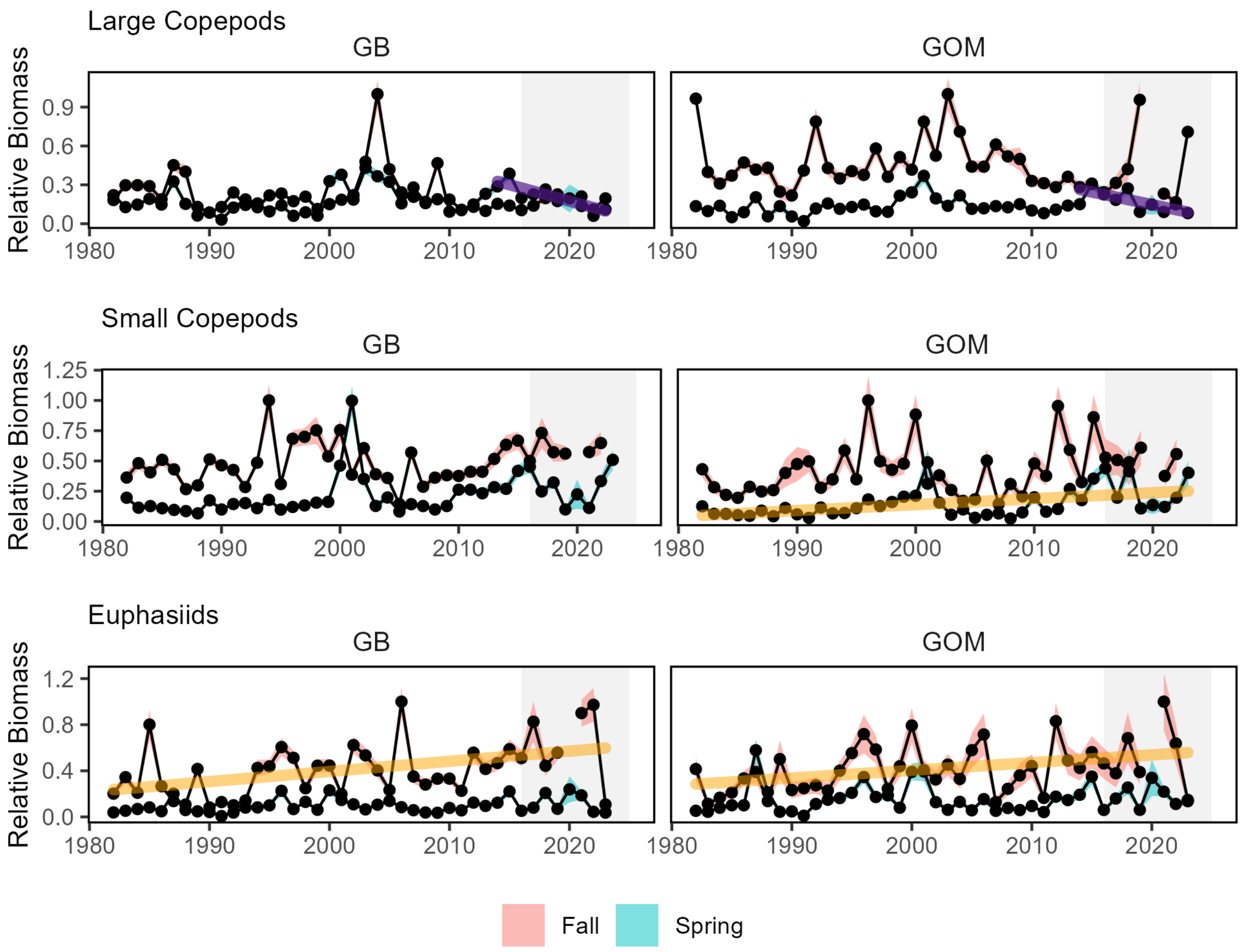


Figure 59: Changes in the abundance anomalies of three zooplankton groups in Georges Bank (GB, left) and the Gulf of Maine (GOM, right): large copepods (includes *Calanus finmarchicus*, top), small copepods (including *C. typicus* and *Pseudocalanus spp.*), and Euphausiids (bottom), with significant decreases (short-term, dark purple) in large copepods and long-term increases (orange) in GOM small copepods and GB and GOM euphausiids.

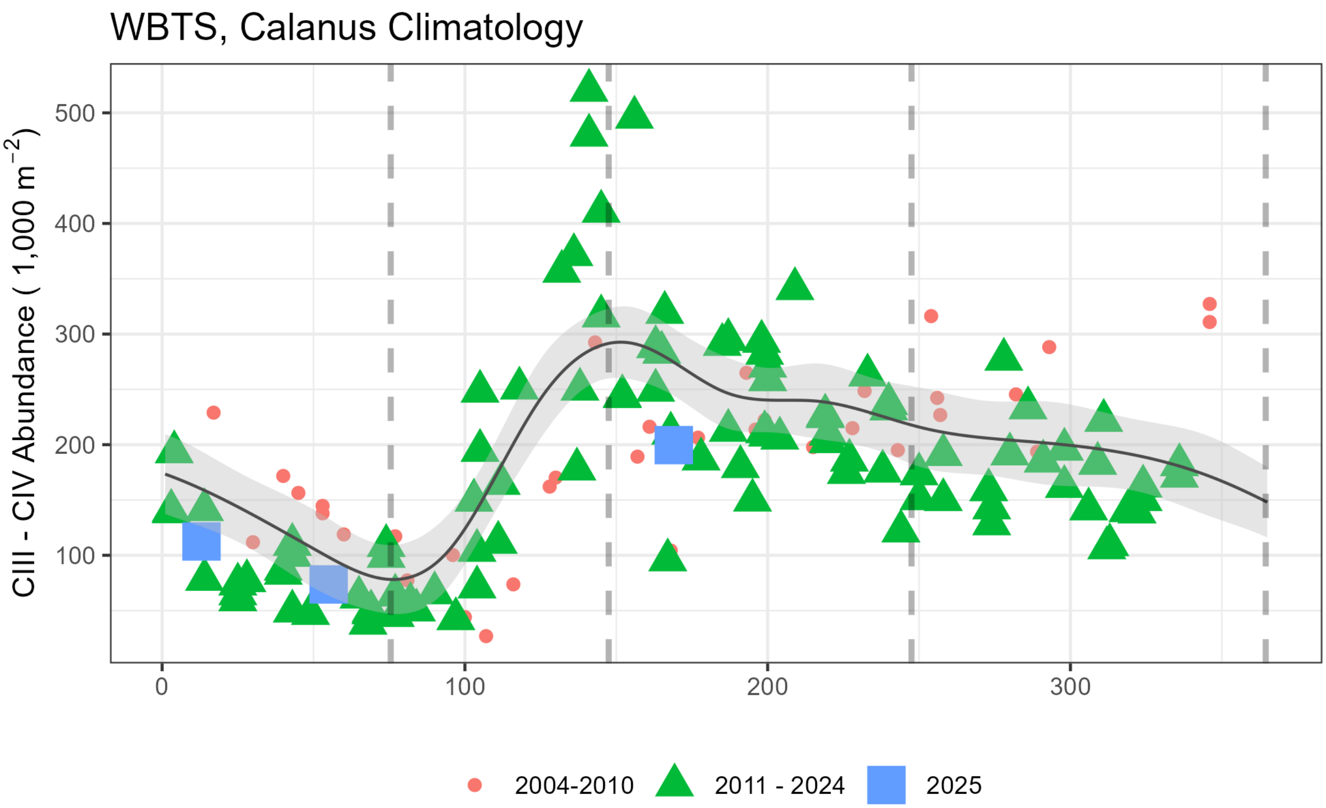


Figure 60: Mesozooplankton biomass phenology at Wilkinson Basin Time Series station: 2005 to 2025. Fitted line (black) shows GAM prediction for 2012 with 95% confidence interval (shaded). Shapes indicate observation year. Vertical lines denote season boundaries. Data for 2025 is incomplete.

Environmental Drivers Fish production can also be directly related to the prevailing environmental conditions by altering metabolic (growth) and reproductive processes. Many species possess thermal tolerances and can experience stressful or lethal conditions if temperatures exceed certain levels. Extreme temperature at both the surface (Fig. 45) and bottom can exceed thermal tolerance limits for some fish. For example, 2012 had among the warmest surface and bottom temperatures (GB) in New England. A large proportion of the Georges Bank and Mid-Atlantic regions had bottom temperatures above the 15℃ thermal tolerance for most groundfish, with some days in the Mid-Atlantic exceeding the 24℃ potential mortality limit (Fig. 62).

Cooler ocean temperatures prevented marine heatwaves in the Gulf of Maine and Georges Bank during 2025. Instead, Georges Bank experienced three surface and two bottom marine cold spells, which are extreme cooling events below the 90th percentile. The location, duration, and timing of cold spells can affect the productivity of temperature-sensitive species. The most significant surface event occurred in November, ranking as the 11th strongest on record, while a notable bottom cold spell beginning August 11th reached peak intensity on September 15th and may be ongoing. Another bottom cold spell on the Bank persisted for 71 days starting in early February.

The Gulf of Maine recorded five surface and three bottom marine cold spells in 2025 (Fig. 61). A major surface event began February 6th and lasted 42 days, with sea surface temperatures averaging 4.50°C—nearly 1°C below the 2016-2025 average. Additionally, the seventh strongest surface cold spell on record occurred in April, lasting 37 days. Bottom conditions in the Gulf of Maine were similarly impacted by three cold spells, including the fifth strongest on record. This event began in December 2024 and lasted 83 days, with bottom temperatures averaging 7.5°C. This represented a cooling of more than 1 °C compared to the 2016-2025 average.

Lower ocean temperatures near long-term averages will affect species differently across the region. While cold-water species like cod may benefit from these conditions, warm-water species such as black sea bass are unlikely to see positive effects. This variability in regional cooling highlights the need for management to account for shifting species distributions and productivity.

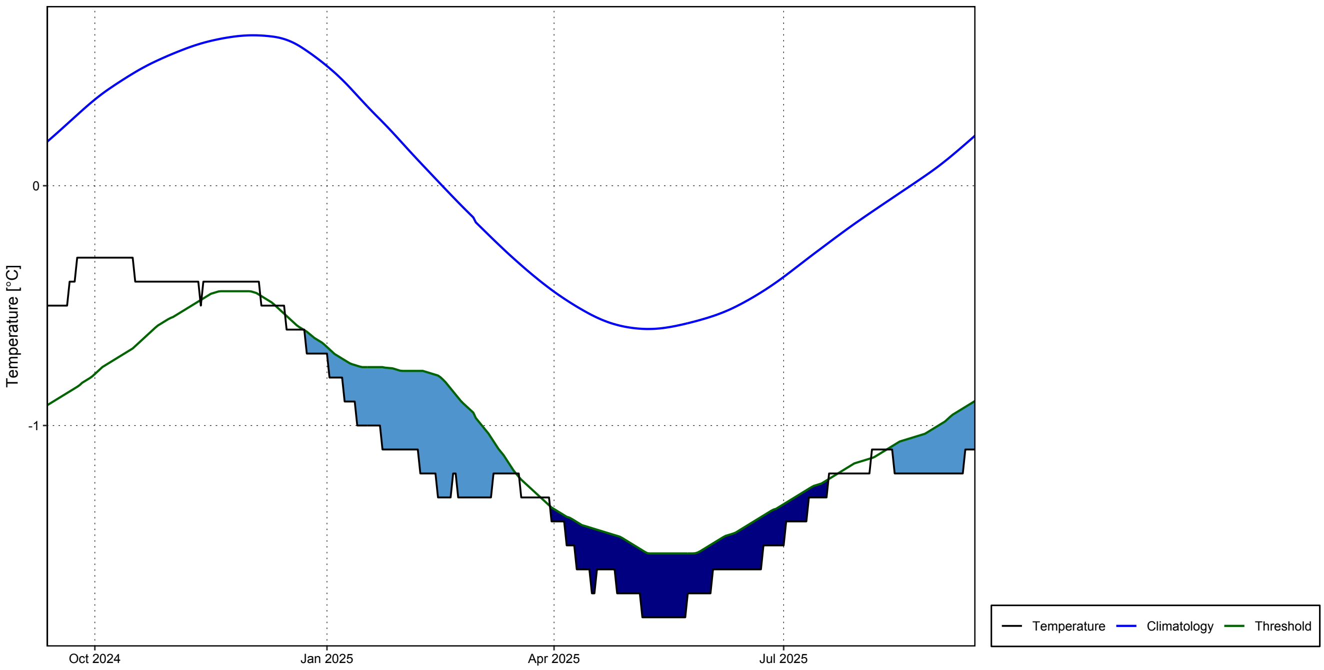


Figure 61: Marine cold spells based on detrended GLORYS12V1 bottom temperature from October 2024 though October 2025 in the Gulf of Maine. Cold spells defined by events where observered temperature (black) exceeds a threshold (green) based on the climatology (blue). Blue shaded areas show the cold spell events with the largest event in dark blue.

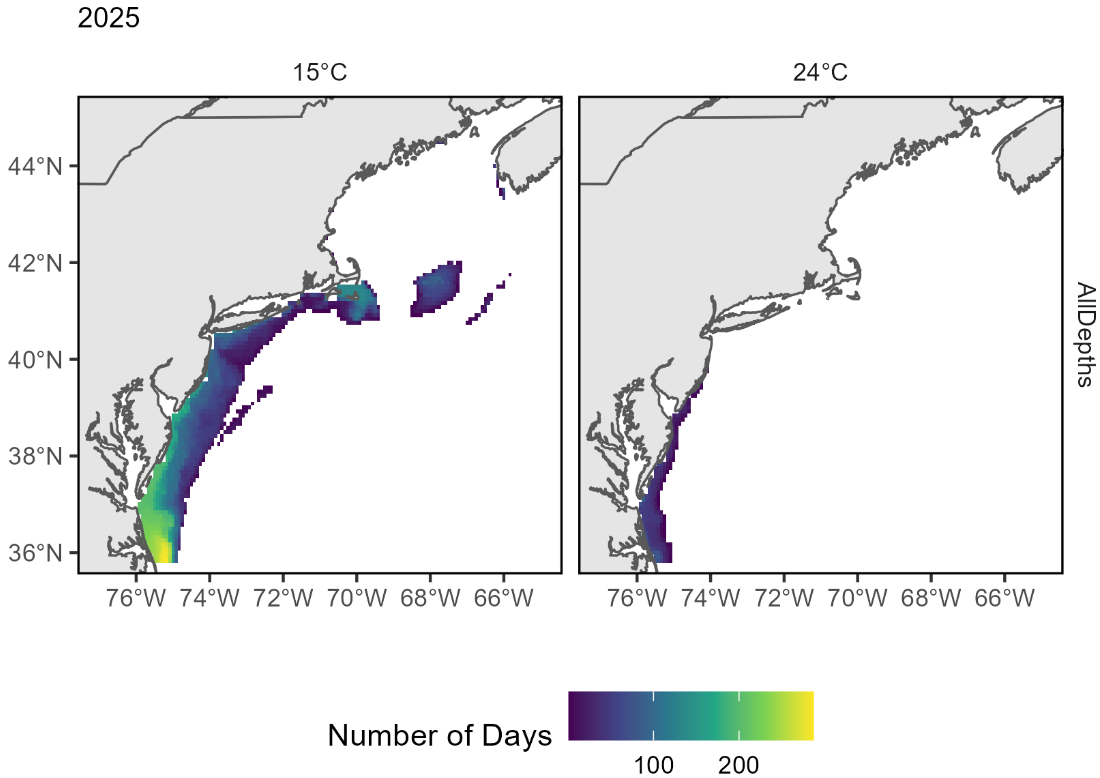


Figure 62: The number of days in 2025 where bottom temperature exceeds 15 degrees (left) and 24 degrees (right) based on the GLORYS 1/12 degree grid.

The newly-developed advection index (Fig. 63) shows total transport of water onto and off the continental shelf and can be linked to the survival of early life stages of fish and invertebrates. Long-term trends in New England show increased onshelf movement of mid-layer and bottom waters in June, which could increase retention of some species. Further study is needed on the species level to link spawning timing and larval periods to the advection index at the corresponding depth and month.

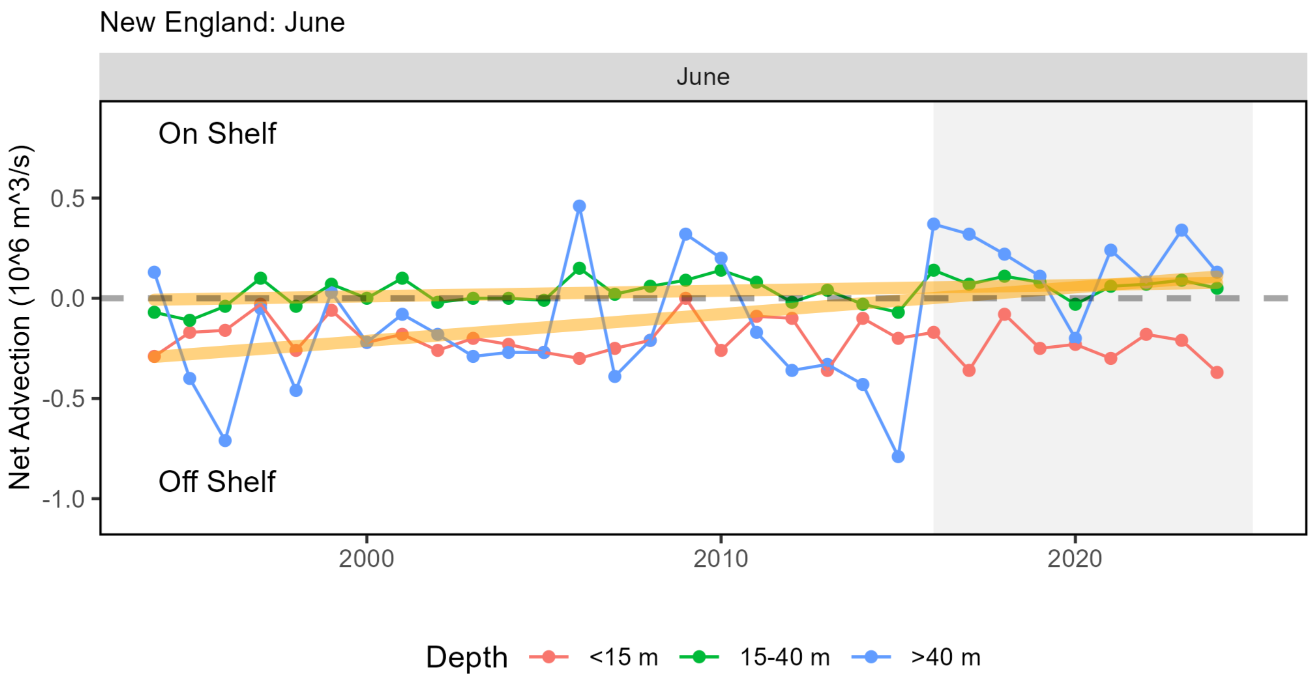


Figure 63: Net advection in June across the Southern New England and Georges Bank continental shelf break within 3 depth bands, with increasing long-term trends in the middle and bottom depths (orange).

Ocean acidification (OA) risks vary among species and include reduced survival, growth, reproduction, and productivity,reached record levels in 2024, though were moderated in 2025 (Fig. 64). Atlantic sea scallop and longfin squid faced high OA risk in Long Island Sound and the New Jersey shelf during the summers of 2016, 2018, 2019, 2023, and 2024, with 2024 marking the highest risk recorded since 2007. By 2025, risk levels decreased but still exceeded biological sensitivity limits for scallops on the New Jersey outer shelf in spring and reached sensitivity limits for longfin squid in nearshore New Jersey waters during summer. These risks are heightened by cold-water CO_2 absorption and the movement of high-CO_2 water masses. While 2025 bottom temperatures remained as cool as 2024, higher salinity indicated a shift in water mass composition that resulted in lower overall OA risk compared to the previous two years.

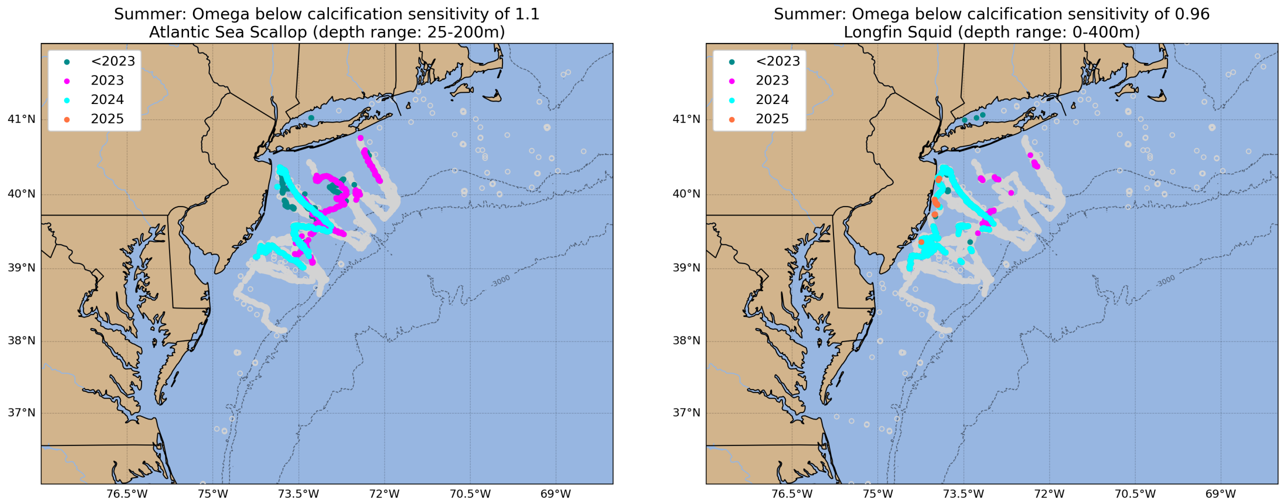


Figure 64: Locations where bottom aragonite saturation state (Ω_{Arag}; summer only: June-August) were at or below the laboratory-derived sensitivity level for Atlantic sea scallop (left panel) and longfin squid (right panel) for the time periods 2007-2022 (dark cyan), 2023 only (magenta) and 2024 only (cyan). Gray circles indicate locations where bottom Ω_{Arag} values were above the species specific sensitivity values.

Biological and oceanographic processes can affect the amount of oxygen present in the water column. During low oxygen (hypoxic) events, species' growth is negatively affected and very low oxygen can result in mortality. In 2025, aggregated demersal DO observations collected by a variety of programs were examined simultaneously. These programs include glider deployments, fishery-independent surveys, and cooperative ocean observing efforts aboard commercial fishing vessels. Coastal hypoxia was observed in Narragansett Bay in September and October where water temperatures were warm and stagnant. There were no reports of mass mortality events from the fishing industry. The duration and extent of hypoxic events is being monitored, but long-term shelf-wide observations are not yet available. However, hypoxic events were detected in Cape Cod Bay in 2019 and 2020 and off the coast of New Jersey in 2023 and were potentially responsible for fish, lobster, and crab mortalities.

Drivers: Predation The abundance and distribution of predators can affect both the productivity and mortality rates on managed stocks. Predators can consume managed species or compete for the same resources resulting in increased natural mortality or declining productivity, respectively. The northeast shift in some highly cetacean migratory species (Fig. 35) indicates a change in the overlap between predators and prey. Managed fishes also act as predators on other managed species. Since we also observe distribution shifts in both managed and forage species, the effect of changing predator distributions alone is difficult to quantify.

Gray seals are fish predators with increasing populations in New England. Recent white shark aggregations have been observed near Cape Cod, however, both gray seals and white sharks are broad generalist feeders that do not generally target commercially-sized managed species. Stock status is mixed for Atlantic Highly Migratory Species (HMS) stocks (including sharks, swordfish, billfish, and tunas) occurring throughout the Northeast U.S. shelf. While there are several HMS species considered to be overfished or that have unknown stock status, the population status for some managed Atlantic sharks and tunas is at or above the biomass target, suggesting the potential for robust (or rebuilt) predator populations among these managed species. Stable predator populations suggest stable predation pressure on managed species, but increasing predator populations may reflect increasing predation pressure.

Future Considerations The processes that control fish productivity and mortality are dynamic, complex, and the result of the interactions between multiple system drivers. Fishing effects could impact fish productivity, although we do not explore those connections at this time. There is a real risk that short-term predictions in assessments and rebuilding plans that assume unchanging underlying conditions will not be as effective, given the observed ecological and environmental process changes documented throughout the report. Assumptions for species' growth, reproduction, and natural mortality should continue to be evaluated for individual species. With observations of system-wide productivity shifts of multiple managed stocks, more research is needed to determine whether regime shifts or ecosystem reorganization are occurring, and how this should be incorporated into management.

Other Ocean Uses: Offshore Wind

Offshore wind development is active and dynamic throughout the region. The following section reflects the status of projects as of the end of January 2026.

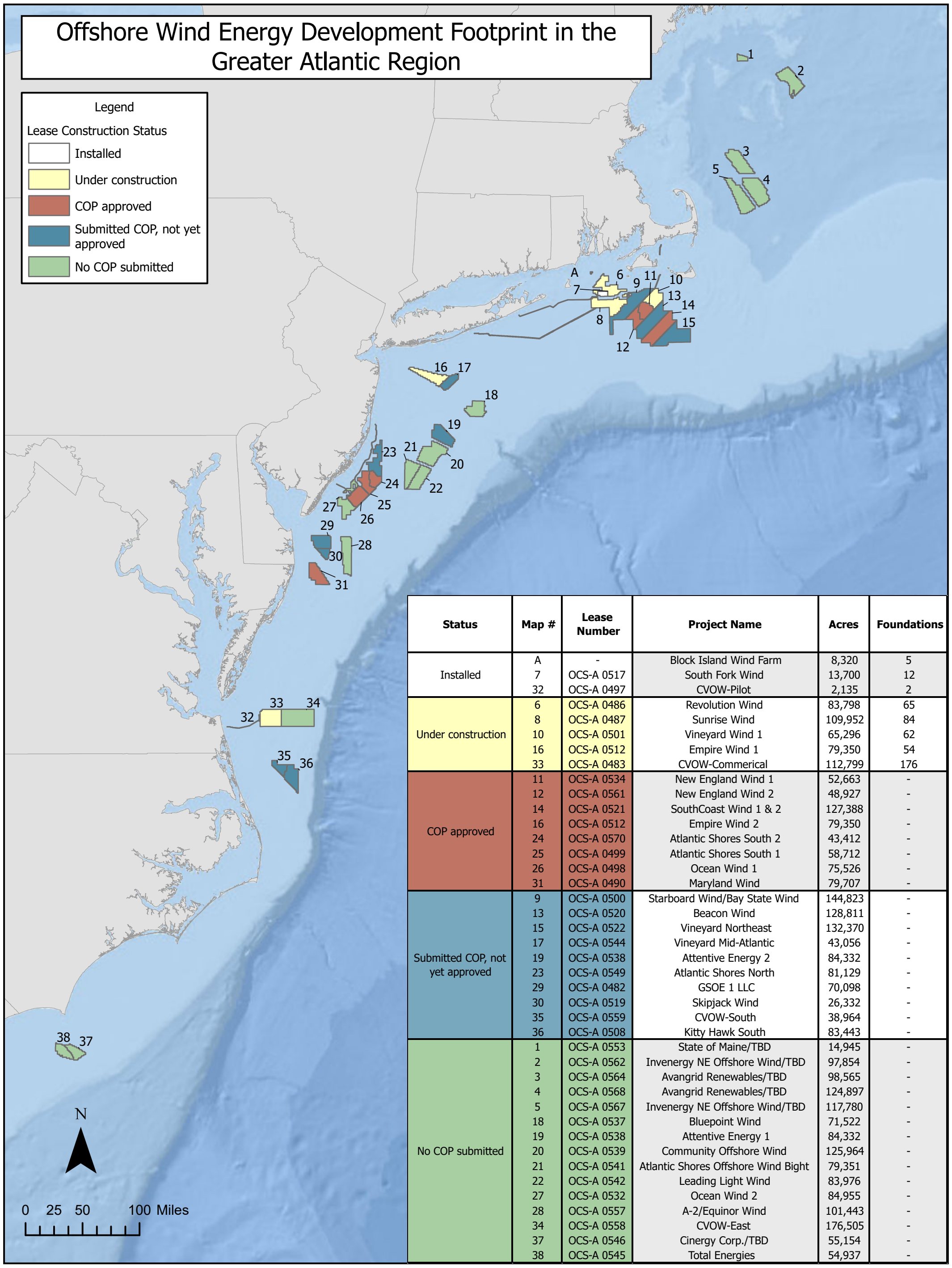
Indicators: development timeline, revenue in lease areas, coastal community vulnerability

Offshore wind indicators are used to quantify the influence of offshore wind on fisheries and ecosystems. They are based on BOEM's Offshore Renewable Activities page and projects' Final Environmental Impact Statements. In 2025, Presidential Memorandum 90 FR 8363 removed existing planning areas and excluded the establishment of additional lease areas.

As of January 2026, 38 offshore wind development leases are under different stages of development in the Northeast (Fig. 65). One project (South Fork Wind Farm) is fully operational and another (Vineyard Wind 1) is partially operational while construction finishes. The southern New England region has two other projects currently under construction (Revolution Wind and Sunrise Wind). Empire Wind and Coastal Virginia Offshore Wind (CVOW) are currently under construction in the New York Bight and Mid-Atlantic Region, respectively, with CVOW expected to start generating power in early 2026.

Construction of these projects during 2025 affected fisheries managed by the New England Fishery Management Council. There are eight additional projects that have Construction and Operations Plan (COP) approvals (three in Southern New England and five in the Mid-Atlantic/New York Bight) that could begin construction in 2026, however, construction schedules are highly uncertain at this time. Seven additional projects have submitted COPs and are pending approval, while the remaining projects are under the site assessment phase and have not submitted COPs to date (Fig. 65).

With the first offshore wind energy projects now under construction and operation, all indicator analyses in this section follow a different reporting format than in previous years. Where previous years reported data for all lease areas, this year we investigate impacts of the six commercial scale projects currently under construction or operation, (i.e., Active Projects: South Fork Wind Farm, Revolution Wind, Sunrise Wind, Empire Wind 1, Vineyard Wind 1, and CVOW-Commercial).



Status	Map #	Lease Number	Project Name	Acres	Foundations
Installed	A	-	Block Island Wind Farm	8,320	5
	7	OCS-A 0517	South Fork Wind	13,700	12
	32	OCS-A 0497	CVOW-Pilot	2,135	2
Under construction	6	OCS-A 0486	Revolution Wind	83,798	65
	8	OCS-A 0487	Sunrise Wind	109,952	84
	10	OCS-A 0501	Vineyard Wind 1	65,296	62
	16	OCS-A 0512	Empire Wind 1	79,350	54
	33	OCS-A 0483	CVOW-Commerical	112,799	176
COP approved	11	OCS-A 0534	New England Wind 1	52,663	-
	12	OCS-A 0561	New England Wind 2	48,927	-
	14	OCS-A 0521	SouthCoast Wind 1 & 2	127,388	-
	16	OCS-A 0512	Empire Wind 2	79,350	-
	24	OCS-A 0570	Atlantic Shores South 2	43,412	-
	25	OCS-A 0499	Atlantic Shores South 1	58,712	-
	26	OCS-A 0498	Ocean Wind 1	75,526	-
	31	OCS-A 0490	Maryland Wind	79,707	-
Submitted COP, not yet approved	9	OCS-A 0500	Starboard Wind/Bay State Wind	144,823	-
	13	OCS-A 0520	Beacon Wind	128,811	-
	15	OCS-A 0522	Vineyard Northeast	132,370	-
	17	OCS-A 0544	Vineyard Mid-Atlantic	43,056	-
	19	OCS-A 0538	Attentive Energy 2	84,332	-
	23	OCS-A 0549	Atlantic Shores North	81,129	-
	29	OCS-A 0482	GSOE 1 LLC	70,098	-
	30	OCS-A 0519	Skipjack Wind	26,332	-
	35	OCS-A 0559	CVOW-South	38,964	-
	36	OCS-A 0508	Kitty Hawk South	83,443	-
No COP submitted	1	OCS-A 0553	State of Maine/TBD	14,945	-
	2	OCS-A 0562	Invenergy NE Offshore Wind/TBD	97,854	-
	3	OCS-A 0564	Avangrid Renewables/TBD	98,565	-
	4	OCS-A 0568	Avangrid Renewables/TBD	124,897	-
	5	OCS-A 0567	Invenergy NE Offshore Wind/TBD	117,780	-
	18	OCS-A 0537	Bluepoint Wind	71,522	-
	19	OCS-A 0538	Attentive Energy 1	84,332	-
	20	OCS-A 0539	Community Offshore Wind	125,964	-
	21	OCS-A 0541	Atlantic Shores Offshore Wind Bight	79,351	-
	22	OCS-A 0542	Leading Light Wind	83,976	-
	27	OCS-A 0532	Ocean Wind 2	84,955	-
	28	OCS-A 0557	A-2/Equinor Wind	101,443	-
	34	OCS-A 0558	CVOW-East	176,505	-
	37	OCS-A 0546	Cinergy Corp./TBD	55,154	-
	38	OCS-A 0545	Total Energies	54,937	-

Figure 65: All Northeast wind energy lease areas, colored by lease construction status.

Offshore wind indicators are based on federal logbook data and do not include all data for all fisheries; therefore a complete evaluation of potential offshore wind energy development impacts would need to be supplemented by other data sources. For further information on the utility of the data, see the socioeconomic impacts of offshore wind development data reports page.

Based on federal vessel logbook data, commercial fishery revenue from trips within Active Projects varied annually from 2008-2024. Maximum annual revenue for the fisheries with the most overlap with Active Projects peaked at over $8.7 million for the sea scallop fishery, $1.1 million for monkfish, $477,000 for skates, $377,000 for yellowtail flounder, and $344,000 for Atlantic herring (Fig. 66). Individual groundfish species are more affected on a percentage basis, with up to 13% of historical annual revenues overlapping with Active Projects for species such as little skate (13%), barndoor skate (11%), yellowtail flounder (10%), and 6% each for red hake, clearnose skate, and winter skate, respectively (Table 7). Future fishery resource overlap with wind leases, especially scallops, may change due to species distribution shifts attributable to climate change and recruitment and larval dispersion pattern changes caused by hydrodynamic flow disruptions from turbine foundations, which could also affect fishery landings/revenue.

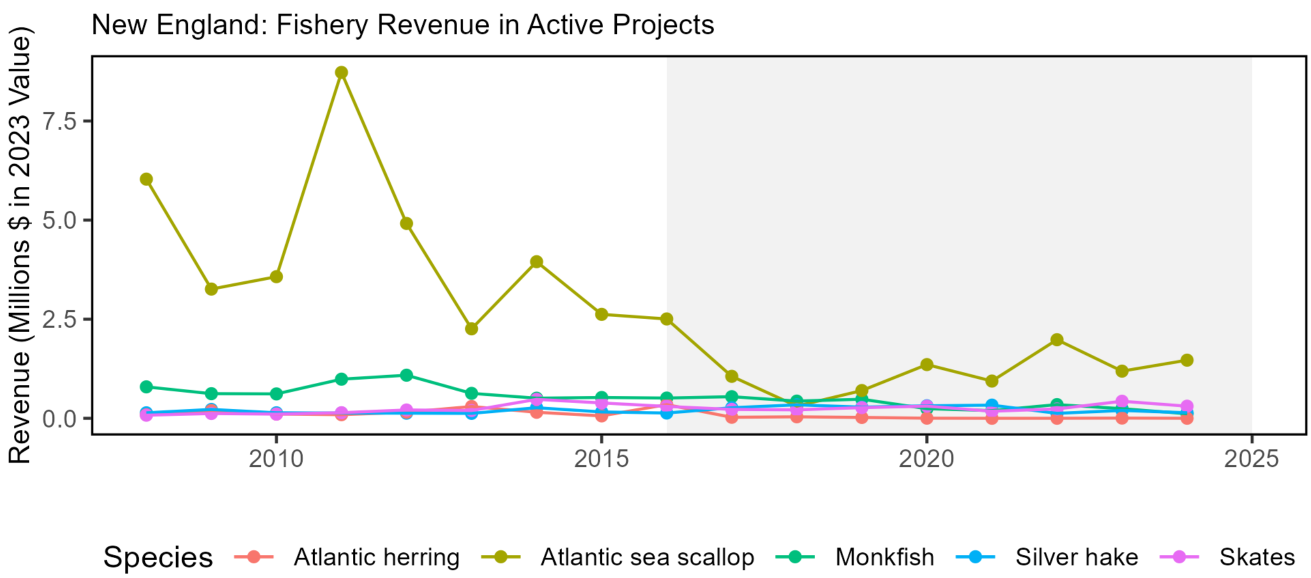


Figure 66: Revenue of species managed by the New England Fishery Management Council within existing offshore wind lease areas, with significant long-term declines (purple) in Atlantic sea scallop, Atlantic herring, monkfish, and silver hake.

Table 7: Top 10 New England managed species Landings and Revenue from Active Projects. *Less than a maximum of 50,000 lb was reported landed annually in wind energy lease areas for these species.

NEFMC, MAFMC, and ASMFC Managed Species	Maximum Percent Total Annual Regional Species Landings	Maximum Percent Total Annual Regional Species Revenue
Little Skate	7.42	12.94
Barndoor Skate*	11.45	11.07
Yellowtail Flounder	9.01	9.61
Winter Skate	6.39	6.05
Clearnose Skate	5.21	5.82
Red Hake	8.64	5.57
Smooth Skate*	9.31	5.04
Monkfish	4.66	3.23
Winter Flounder	3.14	3.23
Windowpane Flounder*	3.07	2.66

The socio-demographic conditions, and resultant vulnerabilities, of some communities may further exacerbate the impacts of offshore wind development in the Northeast such that the impacts of offshore wind development are expected to differentially impact specific coastal communities (Fig. 67)

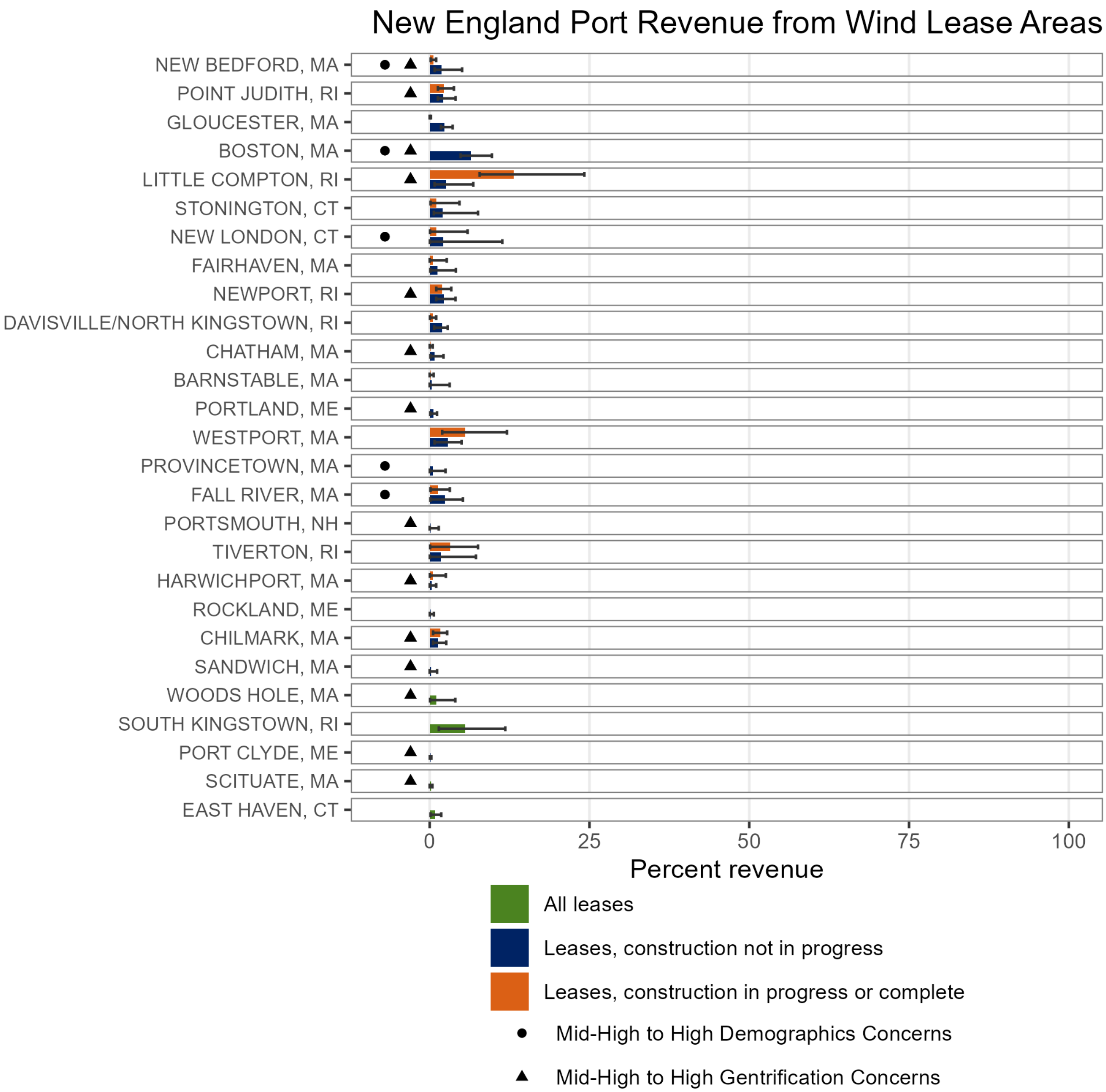


Figure 67: Percent of New England port fisheries revenue from wind lease areas from all leases (green), leases not under construction (blue), and active leases (orange).

Based on federal vessel logbook data, Little Compton, RI (13% average and 24% maximum) and Westport, MA (6% average and 12% maximum) have the highest potential revenue loss from Active Projects based on 2008-2024 total port fisheries revenue, with all other New England communities having less than 5% (Fig. 67). Additional fishing revenue may be affected as more areas historically used for fishing are developed for offshore wind energy. In response to Council request, we also present information on the Mid-Atlantic ports that land NEFMC-managed species within the wind lease areas. This information can help fisheries managers better understand how NEFMC-managed species may be more broadly affected by offshore wind development. Seven Mid-Atlantic ports attribute the majority of their landings within the wind lease areas to NEFMC-managed species (Fig. 68); note that overall, the Active Projects account for less than 17% of total revenue in these ports. Future analyses should also consider that the impacts of offshore wind development may unevenly affect individual operators, with some permit holders deriving a much higher proportion of revenue from wind areas than the port-based mean.

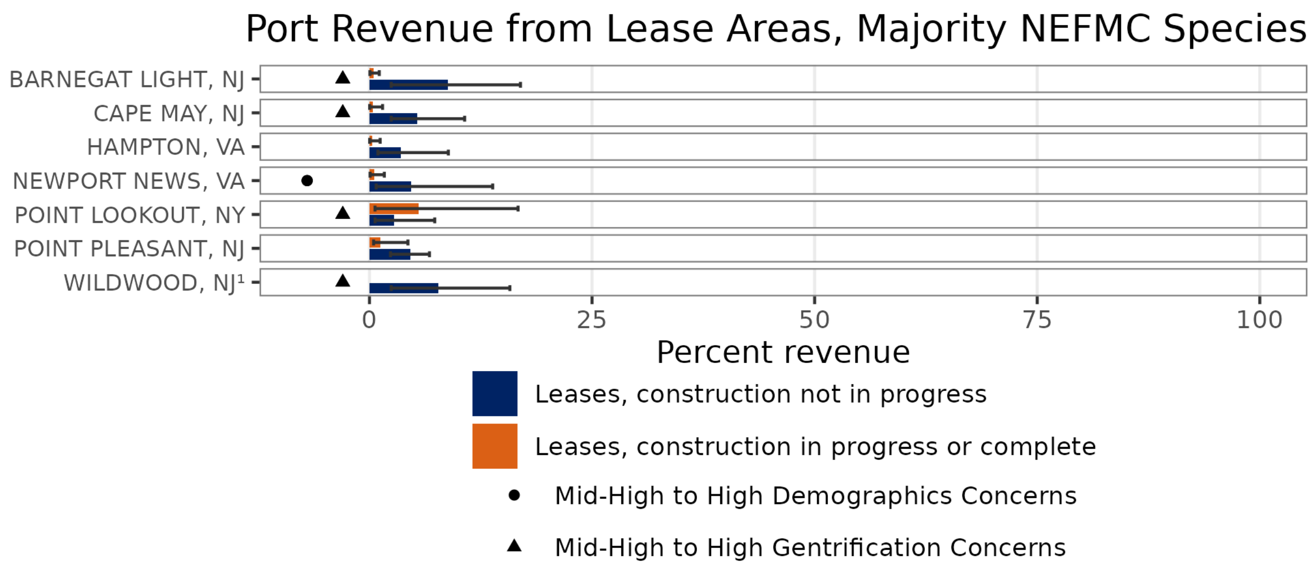


Figure 68: Percent of port revenue from wind lease areas for Mid-Atlantic ports that land a majority of New England Fishery Management Council-managed species within the wind lease areas. Percent of revenue is shown for leases not under construction (blue) and active leases (orange).

BOEM reports that cumulative offshore wind development (if all proposed projects are developed) could have moderate impacts on low-income members of vulnerable communities who work in the commercial fishing and for-hire fishing industry due to disruptions to fish populations, restrictions on navigation, and increased vessel traffic as well as exacerbation of existing vulnerabilities of low-income workers to economic impacts.

Top fishing communities with high socio-demographic and/or gentrification concerns such as Little Compton, RI, New Bedford, MA and New London, CT should be recognized as having potential additional vulnerability of the Active Projects and considered in decision making to reduce the social and economic impacts and aid in the resilience and adaptive capacity of these communities. In addition to fisheries landing overlaps, New Bedford, MA and New London, CT also support significant offshore wind port infrastructure needs for the Active Projects. Historically, the introduction of new industries can trigger industrial and socioeconomic gentrification of fishing ports. Competition for port space and potential pivoting of space use for offshore wind development should be monitored closely to ensure fishing communities are not adversely impacted. Additionally, offshore wind could increase recreational fishing opportunities at the turbines, potentially creating a demand for additional tourism, recreational fishing and boating port space in communities already balancing these uses with commercial fishing infrastructure, for example Point Judith, RI, and Newport, RI, and Gloucester, MA. Socio-demographic concerns also highlight communities where further resources are needed to reach underserved and underrepresented groups and create opportunities for, and directly involve, these groups in the decision-making process.

Implications

Current plans for buildout of offshore wind in a patchwork of areas spreads the impacts differentially throughout the region (Fig. 65). Up to 13% of total average revenue for major New England commercial species in lease areas could be forgone or reduced and associated effort displaced if all sites are developed. Displaced fishing effort can alter fishing area, timing, and method patterns, which can in turn change habitat, species (managed and protected), and fleet interactions. Several factors, including fishery regulations, fishery availability, and user conflicts affect where, when, and how fishing effort may be displaced, along with impacts to and responses of affected fish species.

Proposed wind development areas interact with the region's federal scientific surveys. Scientific surveys are impacted by offshore wind in four ways: 1. Exclusion of NOAA Fisheries' sampling platforms from the wind development area due to operational and safety limitations. 2. Impacts on the random-stratified statistical design that is the basis for scientific assessments, advice, and analyses. 3. Alteration of benthic and pelagic habitats, and airspace in and around the wind energy development, requiring new designs and methods to sample new habitats. 4. Reduced sampling productivity through navigation impacts of wind energy infrastructure on aerial and vessel survey operations.

Increased vessel transit between stations may decrease data collections that are already limited by annual days-at-sea day allocations. In the Northeast region, 14 NEFSC surveys overlap with offshore wind development projects at varying capacities, with each of the 38 existing lease areas overlapping between 4-14 surveys. The Active Projects overlap between 10-12 surveys. Implementation of the region-wide survey mitigation program is underway with requirements to mitigate impacts to surveys included as a condition of most project approvals.

Planned development overlaps NARW mother and calf migration corridors and a significant foraging habitat that is used throughout the year (Fig. 69). Turbine presence and extraction of energy from the system could alter local oceanography and may affect right whale prey availability. For example, persistent foraging hotspots of right whales and seabirds overlap on Nantucket Shoals, where unique hydrography aggregates enhanced prey densities. Wind leases (OCS-A 0521 and OCS-A 0522) currently intersect these hotspots on the southwestern corner of Nantucket Shoals and a prominent tidal front associated with invertebrate prey swarms important to seabirds and possibly right whales. Proposed wind development areas also bring increased vessel strike risk from construction and operation vessels. In addition, there are a number of potential impacts to whales from pile driving and operational noise such as displacement, increased levels of communication masking, and elevated stress hormones.

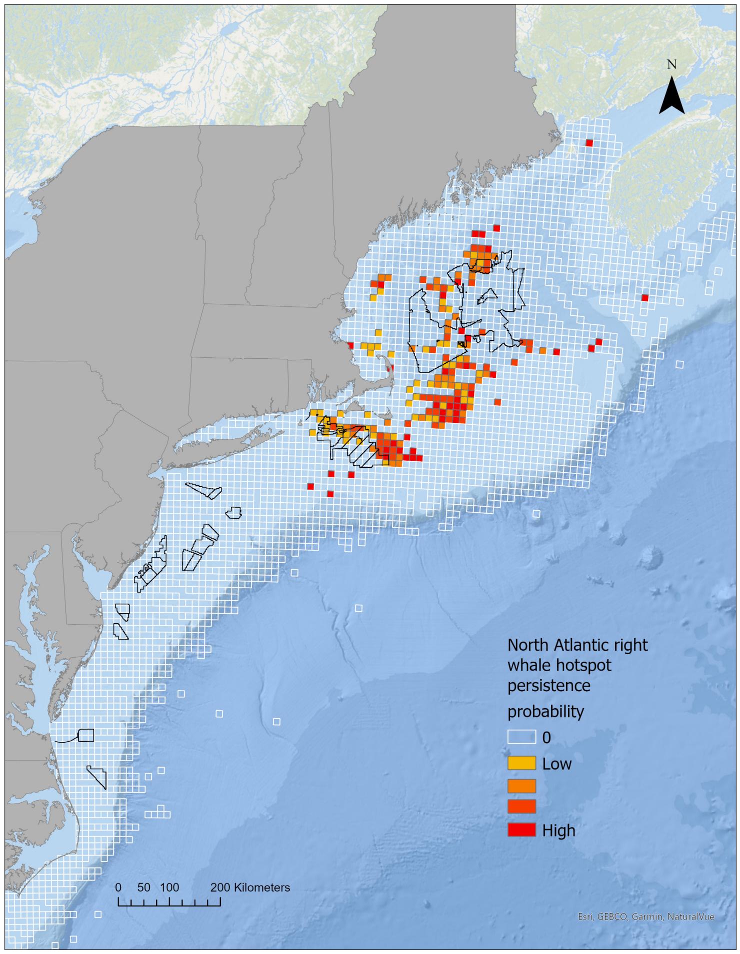


Figure 69: North Atlantic Right Whale persistent hotspots (red shading) and wind lease areas (black outlines).

The increase of offshore wind development can have both positive (e.g., employment opportunities) and negative (e.g., space-use conflicts) effects. Continued increase in coastal development and gentrification pressure has resulted in loss of fishing infrastructure space within ports. Understanding these existing pressures can allow for avoiding and mitigating negative impacts to our shore support industry and communities dependent on fishing. Some of the communities with the highest fisheries revenue overlap with offshore wind development areas that are also vulnerable to gentrification pressure are Point Judith and Newport, RI; and Boston and New Bedford, MA.

Marine Aquaculture Aquaculture fisheries and federally-managed fisheries could compete with or benefit each other with spatial access, shoreside infrastructure, or the supply of seafood. Unlike offshore wind, offshore aquaculture is not regulated by any federal leasing program but is permitted via the U.S. Army Corps of Engineers and the U.S. EPA. Currently, there are no federally-permitted aquaculture projects in the Northeast U.S. The marine aquaculture industry of the Northeast currently occurs in nearshore waters which are regulated by state leasing and permitting processes and federal permitting processes, as applicable. Analyses are needed to quantify the nearshore spatial distribution of aquaculture in the Northeast.

2025 Highlights

This section intends to provide a record of noteworthy observations reported in 2025 across the Northeast U.S. region. The full ecosystem and fisheries impacts of many of these observations are still to be determined. They should, however, be noted and considered in future analyses and management decisions.

The Northeast U.S. region experienced colder than average ocean temperatures, despite record warm global ocean and air temperatures. Similar to 2024, oceanographic and ecological conditions reflected cooler water and changing species abundance, distribution, and timing.

Northwest Atlantic Phenomena The below average temperatures observed in 2024 persisted into 2025, although there are seasonal and local exceptions to this pattern. Anomalously cold surface conditions (Fig. 70) were recorded throughout the Northeast Shelf and were widespread across the Slope Sea for much of the year, however the waters were not as fresh as recorded in 2024. Winter bottom temperatures were also below average across much of the Northeast Shelf (Fig. 70). Multiple oceanographic and atmospheric factors can contribute to these cooler conditions including a more southerly Gulf Stream and higher proportions of Labrador Slope and Scotian Shelf water entering the system.

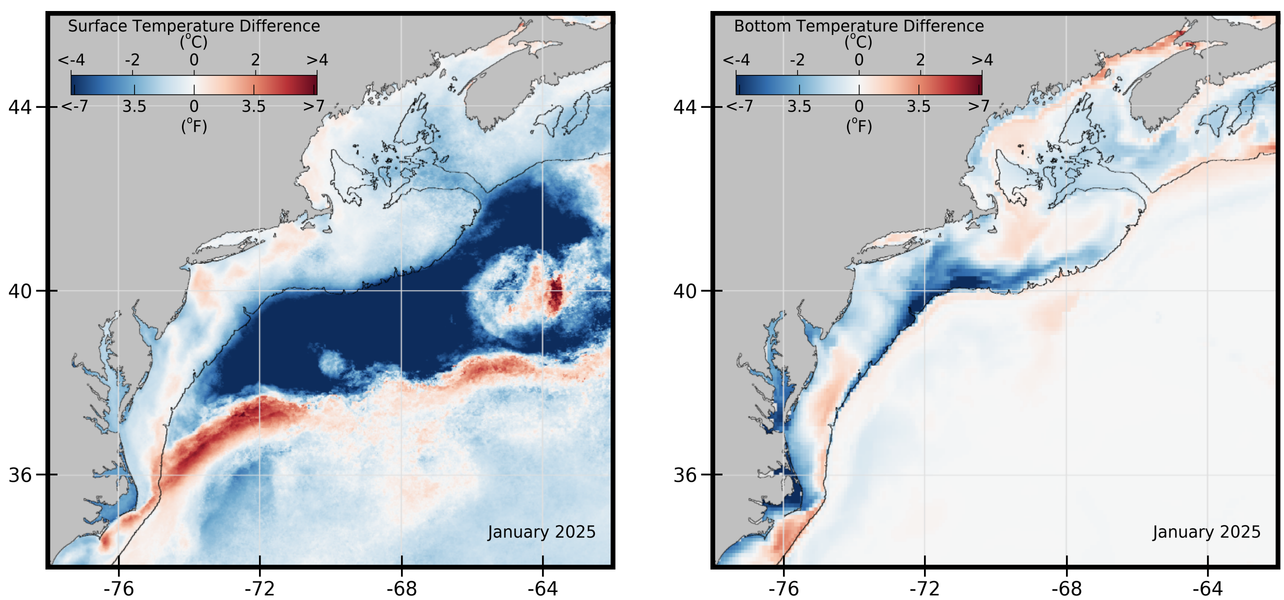


Figure 70: January 2025 sea surface (left) and bottom (right) temperature differences compared to the January climatological means. Sea Surface Temperature (SST) is from the NOAA Advanced Clear-Sky Processor for Ocean (ACSPO) Super-collated SST (climatology range 2000-2020); Bottom temperature is from the GLORYS reanalysis model (climatological range 1990-2020).

In 2024, the Gulf of Maine source water entering through the Northeast Channel was near equal proportions of Warm Slope Water and cooler Labrador Slope Water (Fig. 71); data are still being processed for 2025. The colder conditions observed in 2024 continued into 2025 and contributed to the increased size and colder temperatures of the Mid-Atlantic Cold Pool.

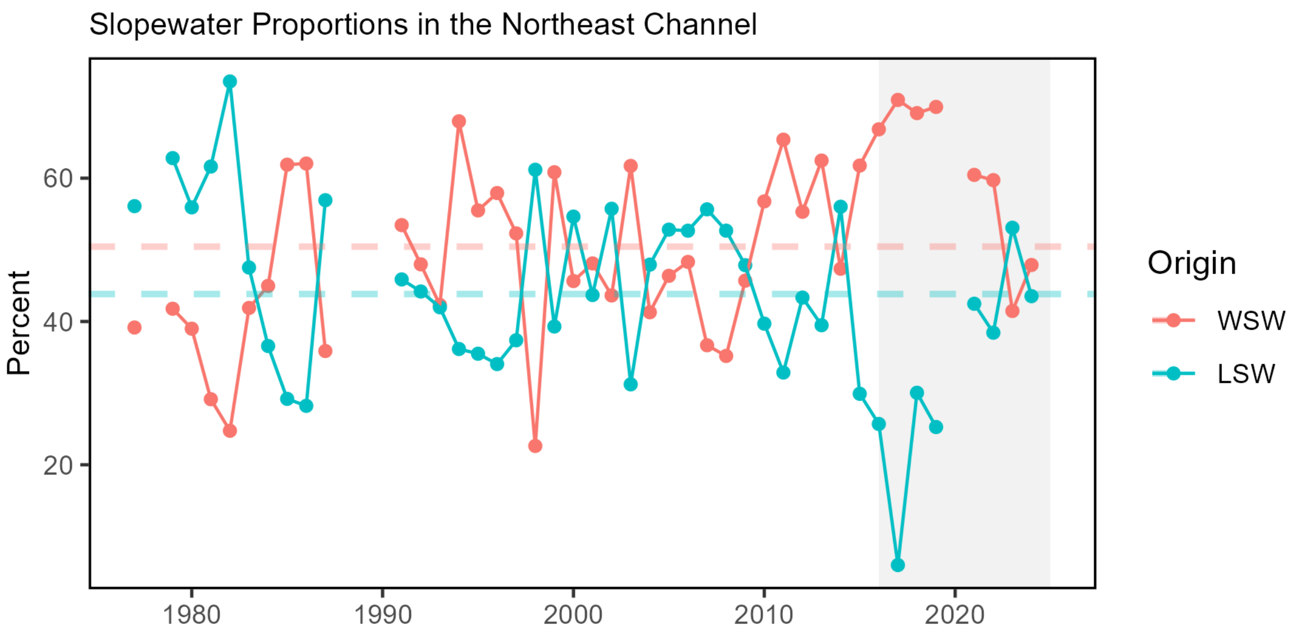


Figure 71: The proportion of Warm Slope Water (WSW) and Labrador Slope Water (LSW) entering the Gulf of Maine through the Northeast Channel from 1977 to 2024. The red and teal dashed lines represent the long-term proportion averages for the WSW and LSW respectively.

2025 total primary production was below average in Georges Bank and the Mid-Atlantic due to lower phytoplankton biomass and cooler sea surface temperatures. Phytoplankton biomass (shown as chlorophyll a concentration) was also below average for much of 2025 (Fig. 72). In particular, the winter-spring bloom period, which typically accounts for a significant proportion of total annual phytoplankton production, was shorter in duration and lower in magnitude across the entire Northeast shelf region. The fall bloom period was above average in the Gulf of Maine and Georges Bank, but near average in the Mid-Atlantic.

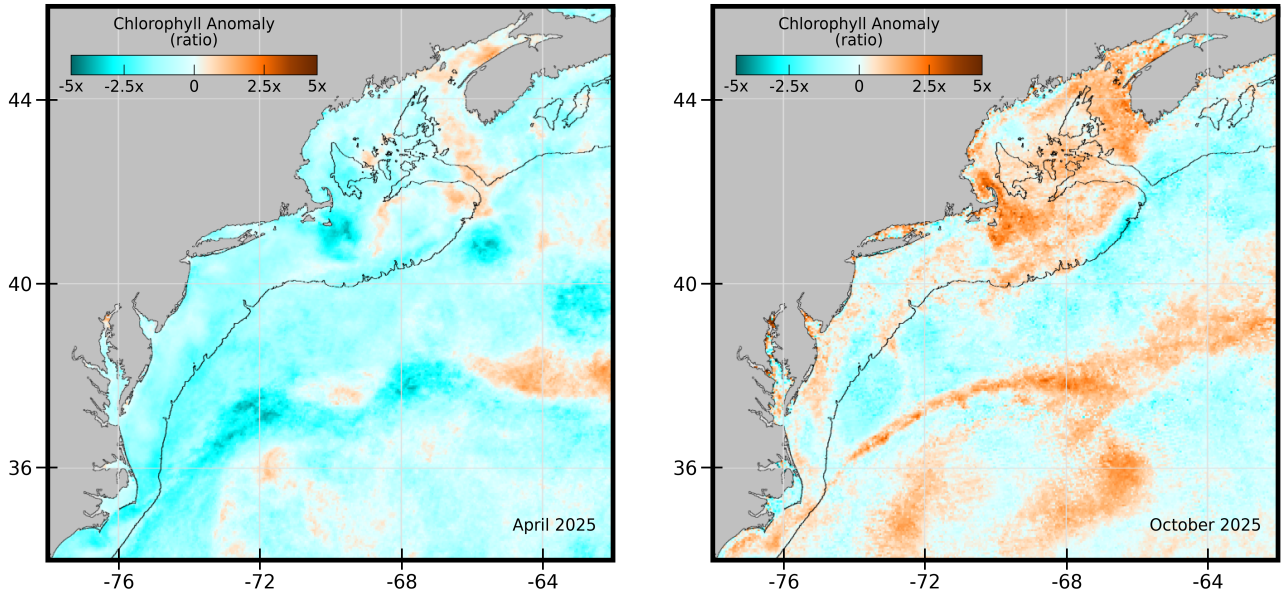


Figure 72: Chlorophyll anomalies shown as the ratio of the monthly concentration compared to the climatological mean (1998-2020) for April (left) and October (right), 2025.

Hurricane Erin was the most notable storm in the region in 2025 and caused significant shoreside and oceanographic disturbances despite not making landfall in the Northeast. Its strong winds and large size caused mixing and weakened stratification throughout the Mid-Atlantic resulting in cooler than average surface waters across the shelf and into the Slope Sea. Along the coast, beaches from Maryland to Maine were closed due to rough surf, large waves, and rip currents, while coastal flooding led to road closures and several water rescues, particularly in New Jersey. Beach erosion was significant in some locations.

Northeast Shelf and Local Phenomena The shift to cooler waters in 2024-2025 is likely linked to multiple observations across the Northeast Shelf including the uncommon presence of Arctic zooplankton species in the Gulf of Maine, delayed migration of many species, and redistribution of some species. These shifts could affect the availability of some species to surveys or fishing, although aggregate species distributions in the cooler 2024-2025 period are tracking on the long-term trend towards northward and deeper waters (Fig. 34).

Mid-Atlantic scallops in the Elephant Trunk region are showing positive signs following the documented die-off. Two-year olds observed in 2024 had good survival into the 2025 survey. The Elephant Trunk region is scheduled to reopen in 2026. There was also good survival of the 2024 recruits in the southeastern Nantucket Lightship Area in 2025. In contrast, large numbers of the scallop predator *Asterias vulgaris* sea stars were linked to an increased sea scallop mortality in 2024 and 2025 on Georges Bank.

Several members of the fishing community noted changes in species composition, distribution, and timing in their typical fishing grounds and attributed it to the cooler temperatures. These observations may not fully represent the entire ecosystem, but provide local context to recent events that may not be represented in other indicators. Some notable examples include:

- Several members of the fishing industry reported that it was a "very good year" for billfish. According to the Large Pelagic Survey, it was a record year for white marlin with more than 23,000 fish caught and released. Billfish effort may have been higher than usual due to the closure of the recreational bluefin tuna fishery in August 2025.
- Chesapeake Bay anglers reported good catch of red drum in 2024, followed by low catch and even cold stunned red drum and spotted sea trout in 2025. Scientists working with charter captains in Chesapeake Bay reported

low catch rates of striped bass and red drum from June-September, but higher catch rates in the early spring and fall.
- Fishers attributed the delayed migration of black sea bass inshore, and scup migrating south for the winter using similar routes as in the early 1970s due to the cooler temperatures.
- Members of the bluefish fishery in Rhode Island reported very low landings in 2025 attributed to changes in seasonal migration path or timing.
- Some species, such as Atlantic mackerel, Illex squid and sandlance, were observed in higher abundance and wider distributions compared to recent years.
- Fishers in the Gulf of Maine and Georges Bank had mixed reports of lobsters and good catch of sea scallops.
- Fishers reported fewer warm water species in 2025 along the New Jersey coast. Others, however, noted more new species (e.g., pomapano, spadefish, triggerfish, Spanish and king mackerel) in Delaware Bay.
- Anglers also observed low spring and summer catches of gamefish in Mid-Atlantic bays and on the shelf, and high concentrations of shark species near the coast.

In Chesapeake Bay, colder than average winter 2025 temperatures (Fig. 73) were reported by state agencies as a likely cause of higher blue crab mortality rates compared to the previous winter. Colder winters generally indicate good conditions for striped bass spawning, and while the striped bass juvenile index slightly increased, it was still well below the long-term average. Several years of low striped bass recruitment is a growing concern of fisheries managers. Factors that could be influencing striped bass include below average winter-to-spring freshwater flow and above average water temperatures combined with stressfully low dissolved oxygen values during the summer. The continued presence of invasive blue catfish and the effect they are having on blue crab, alosines, menhaden, and striped bass populations is also a management concern.

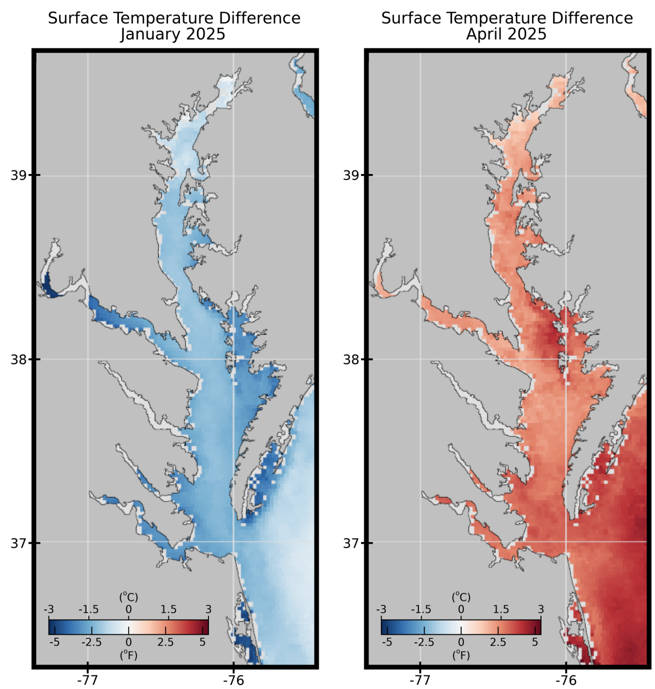


Figure 73: January 2025 (left) and April 2025 (right) sea surface temperature differences compared to the respective monthly climatological means. Sea Surface Temperature (SST) is from the NOAA Advanced Clear-Sky Processor for Ocean (ACSPO) Super-collated SST (climatology range 2000-2020).

Ocean acidification (OA) risk in 2025 in the Mid-Atlantic was relatively low (Fig. 64). Compared to 2023 and 2024, there were only a few locations in 2025 where OA risk was high for Atlantic sea scallops (outer shelf, spring 2025 only), longfin squid (nearshore, summer 2025 only), and pteropods (nearshore and outer shelf, spring and summer).

Gulf of Maine surface OA risk in 2025 was below 2024 levels, as indicated by aragonite saturation state (Ωa) at or near the climatological average (2006-2024).

Offshore Wind Offshore wind projects continue to be developed throughout the region. Information here represents the status as of the end of January 2026. In Southern New England, South Fork Wind Farm remains the first and only commercial scale project under operation (12 turbines), Vineyard Wind 1 and Revolution Wind continued construction, and Sunrise Wind began offshore construction (Fig. 65). In the New York Bight, Empire Wind 1 began offshore construction (Fig. 65). Coastal Virginia Offshore Wind (CVOW) also continued construction in the Mid-Atlantic. All projects currently under construction are anticipated to be complete by the end of 2026. New London, CT and New Bedford, MA have expanded dedicated space and infrastructure for the offshore wind industry with increased port activity for the first projects under construction in southern New England. There are eight additional projects that have Construction and Operations Plan (COP) approvals (three in Southern New England and five in the Mid-Atlantic/New York Bight) that could begin construction in 2026. However, construction schedules are highly uncertain at this time.

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